



International Workshop on Clean Energy Development in Asian Cities

(Technological and political perspectives)

28-29 March 2016

Venue:

Institute of Advanced Energy, Main building,
W-503E, Kyoto University, Uji Campus

Organized by:

*Unit of Academic Knowledge Integration
Studies of Kyoto University*



Introduction and Purpose of the Workshop:

The world is rapidly urbanizing, and a majority of the global population will experience climate change in cities. Climate change will exacerbate the existing urban environmental management challenges in cities. At the same time, cities are responsible for significant global greenhouse gas emissions, and given current demographic trends, this level will likely only increase over time. These challenges highlight the need for cities to rethink how assets are deployed and people protected, how infrastructure investments are prioritized, and how climate will affect long-term growth and development plans.

Asian cities, in developing nations in particular, must prepare themselves in adopting appropriate adaptation and mitigation measures/strategies through the implementation of a variety of clean energy policies and programs using energy efficiency, renewable energy, reduction of transportation emissions, and other initiatives that can lead to improvements in air quality and securing the public health.

The big challenges concerning the clean energy development in Asian cities spring from the lack of awareness at the local government level and the limited institutional capacities and arrangements. Comprehensive policies focused on clean energy and GHG mitigation do not currently exist at the city level in Asia and only a minority of developed countries such as Japan and Korea have started formulating such policies. Concurrently since climate change and energy security have emerged as key global challenges of the 21st century, policies and programs, facilitating large-scale adoption and deployment of clean and renewable energy will need to play a central role in this area.

The overall aim of this workshop was to bring together researchers and practitioners from academia to discuss how we can develop policies and instruments to boost the capacity of societies to establish a cleaner energy system in Asian cities and achieve the local and global goals of sustainable development.

Topics which were expected to be addressed in this workshop include:

- ❖ Emerging clean energy scenarios in Asian cities.
- ❖ Policy framework for the promotion of clean energy in Asian cities.
- ❖ Main drivers and challenges for clean energy development in Asian cities.
- ❖ International experiences for clean energy development and key learnings

The workshop was intended to be a forum to share the experiences about clean energy development and its applications in Asian cities, following three main sessions:

Session I: Scenario analysis of urban clean energy; existing systems and future policies

Session II: Clean energy for sustainable urbanization; legal-technological interaction

Session III: Smart cities; opportunities and barriers in Asian cities

Based on these learnings and background understanding, a two day open event was hosted by the Institute of Advanced Energy, Kyoto University on 28th and 29th of June 2016 in Kyoto. The

workshop was financially supported by the Unit of Academic Knowledge Integration Studies of Kyoto University as part of an ongoing research project designed to assess the multiple benefits of clean energy development in Asian mega-cities. The workshop was attended by over 15 delegates from India, Japan, Europe and USA. These included:

- National Institute of Urban Affairs, New Delhi, India
- National Institute of Advanced Industrial Science and Technology, Japan
- Kyoto University, Japan
- Kyoto Women's University, Japan
- Ritsumeikan University, Kyoto, Japan
- Mercator Research Institute on Global Commons and Climate Change, Germany
- MIT-UTM, USA
- Sharda University, India
- CNRS - CERAPS-Lille University, France
- CNRS (Géographie-Cités), Paris, France
- United Nations University, Tokyo, Japan
- University of Liege, Belgium

Experiences were shared from a high participation from India, which has a well-known group of entrepreneurs and businesses in the provision of smart cities and use of renewable energy technology by their business models. Similarly, other speakers from Japan, Europe and USA shared opportunities to strengthen enterprise development and, through a collaborative program, assist in the improvement of regulations, facilitation of technology, business model delivery on innovative approaches, and enhancement of skills of energy access entrepreneurs in Asian cities.

The purpose of this report is to briefly provide a summary of the deliberations of the workshop that included a brief overview of city-level perspective and knowledge areas; sharing knowledge and experiences of practical clean energy development scope and objectives, areas of priority focus, organizational issues and a listing of an actionable program of implementation.

Beginning with this introductory section, the report provides the background to the event, underscores the need for the network and summarizes the discussions under four distinct categories:

- a. Goals, aims and objectives,
- b. Opportunities and challenges,
- c. Functional areas, and
- d. Next steps.

