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5th International Workshop on Clean Energy Development in Asian Cities: Report

1. Background:

Cities throughout Asia have experienced an unprecedented economic development over the past decades. In many cases, this has contributed to their rapid and uncontrolled growth, and has resulted in multiple problems, which include a rapid population increase, enhanced environmental pollution, collapsing traffic systems, dysfunctional waste management, as well as a rapid increase in the consumption of energy, water, and other resources. The twin challenges of global climate change and energy insecurity in Asian cities can only be solved with rapid devising of clean energy strategies, both for energy supply and energy efficiency. Many Asian cities were not able to provide social and economic opportunities to many, as well as put tremendous pressure on the local and global environment. Consequently, urban areas in Asia contribute increasingly to climate change, and as well as suffering many of its impacts. Thus, in an attempt to provide some viable solutions for clean energy strategy development in urban Asia, we aim to organize this annual expert workshop at Kyushu University.

2. Workshop Objectives:

The Objective of the workshop is to discuss interdisciplinary approaches to help solving the energy-related climate change problem in Asian cities, demonstrating how an interdisciplinary approach is probably necessary to sketch out a solution. The workshop will develop inclusion in a broader interdisciplinary approach which will serve as the foundation for solving multiple problems in the various fields of renewable energy utilization, smart energy and socio-environmental energy systems. The lectures given at this workshop are structured on the experiences achieved from the collaborative research activities conducted at the Kyushu University Platform of Inter-Transdisciplinary energy research.

3. Organizers and Participants:

The Workshop was attended by Students from Kyushu university, Professors and speakers.

The Chairs of the Workshop were:

- Assoc. Prof. Hooman Farzaneh, Platform of Inter/Transdisciplinary Energy Research (Q-PIT), Kyushu University.
- Prof. Shoichiro Hara, Center for Southeast Asian Studies, Kyoto University.
- Prof. Aya Hagishima, Interdisciplinary Graduate School of Engineering Sciences, Kyushu University.

The local committee at Kyushu University were:

- Ayas Shaqour, Energy and Environmental Systems Laboratory, IGSES, Kyushu University.
- Hirotomo Kohno, Energy and Environmental Systems Laboratory, IGSES, Kyushu University.
- Maiko Kawabata, Platform of Inter/Transdisciplinary Energy Research (Q-PIT), Kyushu University.

The Workshop Secretariat was:

- Ikeuchi Midori, Energy and Environmental Systems Laboratory, IGSES, Kyushu University.

The Invited Speakers to the workshop:

- Prof. Hideaki Ohgaki, Kyoto University, Japan
- Prof. Keiichi N. Ishihara, Kyoto University, Japan
- Prof. Shoichiro Hara, Kyoto University, Japan
- Assoc. Prof. Osama Eljamal, Kyushu University, Japan
- Dr. Wang Xin, Tongji University, China
- Assoc. Prof. Andrew Chapman, Kyushu University, Japan
- Dr. Eric Zusman, Institute for Global Environmental Strategies, Japan
- Dr. Zbigniew Klimont, International Institute for Applied Systems Analysis (IIASA), Austria
- Prof. Eiji Yamasue, Ritsumeikan University, Japan
- Assoc. Prof. Benjamin McLellan, Kyoto University, Japan

4. Discussion:

The Workshop started with a welcome address by Prof. Aya Hagishima and giving a briefing on the interdisciplinary graduate school of engineering studies at Kyushu University and its different programs with neighboring universities and internationalization initiatives. Then Assoc. Prof. Hooman Farzaneh gave a general overview of the workshop program and a briefing on the history of the previous workshops. The Workshop was divided into 4 different sessions, each discussing different topics related to clean energy development in Asian cities:

Session 1 (Data Intensive studies)

The First Session was moderated by Assoc. Prof. Hooman Farzaneh, which focused on Data-intensive studies related to clean energy development in Asian Cities. The Session started with Prof. Shoichiro Hara, Kyoto University, discussing "Trails to quantitative area Study" Where he Introduced the field of Area studies and area informatics as in interdisciplinary field combining humanities, social science, engineering, health and medicine. This field introduces the use of mathematical models in the field of humanities and sociology. Then he discussed Establishing an area informatics model of collecting big data, using machine learning algorithms to analyze the data than storing the data in databases or using it make future scenarios. Prof. Hara also discussed the application of quantitative models to social studies and the need to develop a more complicated model and to integrate it with the clean energy and sustainability development model. Then Prof. Hideaki Ohgaki, Kyoto University, introduced a "Study on Quality of Life Change for Rural Community through Rural Electrification by Renewable Energy in Malaysia, Cambodia, and Myanmar" first stating that 850 million out of the 7.7 billion of population doesn't have access to electricity and that statistics stating 100% electricity access is not always accurate. Then explained that the Quality of life case study was carried out in areas that didn't have electricity, where those areas were provided electricity by Grid extension, mini-grid, centralized solar system, and renewable energy. Then The quality of life was measured before and after the installation of electricity, where most of the results showed improvements in QOL but in one case women reported decreased quality which was an interesting observation. As for the future, they will focus on collecting more data from more sites and more extended time and calculating longer-term effects.

