

IGES Conference Report-KUC-2011-01

IGES - YCU Joint Seminar on Low-Carbon and Smart Cities

*Seeking for Local Energy Solutions
after the Nuclear Crisis*



Held on the occasion of
The International Forum for Sustainable Asia and the Pacific
(ISAP2011)
26 – 27 July 2011



YOKOHAMA
CITY
UNIVERSITY

Global Cooperation Institute
for Sustainable Cities



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Introduction to the IGES - YCU Joint Seminar

The IGES – YCU Joint Seminar on Low-Carbon and Smart Cities was held on the occasion of the 3rd International Forum for Sustainable Asia and the Pacific (ISAP2011) from 26th to 27th July 2011, in Yokohama, Japan. The seminar was composed of two parts, the first on the Concept and Implementation of Smart Cities, and the second, on the Realisation of Low-Carbon Cities in Asia and the Pacific. Part 1 consisted of a Lunch Session followed by an Expert Workshop, and Part 2 of another Expert Workshop with speakers from Japan and abroad.

The Lunch Session focused on good practices and energy policies implemented among local governments in response to the challenges caused by the earthquake and tsunami-related disaster in the North-Eastern regions of Japan. Unique know-how and local actions included energy-saving and peak-cut efforts during the summer season, as well as the introduction of photovoltaic power generation for public facilities, private companies, and households. Presentations pointed the way to a new systems approach and mechanisms for a more resilient, energy secure and efficient society. These may be useful for local governments in Japan as well as for other countries looking to save energy and pursue low-carbon development.

Following this Lunch Session, the Expert Workshop presented advanced policies and energy-management models of low-carbon and smart cities. A roundtable discussion served as an opportunity for participants to share ideas and opinions on financial, technological, and institutional barriers to the effective deployment of smart cities in Japan. Discussions also served to deepen knowledge on the possible applications of these smart city models and energy policies toward rapidly developing cities in Asia.

In part 2, the Expert Workshop on International Cooperation for Low-Carbon Development in Asia and the Pacific was held in the aim of sharing information on various cooperation activities being carried out in the region and to explore further opportunities for realising low-carbon cities through collaboration among participants. The meeting was held in the form of an open roundtable meeting with a total of 12 organisations, among which IGES and YCU played the role of moderator. Among the speakers were representatives from the national government of Japan, local governments, cooperation agencies, research institutions, and network organisations.

Note) Figures have been extracted from the speakers' presentation materials.

Part 1: Concept and Implementation of Smart Cities

Lunch Session < Local Energy Solutions >

Tuesday 26 July 2011, 13:15-14:15

Pacifico Yokohama, Japan

AGENDA
Moderator:
Prof. Hidefumi Imura, Senior Project Manager, Global Cooperation Institute for Sustainable Cities, Yokohama City University and Senior Policy Advisor, IGES
Presentations:
Mr. Kazuhiko Kobayashi, Executive Director, Office for Environmental Future City Promotion, Environment Bureau, City of Kitakyushu
Mr. Masato Nobutoki, Executive Director, Climate Change Policy Headquarters, City of Yokohama
Mr. Kentaro Yamaguchi, Director, Photovoltaic Power Generation Promotion Division, New Energy and Global Warming Countermeasures Department, Environment and Agriculture Bureau, Kanagawa Prefectural Government
Mr. Shigeru Inoue, Deputy General Manager, City Planning Project, Mitsubishi Estate Co., Ltd.
Mr. Tsunehiko Nakagawa, General Manager, Planning and Advanced Engineering Development Division, Nissan Motor Co., Ltd.

Summary of Presentations

The energy shortage and nuclear crisis of Japan have brought to light the need for alternative means to ensure a safe and stable supply of electricity.