Finally, this report will summarize the presentations made, main issues discussed, and suggested actions that the international community should consider in order to further promote clean energy cities in Asia.

Workshop agenda and participants

First Day

	INTRODUCTORY:	
14:00 – 14:15	Welcome Address, Introduction to IAE and HSD unit of Kyoto University	Prof. Hideaki Ohgaki, IAE, Kyoto University, Japan
14:15 – 14:30	Overview of the Workshop—Objectives and Expected Outcomes	Jr. Assoc. Prof. Hooman Farzaneh, IAE , Kyoto University, Japan
	SESSION I: Scenario analysis of urban clean energy (Part 1)	
14:30– 15:00	E3 challenges in Indian cities: Technology and policy alternatives	Dr. Mahendra Sethi, National Institute of Urban Affairs, New Delhi, India
15:00 – 15:10	Discussion	
15:10 -15:40	Designing backcasting scenarios of resilient energy futures - A case study of a Japanese Community	Dr. Yusuke Kishita, National Institute of Advanced Industrial Science and Technology, Japan
15:40-15:50	Discussion	
15:50-16:10	Break	
	SESSION I: Scenario analysis of urban clean energy (Part 2)	
16:10-16:40	CO2 emissions from Household Direct Energy Use in Indian Cities	Dr. Sohail Ahmad, Mercator Research Institute on Global Commons and Climate Change, Germany
16:40- 16:50	Discussion	
16:50-17:20	Clean energy development in Delhi: Opportunities and Challenges	Prof. Shovan K. Saha, Sharda University, India
17:20-17:30	Discussion	
17:30- 18:00	Transformation of clean energy for sustainable development in urban Asia	Dr. Jose Puppim de Oliveira, MIT-UTM, USA
18:00-18:10	Discussion	
18:30 -20:30	Welcome Dinner	

Second Day

Session II: Clean energy for sustainable urbanization (part 1)		
10:00 – 10:30	European cities and clean energy: making the best use of new opportunities	Dr. Gilles Lepasant, Senior researcher, CNRS (Géographie-Cités), Paris
10:30 – 10:40	Discussion	
10:40 – 11:10	The promotion of urban clean energy by local governments	Dr. Magali Dreyfus, CNRS - CERAPS-Lille University, France
11:10 – 11:20	Discussion	
11:30-13:00	Lunch	
SESSION II : Clean energy for sustainable urbanization (part 2)		
13:00 – 13:30	Legal-Technological Interaction for Solar Rights to secure clean energy in Japanese cities	Prof. Aki Suwa, Kyoto Women's University, Japan
13:30 – 13:40	Discussion	
13:40- 14:10	Promotion of waste management system towards sustainable development in Asian cities	Dr. Mehrnoosh Dashti, United Nations University, Japan
14:10 – 14:20	Discussion	
14:20-14:50	Reverse power flow from high voltage grids to extra-high voltage grids and large-scale wind and PV integration in Germany, its policy implications for Japan	Prof. Asami Takehama, Ritsumeikan University, Japan
14:50 – 15:00	Discussion	
15:00 – 15:20	Break	
SESSION III: Smart Cities		
15:20- 15:50	Sustainable and Climate Resilient Urban Development in Indian Smart Cities	Assoc. Prof. Benjamin McLellan, Graduate school of energy science, Kyoto university, Japan
15:50- 16:00	Discussion	
16:00- 16:30	The bottom up innovation and entrepreneurship in smart cities, case of Indian cities	Dr. Rama Kirishna Reddy, University of Liege, Belgium
16:30-16:40	Discussion	
16:40-17:00	Break	
17:00-17:30	Workshop wrap-up	Jr. Assoc. Prof. Hooman Farzaneh, IAE, Kyoto University, Japan
17:30 – 17:50	Closing Remarks	Prof. Keiichi N. Ishihara, Graduate school of energy science, Kyoto university, Japan

Workshop sessions

Introductory:

Introductory remarks were made by the members of the organizing committee. Professor Hideaki Ohgaki gave a brief introduction to the ongoing research activities of the Institute of Advanced Energy, Kyoto University. Junior associate professor Hooman Farzaneh then introduced the workshop objectives and schedule.