Session II (Policies and Strategies and Programs)

The Second Session moderated by Prof. Aya Hagishima, focused on Policies and Strategies and programs related to clean energy and sustainability issues. The session started with Dr. Eric Zusman, IGES, Introducing the concept of governance as an authority in the pursuit of public or private desirable goals and the reason for the lack of climate change policies in the US. He highlighted that

More votes go against climate change policies due to the fact the voters live in states that heavily depend on fossil fuels. He also discussed the need for coordination between agencies working on climate change and water treatment agencies and Implementing future water treatment technology policies considering climate change factors. Then Assoc. Prof. Andrew Chapman, Kyushu University discussed the big survey that carried out to study the "perceived inequality and energy affordability", he explained that a large-scale survey of 100,956 respondents across 37 nations to identify energy affordability from 2015-2017, where from the findings they had, one important note was that some nations had superior outcomes for health and life satisfaction despite lower income levels where is showed more electricity didn't mean more happiness, where it showed that developed countries can learn from developing countries' in terms of life satisfaction. The session ended with Assoc. Prof. Osama Eljamal, Kyushu University discussing "The Integration of clean energy generation and wastewater treatment" introduced the working cycle of wastewater treatment and how 20 KWH/M^3 of energy is contained in wastewater and water treatment costs only 1 KWH/M^3. He then reviewed the Microbial fuel cell and how microbes used the containment to produce energy and introduced the methods used to increase methane production.

Session III (Case Studies)

The third session moderated by Prof. Takahiko Miyazaki discussed several case studies related to energy and low carbon emissions in Japan, India, and China. The session was started by Prof. Keiichi N. Ishihara, Kyoto University discussing his study on the "Marginal cost of solar PV implementation Caused by Curtailment in Kyushu Region in Japan". He explained how the fast progress of PV target and rehabilitation in nuclear plants in Kyushu had forced the curtailment of PV power, where a simulation was made to find the curtailment of the year 2018 for Kyushu Island. He also discussed how the installation of more batteries can help in saving the curtailment power and how their simulation tries to find the optimal amount of energy storage needed to store a certain amount of curtailment power. He also highlighted that they predicted the energy storage prices to drop to 94$/KWH and 62$/KWH in 2020 and 2030, respectively. Then, Dr. Zbigniew Klimont, International Institute for Applied Systems Analysis (IIASA), introduced a case study of Delhi under the title "Managing future urban air quality: A case study for Delhi, India" where he discussed how Delhi is producing more pm2.5 than the national global target. He also introduced GAINS, which is a multi-pollutant, multi-effect integrated assessment model. The model was used to assess India's pollution impact under different scenarios for 2030 to evaluate and find the optimal future policies. The research highlighted that the collaboration of neighboring states of Delhi is needed and that technology is also critical for pollution mitigation. Dr. Wang Xi, Tongji University, ended the session introducing "Three mega projects for China's low carbon transition", he discussed china's real-time pollution monitoring and how efficient district heating is being introduced for waste energy taking technology into consideration. He also said that a combination of PV and Hydro is a better solution for a reliable energy supply. Finally, he mentioned how natural gas is being used more in china by power suppliers but is faced with technology and supply constraints.

Session IV (Clean Energy Challenges)

The last session of the workshop moderated by Prof. Shoichiro HARA, Kyoto University, discussed the challenges faced by clean energy integration. The session started with Prof. Eiji Yamasue, Ritsumeikan University, presenting “Resources issues as a trade-off of clean energy”, where he explained the impact and associated risks on mining in terms of total material required (TMR) for the contemporary shifts in technologies, and how a database was developed for TMR for different goods. He also highlighted that in power generation from RE and modern vehicles, the use of recycled batteries had a significant effect on reducing TMR for mining. Assoc. Prof. Benjamin McLellan, Kyoto University then introduced the “Trade-offs in the supply chain: clean energy in cities, dirty mining in the countryside”. He discussed the supply chain and some of the key environmental and social trade-offs for specific urban clean energy strategies. He also highlighted that, while mitigating climate change from cities is under the process, the expansion of mining required to provide the necessary materials for it is shifting the negative impacts towards the rural areas that host those mining operations. Ending the session and the workshop, Prof. Takahiko Miyazaki, Kyushu University, Japan, concluded the session and highlighting the essential key points discussed and giving final remarks.

Conclusion

The Workshop was attended by professors from international well-known universities and institutes sharing their research and experiences in current challenges related to clean energy development in Asia. The workshop was also attended by students of different backgrounds and nationalities, where they interacted with professors and gained a lot of useful insights. The attendees shared and discussed their research and topics, building bridges, sharing valuable insights and ideas. By the end, future collaborations and continuation of this workshop were appreciated to bring more analysis, opinions and international collaborations on clean energy issue progress and challenges in Asia.

Workshop Group Photo