Local Energy Solutions:

Prof. Hidefumi Imura, Senior Project Manager, Global Cooperation Institute for Sustainable Cities, Yokohama City University and Senior Policy Advisor, IGES

The Great East Japan Earthquake brought to light the importance of energy management not only for the creation of low-carbon cities and a green economy, but also for post-disaster recovery, which will require a stable energy supply. The consequence of the failure in the Fukushima nuclear power plant has caused a dilemma of energy needs and the fear of nuclear power across society. In this context, this lunch session aimed to present selected cases of leading attempts at energy management. Prof. Imura highlighted three main issues arising in this endeavour to achieve a low-carbon economy: financial, institutional, and technical which also constitute the axes of discussions for this lunch session.



Local government initiatives: The development of Smart Cities is being promoted by leading municipalities in Japan as a means to integrate diverse energy sources with effective demand-side energy management. Emphasis is placed on large-scale introduction of renewable energy as a strategy to combine economic revival and GHG emission reductions.

The Kitakyushu Smart Community Creation Project:

Mr. Kazuhiko Kobayashi, Executive Director, Office for Environmental Future City Promotion, Environment Bureau, City of Kitakyushu

In Kitakyushu City, the “Kitakyushu Smart Community Creation Project” is being implemented in Higashida district in Yahata ward during the period of 2010-2014. In the Kitakyushu Smart Community Creation Project, the objective is to develop a community that produces and uses energy in an efficient manner with 50% less GHG emissions than the city’s average. There are four pillars to Kitakyushu City’s concept of Smart City, namely: 1) Large scale introduction of

renewable energy, 2) Hydrogen use as fuel for household power generation and hydrogen fuel-cell cars, 3) Energy saving at district level, and 4) Testing of a more efficient traffic system such as on-demand community buses. The most important element is the development of a Centralised Energy Management System named the “Regional Energy Saving Station”

3. Functions of the Regional Energy-saving Station

- **Sharing regional energy and new energy by blocks**
 - ⇒ Efficient use of regional energy, new energy
 - ⇒ Enabling both individual optimum energy management for each company or household and general optimum energy management for the entire block
- **Disclosure and instructions of energy information**
 - ⇒ Realization of participation of users in energy management
 - ⇒ Realization of energy sharing within communities
- **Introduction of incentives for citizen participation**
 - ⇒ Realization of dynamic pricing based on deliberate assessment of the operational status of new energy, etc.
 - ⇒ Visualization of the achievements of and degree of contribution to citizens' own energy-saving efforts



Energy consumption will be minimized and leveled within blocks, and impact on the trunk transmission system will be reduced.

GreenFrontier
SMARTER CITY

which involves the introduction of Building Energy Management Systems (BEMS) and Home Energy Management Systems (HEMS) with a focus on using them at the community scale. Demand-side management of energy will become crucial, and measures such as dynamic pricing of electricity and provision of incentives for energy-saving are currently under consideration.

The Yokohama Smart City Project:

Mr. Masato Nobutoki, Executive Director, Climate Change Policy Headquarters, City of Yokohama

The Yokohama Smart City Project (YSCP) has been positioned as a means to reduce GHG emissions and as part of the city’s Growth Strategy. A zoning of model districts for the implementation of the YSCP has been put into place, covering residential, commercial,

Urban Strategy for Environmental Initiative 横浜市 City of Yokohama

Economic revival of the city through the promotion of technology innovation and creation of business chances towards a low carbon society

Provision of business chance through demand-creation

Households: environmental responsibility	Households: wide distribution of Electric Vehicles
Public sector: ecological infrastructure reforms	Businesses: environmental investments

Businesses: Deployment of the Yokohama Smart City Project

- Large scale installation of renewables such as solar power, solar heat, wind power
- Development and dissemination of Energy Management Systems (EMS)
- Distribution of Electric Vehicles and development of Energy Coordination Systems



Promotion of technology innovation among local companies

Support for SME growth in environmental technology	Innovation: Promotion of Yokohama Green Valley
Attraction of environmental technology companies	Generation of new business chances