Picture 1: Professor Ohgaki and Dr. Farzaneh introducing the workshop

SESSION I: Scenario analysis of urban clean energy

Following the introductory session, there was a session on scenario analysis of urban clean energy. The panel had representation from 3 speakers from India, one speaker from Japan and one speaker from France, each with a unique model and approach towards clean energy development in Asian cities. The panel was moderated by Associate professor Benjamin McLellan (Kyoto University, Japan).

The first speaker, Dr. Mahendra Sethi (National Institute of Urban Affairs, New Delhi, India) gave a talk on “E3 Challenges in Indian Cities: Technology and policy alternatives” and in his presentation he addressed the following topics:

- Global literature to theoretically comprehend E3 linkages in urban settlements.
- Present conditions, issues and challenges of India’s economy, energy and environment (emission) sectors.
- The role of urban India in these three sectors and generates for the first time, super-imposed scenarios of the nexus.
- Appropriate technology and policy/ governance instruments that could possibly mitigate impacts or produce co-benefits in urban areas.

He introduced the super-imposed E3 scenarios and discussed on appropriate technology and policy/ governance instruments that could possibly mitigate impacts or produce co-benefits in urban areas. Dr. Sethi concluded that, there is a strong evidence that economy, energy and emissions individually and collectively as a nexus are increasingly asserting a major role in cities.

While Indian cities host only 32% of the national population, they contribute to over 63% of the national economy, associated with 85% of energy generation from thermal plants and responsible for 66.5 - 70.3% of the national GHG emissions. This proportional contribution from Indian cities is quite significant in comparison to the global scenario, where urban areas are responsible for similar E3 impacts but with a larger 52% of the world's urban population. Hence, Indian cities prove to be breeding ground for highly intensive E3 linkages.



Picture 2: Dr. Mahendra Sethi giving his presentation on E3 Challenges in Indian Cities

The second speaker Dr. Yusuke Kishita (National Institute of Advanced Industrial Science and Technology, Japan) introduced the process of designing backcasting scenarios through applying the fault tree analysis, which was used to study the scenarios of collapsed and resilient energy systems in Suita City to 2030.



Picture 3: Dr. Yusuke Kishita giving his presentation on designing backcasting scenarios of resilient energy futures

Dr. Kishita mentioned that, in Japan, “energy resilience” has been discussed since the Fukushima nuclear accident in March 2011 through shifting from nuclear power to renewables, with the feed-in tariff (FIT) program enforced in 2012 and fully liberalization of the electricity market in April 2016. However, it is fairly difficult to design desirable (sustainable and resilient)

energy systems. According to his research the policy options that can be taken by the Suita City are listed as follows:

- Renovating social infrastructures (i.e., incineration plant) to enhance energy recovery from solid waste
- Promoting energy-savings and renewables (e.g., PV and solid waste) to adapt large-scale blackouts

Dr. Kishita concluded that, the listed countermeasures can be incorporated in designing the city's long-term general plan and however, limited effects may be obtained by taking the countermeasures on city level, but, it is vital to reflect the described scenarios on policy design at national level (up-scaling). In addition, clarifying cause-effect chains between collapse patterns, risk factors, and countermeasures would help systematic thinking for designing resilient energy systems in Suita city.

The third speakers in this section, Dr. Sohail Ahmad (Mercator Research Institute on Global Commons and Climate Change, Germany) gave a talk on climate change mitigation options in Indian cities. Dr. Ahmad introduced a regression model which was used together with the micro data from India's 60 largest cities to map the GHG emissions patterns and its determinants. According to his research findings, household GHG emissions from direct energy use correlate strongly with income and household size; population density, basic urban services (municipal water, electricity, and modern cooking-fuels access) and cultural, religious, and social factors explain more detailed emission patterns. The "greenest" cities (on the basis of household GHG emissions) are Bareilly and Allahabad, while the "dirtiest" cities are Chennai and Delhi.



Picture 4: Dr. Sohail Ahmad giving his presentation on climate change mitigation options in Indian cities

According to his final conclusion, to mitigate greenhouse gas emissions, switching to modern non-solid fuels are required and also there is a need for specific consideration for small cities (2-4 million population), since they emit most, rather than focusing on large cities only.

