

ZeroCarbon x Digital: Urban Decarbonization in the post-Covid-19 era

Day 2

Tue, December 15, 2020 [Language: English]

#Japan Time (GMT+9)

Session 1: Integrating renewables with urban energy systems (Chair: T. Kobashi, NIES)

9:00-9:10

Introduction and aims/objectives for the session

Takuro Kobashi, NIES

9:10-9:40

Invited talk: Urban decarbonization and social justice

Dan Kammen, Professor and Director of Renewable and Appropriate Energy Laboratory (RAEL), University of California, Berkeley



Clean energy technologies were long thought to be rural and suburban resources to be fed to urban centers. Several new trends are changing that situation. First the low cost of solar power, and materials science advances in thin-film and transparent solar cells have made on-site generation for better tailored to urban settings. Second, the rapid innovation in energy storage - both for buildings and vehicles -- mean that locally generated and remote power brought in by the transmission system -- can now be available '24/7'. Finally, a focus on the energy needs of minorities, disadvantaged communities, and low-income communities can all be far better served for power and transportation. Indeed, without a focus on low-income communities the social benefits of clean energy are being wasted.

9:40-10:10

Designing resilient district energy systems under uncertainty

Bryn Pickering, Researcher, Department of Environmental Systems Science, Eidgenössische Technische Hochschule Zürich (ETH Zurich)

The need to design resilient energy systems becomes ever more apparent as we continue to decarbonise across all sectors of society. Increasingly, modelling efforts focus on improving system resilience to stochastic variables for which data is increasingly abundant, such as weather and



demand. However, we still fail to consider how supposedly “resilient” system designs will handle the realisation of uncertainty during operation, including exposure to unexpected shocks like grid failure. In this talk, I will present an example of embodying and quantifying resilience in district energy system design, and discuss the challenges that modellers still face in understanding and mitigating against uncertainty.

10:10-10:40

Energy modeling with renewables from a local- to national-scale for decarbonization in Japan

Ryoichi Komiya, Associate Professor, Department of Nuclear Engineering and Management, University of Tokyo



Japan has faced the rapid penetration of solar PV, and specific power service areas actually experience technical difficulty in integrating massive PV into the power grids. For maximization of renewable in energy system, energy planning needs to consider cost, decarbonization and resilience. This presentation discusses desirable power systems and institutions to maximize renewable energy, based on local- and national-scale energy modelling approach and analysis.

10:40-10:50

Coffee break

10:50-11:20

Prospects of blockchain: Still looking for a problem to solve

Amanda Ahl, Digital Industry Analyst, BloombergNEF



Energy is undergoing decarbonization, decentralization, and digitalization. Electricity markets are seeing an increase in distributed energy resources. The complexity that parallels this decentralization has led to a need of improved coordination through digital technologies, with blockchain being a key emerging technology. Blockchain is a digital distributed ledger which has also been referred to as the Internet of Value. It has been used in numerous Proof-of-Concept (PoC) applications such as peer-to-peer power-trading. However, such PoCs still face a series of economic, social, and institutional challenges. This talk will introduce opportunities and key challenges of blockchain in the power sector.

11:20-11:50

P2P energy exchange platform for introducing renewables utilizing EVs and stationary batteries

Kenji Tanaka, Associate Professor, Department of Technology for Innovation, Graduate School of Engineering, The University of Tokyo



When we imagine a coming super city, it should provide many services with IoT devices. In this research, P2P energy exchange platform which is demonstrated in Higashifuji area is introduced as an example. Through blockchain based service platform, IoT devices, such as Electrical Vehicles, Stationary batteries, Renewable generators, business office agents, automatically co-operate and trade their energy based on each economic incentive. Such machine-to-machine service platform may be a good tool for future resource efficient city design.

11:50-12:40

Discussions on the issues of urban decarbonization using renewable energy

Chair: **Takuro Kobashi**, NIES

with presenters

12:40-13:30 **Lunch break**

Session 2: New urban planning approaches for designing future zero carbon cities (Chair: Y. Yamagata, NIES)

13:30-14:00

Data-driven urban systems design

Perry Yang, Associate Professor and Director of Eco Urban Lab, School of City and Regional Planning + School of Architecture, College of Design, Georgia Institute of Technology



The ways how human perceives cities are now both physical and digital. Impacts of mobile devices, the internet of things and pervasive computing to human senses in urban environment are to be further explored. The research integrates physical, performance and experiential modeling to explore how emerging technologies fundamentally change the way human perceives urban environment, and how Urban Systems Design (USD) shapes smart urban environment. It is structured by three

components: 1) A design experiment to produce alternative urban form scenarios; 2) A performance modeling to derive properties of urban systems; 3) A design decision platform using digital twin to visualize design and performance outcomes.