Professor Shovan K. Saha (Sharda University, India) presented the opportunities for and barriers to the clean energy development in Delhi, India. He started his talk by introducing the

basic facts and trends of urban development in India and Delhi. Professor Saha then shared the proposed clean energy strategic plan by MNRE for the period 2011-17 and perspective till 2022 and the goals which have been set by the ministry, and corresponding action plans. He highlighted that, to transform Delhi into a clean energy metropolis, the share of renewable energy out of the total supply would need to be raised by ten times, from the present 10 percent. Inevitably, the approach to achieve that goal would have to consist of both suppressing Delhi's energy demand and raising the supply while recognizing the nexus of E3. Further, the transformation must be within a rational timeframe in view of climate change and other global pressures. Therefore, there is a need to evolve policies to address:

- Immediate situation
- Short term, up to FIVE years to match FYP & 'governance periods'
- Long term, 25 years or more

Rooftop solar PV would be the most plausible scenario in the domestic sector. In addition, there is a strong need for introducing the muscle power, Copenhagen wheel, MRTS in the public transport sector. Professor Saha concluded that, the policies must be based on primary data and they must have complimentary programs and projects with a participatory implementation.



Picture 5: Professor Shovan K. Saha giving his presentation on clean energy development In Delhi

The last speaker of this session, Dr. Gilles Lepasant (CNRS, Géographie-Cités, Paris, France) gave his talk on "European cities and clean energy: making the best use of new opportunities". First, He introduced The EU energy policy as the secure, affordable and sustainable supplies in line with climate commitments to promote energy efficiency and renewably generated energy and to open-up the sector at the expense of national monopolies. He also mentioned that the new institutional solutions have been introduced for the provision of energy, resulting in the diversification of organizational forms and ownership structures. He highlighted that a highly differentiated landscape is thus emerging across European cities, a "remunicipalisation" process being advocated by some cities at the expense of the private sector while the latter has in some other cities strengthened its position.



Picture 6: Dr. Gilles Lepesant giving his presentation on European cities and clean energy

Dr. Lepesant, then presented the municipal energy policy implications of the city of Malmö as the third largest city in Sweden and the 6th largest in the Nordic countries. Finally, he came to the conclusion that:

- Regarding multi-level governance, ambitious urban energy policies implies that an appropriate balance is found between supra-national national, regional and local sustainable development policies. National regulations should in particular provide relevant frameworks for bottom-up initiatives.
- With the increasing number of renewable energies related projects, social acceptance becomes a key issue. Conflicts in this area need to be tackled at different levels through dialogue and policies so that renewable energy projects provide a clear added-value to local communities.

SESSION II: Clean energy for sustainable urbanization

The presentations in this session were followed through deliberating on the following issues:

- ❖ How urban areas expand in the future has big implications on the GHG emissions that are generated in Asian cities?
- ❖ What is the rule of local governments in deploying sustainable cities of the future?
- ❖ What are the strengthening clean energy policies through Implementation of Co-benefit Potentials?

The first speakers of this session, Dr. Jose Puppim de Oliveira (MIT-UTM, USA) spoke about the transformation of clean energy for Sustainable Development in Urban Asia. Dr. de Oliveira, in his presentation, highlighted that, these transformations in Asian cities will occur only if policymaking frameworks for energy systems are able to recognize the ecological limits at the different scales, from local to planetary, as we have seen in the recent Paris climate agreement. Nevertheless, the diversity of the region and innovativeness of some initiatives in urban Asia creates a unique opportunity for exchange of experience, resources and ideas and for

cooperation and collaboration in several areas, such as policy frameworks, capacity building, joint regional mechanisms and technology exchange. He then proposed two guiding questions: 1) how do we form consensus around the idea that economic policy should recognize and be guided by critical environmental limits or thresholds? and 2) how do we change the zero-sum view of the natural and economic world, in both developing industrialized countries in the region?. Dr. Jose finally, listed the factors needed for the clean energy transformation in Asian cities as follows:

- Top-down actions by government must foster the scaled expansion of bottom-up innovations and alliances between stakeholders.
- The role of the state is to support the creation, clustering and scaling up of best practices or “niches” for transformation.
- The potential of technology to facilitate transformations should be actively harnessed by science, technology and innovation policy.
- We must identify the conditions that enable change on a wide scale by changing mindsets and behaviors.



Picture 7: Dr. Jose Puppim de Oliveira giving his presentation on transformation of clean energy for Sustainable Development in Urban Asia

Dr. Magali Dreyfus (CNRS - CERAPS-Lille University, France) started her presentation with a focus on “how local governments can help promoting a clean energy future through their different roles and their legal tools”. She mentioned that the technological solutions are essential for future clean energy cities, but these must be backed by strong policies to make sure they are well implemented. However the local governments facing with the limits of their powers and the need to coordinate with other actors, public and private, at different levels of governments, thus applying a multi-level governance approach. She then highlighted two reasons to take action as follows:

- Exogenous

- ✓ Meeting the country's international commitments, e.g. UNFCCC regime – legal obligation
- ✓ Fuel availability and energy security
- Endogenous
 - ✓ Answering community & citizen's basic needs & leadership
 - ✓ Co-benefits: environmental / economic / social

Dr. Dreyfus presented about the LG's Energy competency and opportunities for LG in France and Japan, together giving some examples and classifications on energy conservation, energy efficiency and renewable energies at the levels of organization and territory. She finalized the available opportunities for the multi-level governance as follows:

- Vertically: between different levels of governments
 - ✓ Classic hierarchical relations
 - ✓ Conventions
- Horizontally : between different types of authorities
 - ✓ Transnational networks eg. international partnership for energy efficiency cooperation
 - ✓ Business partners, e.g. public-private-partnerships
 - ✓ Citizens e.g. crowd funding



Picture 8: Dr. Magali Dreyfus giving her presentation on the promotion of urban clean energy by local governments

The third speaker, Professor Aki Suwa (Kyoto Women's University, Japan) gave her talk on Legal-technological interaction for solar rights, focusing on “how Solar Access shall be protected by regulatory framework”. She mentioned that, the Japanese city planning system and the Japanese building standards law have been weak to control architectural features of Japanese buildings, and do not intervene in structural design to the degree needed to guarantee solar equity as much as in the West. Professor Suwa gave a brief description about the idea of solar

access in shadow as the Japanese building standards law, includes provisions regulating shadows from neighboring architecture, called the Right of Sunshine that is meant to protect the pleasantness associated with sunshine.



Picture 9: Professor Aki Suwa giving her presentation on Legal-technological interaction for solar rights

She highlighted that, many sub-national governments in the US, have a wide range of regulatory tools for solar access, including a solar setback standard designating that shadows from new construction should not fall further than the regulated distance over a property line. As her final conclusion:

- Technological innovation and dissemination will be limited if social (including legal) infrastructure insufficiently provided.
- Environmental legal rights argument not well developed (solar, water, geothermal, ocean, etc.).
- International information gathering (not just US), and policy recommendation for worldwide legal community may be necessary.
- Possibility of further collaborative research on legal-technological interaction theme.

A talk on promotion of waste management system towards sustainable development in Asian cities was given by Dr. Mehrnoosh Dashti (United Nations University, Japan). She mentioned that, the planning of different waste management practices, including recovery, anaerobic digestion, composting, incineration, landfilling and resource recovery is often a challenge for policy and strategic decision makers in the waste management system and in this regard, the co-benefits approach provides a framework to address the benefits of climate change. Dr. Dashti gave a brief comparison of the waste management system in the developed and developing countries, including the city of Surat in India and the city of Yogyakarta in Indonesia. She clearly outlined the key challenges in Asian developing countries at the city level as follows:

- Weak contributions from the residents for source-separation of waste

- Inefficient collection and transportation services
- Open dumping as the most common waste treatment methods in many cities
- No control of gas emissions and leachate in landfill
- Absence of adequate policy actions on appropriate waste handling and treatment
- Lack of security consideration/health benefits for waste workers/Informal collectors

Dr. Dashti, then introduced the ISWM planning strategy and its applications in the selected case studies in Asia. As her final remarks, the Keys towards sustainable cities are:

- Using laws and regulations for prohibiting illegal waste dumping
- Establishing supportive programs for informal sector/waste workers
- Improvements in public health and environmental protection (enhance public awareness)
- Changing from traditional waste treatment technologies to modern technologies by considering any necessary adaption to the local socio-economic conditions



Picture 10: Dr. Mehrnoosh Dashti giving her presentation on promotion of waste management system towards sustainable development in Asian cities