14:00-14:30

Facilitating Data-driven Innovation for Sustainable Smart Cities: Opportunities and Challenges for Tackling Climate Change

Masaru Yarime, Associate Professor, Division of Public Policy, The Hong Kong University of Science and Technology; Honorary Associate Professor, Department of Science, Technology, Engineering and Public Policy, University College London; Visiting Associate Professor, Graduate School of Public Policy, The University of Tokyo

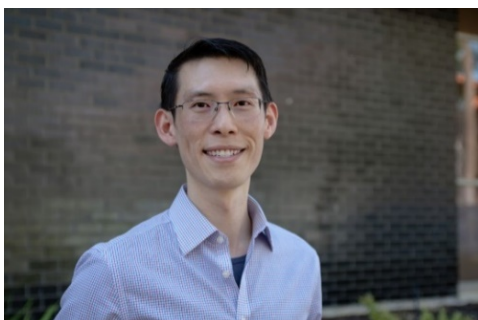


Smart cities play a crucial role in tackling many issues concerning climate change, ranging from increasing energy efficiency and introducing renewable energy sources to maintaining resilience to extreme weather conditions such as floods and typhoons. In facilitating data-driven innovation for sustainable smart cities, effective collection, sharing and usage of data through collaboration among stakeholders would be critical for while addressing concerns about safety, security and privacy and the balance between open and proprietary data. Policy and institutional arrangements for data governance need to incorporate the ability to learn from real-world use and experience and to improve performance through adaptation.

14:30-15:00

Latest developments with decarbonising urban communities in Australia

Kelvin Say, Research Fellow at the Energy Transition Hub, University of Melbourne



As Australia leads the world in behind-the-meter PV, households are significantly reducing their electricity consumption while providing renewable energy to the rest of the electricity system. However, as integration problems begin to emerge, new strategies are being deployed to make the most of household PV generation to further decarbonisation. These include community-scale batteries providing virtual energy storage while alleviating grid constraints, systems that

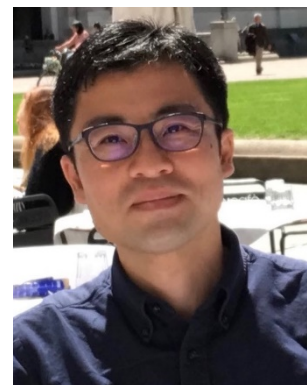
integrate with households within a microgrid to increase the use of renewable energy, to larger-scale community energy projects. Decarbonisation in Australia is continuing to develop as simultaneous transitions at the large- and small-scales.

15:00-15:30

Smart City and Urban Planning Challenges

Akito Murayama, Associate Professor, School of Engineering, The University of Tokyo

Smart city has become one of the important keywords in urban planning in Japan. While smart city is an attractive vision for both urban planners and smart technology specialists, discussion on how urban visions and urban planning institutions should transform has not been conducted so much. The City Planning



Institute of Japan has recently established a Special Committee on Smart City involving academics and practitioners in urban planning, urban development and smart technologies. This presentation presents some of the challenges recognized in the committee including 1)compactness and network, 2)value of real space, 3)relationship between planning and lawless, and 4)governance structure.

15:30-15:50 **Coffee break**

15:50-16:20

Synergies and trade-offs between SDGs and climate actions in cities: Lessons from Japan and the UK

Eric Zusman, Senior Policy Researcher/Area Leader, Institute for Global Environmental Studies (IGES) and Senior Researcher, NIES



The COVID-19 pandemic has demonstrated the disruptive impacts on economies and livelihoods when human activity transgresses planetary boundaries. The climate emergency poses an even greater threat to a sustainable future for similar reasons. This realisation has led city policymakers to contemplate how they can effectively manage the climate emergency and other COVIDf-like threats to sustainability. This presentation will examine synergies and trade-offs between climate and other sustainable development objectives in relevant city plans and policies in Japan and the United Kingdom.

It will also discuss governance arrangements that can align interests to achieve the former and avoid the latter.

16:20-16:40

Financing Asian cities through securitization: Spatial evidence for ESG investing

Jin Murakami, Assistant Professor, Humanities, Arts and Social Sciences (HASS) and Director of Master of Urban Science, Policy and Planning (MUSPP) Program, Singapore University of Technology and Design (SUTD)



Investors who have signed up to environmental, social, and governance (ESG) investment criteria are estimated to manage above US\$45 trillion in assets worldwide. From the huge funding potential, Asian cities would be encouraged to attract ESG investors by promoting some kinds of land marketization and asset securitization along with public policy programs. This talk suggests the importance of developing more systemic asset profiles and appropriate safeguard measures (e.g., evidence-based new land use and urban design codes, green building and smart mobility requirements, portfolio diversification strategies) against global risks, including pandemic threats.

16:40-17:30

Panel discussions on the international project proposals on the post-COVID-

19 Digital Society & Zero Carbon City

Co-Chairs: **Yoshiki Yamagata**, NIES & **Eric Zusman**, IGES

Panelists:

Kei Hiroi, Associate Professor, Disaster Prevention Research Institute, Kyoto University



Giles Sioen, Research Associate, NIES and co-lead, Future Earth Research and Innovation



Sustainability with Cities through Research and Innovation

Climate change is projected to increase the intensity and number of extreme events around the world. Cities, with more than half of the world's population, have the potential to lead the decarbonization efforts. Co-design processes that help to ensure adoption of research and innovation efforts with the potential of creating systemic change will be at the heart of this change.