The last speaker of this session, Professor Asami Takehama (Ritsumeikan University, Japan) presented a method for the analysis of reverse power flow from high voltage grids to extra-high voltage grids related to large-scale wind and PV integration 50Hertz and TenneT zones in Germany, based on grid data in MW 15minutes. She highlighted the necessary reforms for Japan's grid integration rules through a comparison with Germany's bi-directional grid operations as follows:

- Disclosure of grid data is necessary: Wind feed-in, PV feed-in, vertical load at 66kV/6.6kV and 154kV/66kV. 15 minutes or 30minutes in MW.
- Transmission of renewable electricity to upstream grids and to inter-zone lines physically as a priority: The rule for upward transmission is necessary.

- Grids expansion at 66kV and 154kV is necessary and important for wind energy growth.
- The grid reinforcement cost (including from PCC to the first transformer) must be shared by end consumers and renewable energy developers.
- The utility companies must be obliged to expand and reinforce the grid systems at 154kV and lower voltage grids for wind/ PV integration.

Professor Takehama, then remarked that the Japan's renewable energy developers are required to reinforce the grid capacity at the third-highest voltage grids and the lower voltage grids at their own expense.



Picture 11: Professor Asami Takehama giving her presentation on Reverse power flow from high voltage grids to extra-high voltage grids and large-scale wind and PV integration in Germany, its policy implications for Japan

SESSION III: Smart Cities

The two speakers of this session, Associate professor Benjamin McLellan (Graduate school of energy science, Kyoto university, Japan) and Dr. Rama Krishna Reddy (University of Liege, Belgium) shared their recent researches and projects on smart cities, case of Indian cities. Associate professor McLellan gave a brief description about his ongoing project on sustainable and climate resilient urban development in India Smart Cities and highlighted the main aims of his project as follows:

- To develop a water integrated energy systems model which is applicable at a city level to investigate the impact of water availability constraint on long term energy supply system.
- To develop a regional water supply curve to assess the long term water availability for a selected region.
- To investigate the existing pattern of land use to forecast the land use change over the period of time given the social, economic and environmental changes.

- To investigate the issues of human behavior and corresponding resource demand to meet consumption in urban areas which will finally be converted into sectoral water, energy and land demand
- To demonstrate how to use an alternative decision making process to plan and develop smart cities in Indian context



Picture 12: Associate professor Benjamin McLellan and Dr. Rama Kirishna Reddy explaining their research projects on smart cities in India

Dr. Rama Kirishna Reddy started his presentation with this basic that ; “where do Smart cities stand in the promotion of innovation and entrepreneurship and how smart cities can create systems to foster bottom-up innovations and entrepreneurship and contribute to the 'larger' smart community perspective in smart cities”. He then shared the concept of evolution of smart cities and a case study research in Hyderabad city which is considered as one of the technology hubs of India. Dr. Reddy outlined his policy suggestions as follows:

- There is a need to create a vibrant academic system which will be able to understand the needs of the market and promote the skills and capabilities of the graduates.
- The government should look for more avenues in order to promote startups and entrepreneurship
- It is also necessary to create more engagement modules and hackathons as part of an entrepreneurial education system in order to create and nurture the zeal of entrepreneurship.
- In addition, government should also transform the academic system in order to allow the students to take up entrepreneurship as a choice for a year with sufficient stipend.

Workshop wrap-up

The workshop wrap-up was devoted primarily to general discussion and to distilling and considering the main points that had been presented.



Picture 13: Workshop wrap-up session

The discussion involved the following topic areas:

❖ Focus areas for the clean energy development in Asian cities

- Land Use and Transport Planning
- Site Planning and Building Design
- Infrastructure Efficiency
- Energy Supply

❖ Three pillars of the clean energy development in Asian cities:

1. Promoting renewable energy and energy efficiency.
2. Maximizing access to energy for all.
3. Promoting energy sector reforms, capacity building, and governance

❖ Strategy for a clean energy future in Asian cities

An approach is needed where the highest priorities are addressed first based on a set of screening criteria, with a particular emphasis on low-cost, high impact solutions. The criteria for prioritizing investments included:

- ✓ Cost-effectiveness;
- ✓ Consistency with national sustainable development goals; and
- ✓ Obtaining multiple benefits; energy-environment-public health- Local economy.

❖ **Challenges**

- ✓ Institutional Challenges:
Energy and climate change are not mainstreamed in urban development planning processes.
- ✓ Social/Community Challenges:
Local communities not aware and resistant to proposed changes in lifestyles and attitudes; Lack of sector planning.
- ✓ Capacity & Financial Challenges:
Lack of appropriate technology, Lack of financing for low carbon development initiatives, Lack of private sector investment, Low energy access and Difficulties in grid integration.
- ✓ Energy Use and Energy Policy Challenges:
Existing laws, regulations not supportive of EE and RE initiatives; restrictive regulations and default controls.

The sort of policies needed include:

- Establishment of a credible legal and regulatory framework that provides the stability of rules and prices that will induce investments into financially viable products.
- Development of enabling policy environments through regulatory interventions such as appliance energy efficiency standards, demand side management programs, energy audits, industrial energy efficiency norms, market access for clean energy generators, etc.;

❖ **Opportunities**

- End-use efficiency improvements in the transportation, industry, commercial, and residential sectors can have a significant impact on the clean energy investment requirements.
- An aggressive program on local energy production and end-use efficiency improvements through the significant penetration of renewable energy technologies and fuel switching.
- Renewable energy could become a significant component of the total energy mix of a distributed energy system by employing new and improved small-scale technologies together with smart meters and intelligent grids.

- The role of National Governments and Local-National Cooperation is especially important because local governments lack the capacity for policies. Regardless of size, Asian cities should undertake policy development to support clean energy deployment in association with national policies linked to sustainability goals and climate change, and local policies relating to energy security, energy access, health, employment, equity and reducing energy demands. Local authorities can serve as a vehicle to implement top-down policies from national governments, deliver meaningful results, and ensure national mandates are carried out.
- Sharing experiences amongst cities would be beneficial.
- Creating momentum for Change by targeting available niches would be necessary. Niche opportunities exist in areas like clean vehicles, renewable energy technologies, biomass utilization and waste reduction schemes, all of which would create awareness and impart environmental education.

Closing remarks were made by Professor Keiichi N. Ishihara (Kyoto University, Japan). He mentioned that, how to fill the gap between the local and national levels is still a key question and however there is an intimate connection between clean energy policies and sustainable development, the ultimate goal should be set as the sustainable urban development in Asia.



Picture 14: Professor Keiichi N. Ishihara giving the closing remarks

❖ **Next Step:**

The main achievement of this workshop was to create a knowledge sharing environment for further cooperation and dialogue between different scholars in order to identify challenges and possibilities. The next step would be to enable the specific research projects on examining the plausible policy interventions for the future clean energy development in Asian cities. In this regard, two research projects have been recently started at Kyoto University, which are funded by the Unit of Academic Knowledge Integration Studies and KAKENHI Grand in-Aid for Scientific

research (C) for the period of 2016 to 2018. One research project will be proposed to the JSPS international joint research program 2017. In addition, public health benefits of clean energy development in Asian city will be considered as one of the important topics which needs to be addressed in the next workshop.

Workshop Key Messages

- ❖ *How urban areas expand in the future has big implications on the GHG emissions that are generated in Asian cities.*
- ❖ *Urban development planning should consider energy as one important component of sustainable development.*
- ❖ *Energy and Climate Change should be mainstreamed into the urban development planning processes.*
- ❖ *Strategies formulated for various concerns in city development plans should be in accord with the provision of clean energy for sustaining Human Well-Being.*
- ❖ *The capacity of local governments should be improved to better identify the optimum mix of regulatory and public financing instruments.*
- ❖ *In addition to strengthening the capacities of the local governments, it will be more useful to foster bottom up citizen led clean energy initiatives.*
- ❖ *The success of a clean energy development plan can only be ensured if there is a sustained political support. Without it, any planning approach will fail.*
- ❖ *Further research at the city level is necessary to investigate appropriate technology and policy alternatives in their local and national circumstances.*
- ❖ *Policy-makers need to transform the way they plan and manage cities in order to include ecological boundaries into urban development.*
- ❖ *There are huge co-benefits of clean energy in urban areas.*
- ❖ *With the increasing number of clean energy related projects, social acceptance becomes a key issue. Provision of clean energy should enhance social inclusion in Asian cities.*



Picture 15: Group photograph of workshop participants