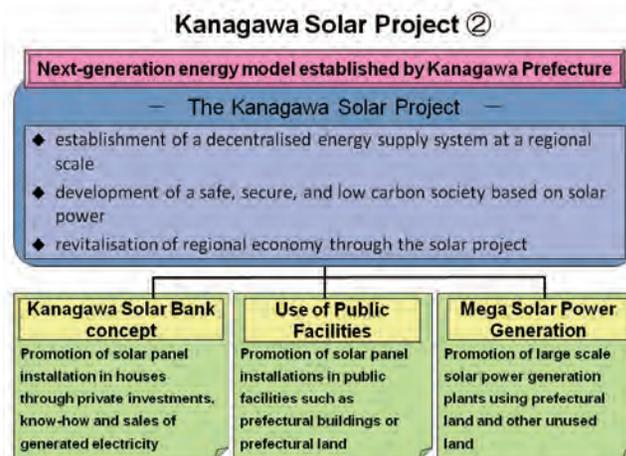
and industrial areas of the city. Yokohama Smart City Project, with key private sector partners, targets the installation of solar panels and HEMS in 4,000 households, introduction of 2,000 electric vehicles, and a total of 27 megawatts of renewable energy generation capacity. By being Japan’s most populous municipality, Yokohama City’s diverse settings present numerous opportunities for exploring innovations in green and low carbon growth, which could be relevant for cities in many other parts of the world.

The Kanagawa Solar Project:

Mr. Kentaro Yamaguchi, Director, Photovoltaic Power Generation Promotion Division, New Energy and Global Warming Countermeasures Department, Environment and Agriculture Bureau, Kanagawa Prefectural Government

Mr. Yamaguchi made a presentation on Kanagawa prefecture’s policies to

promote solar power. Further dedication is being seen in response to the Eastern Japan disaster and consequent power shortages. The realisation of a “Solar Economy” is the highlight of the prefectural energy policy, which aims to promote the installation of solar panels among households, businesses and industries. A study group has been set up within the prefecture which has identified three challenges to the dissemination of solar power: high installation costs, long cost recovery time, and complicated paperwork. Government subsidies will be needed as an initial booster for market creation, but the “Solar Economy” will eventually need to become self-sufficient through private investments. Partnership with financial institutions is essential, thus “Solar Loans” have been set up in 3 banks in Kanagawa. The linkage of solar power technology with electricity storage technology is also needed in addition to the balance of consumption and energy-saving efforts.



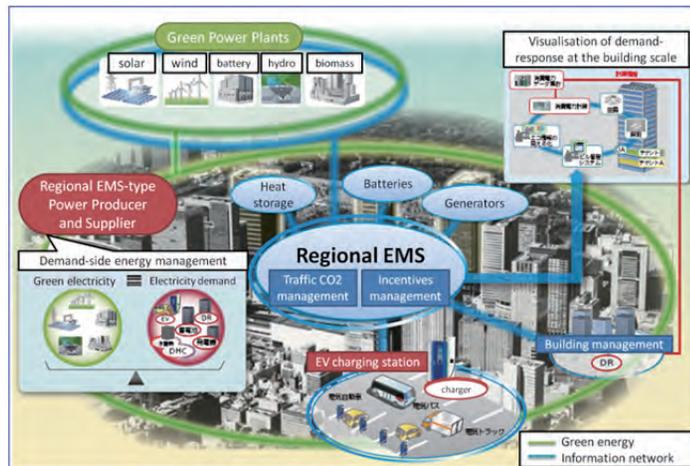
Private company actions: In response to the increasing demand for GHG emission reductions under national and local government policies, private companies are developing new technologies and business models which could serve as a starting point for an alternative energy infrastructure.

Approach of Low-Carbon Community around Tokyo Station – Smart Community of Dai-Maru-Yu Neighbourhood – :

Mr. Shigeru Inoue, Deputy General Manager, City Planning Project, Mitsubishi Estate Co., Ltd.

Mitsubishi Estate Co., Ltd is conducting “area management” activities in the Otemachi - Marunouchi - Yurakucho district (“Dai-Maru-Yu district”) which is the central business district of Tokyo, with extremely high construction density. Under the climate change mitigation policies of Tokyo Metropolitan Government, Mitsubishi Estate Co. has been actively seeking means to reduce its carbon emissions. However, due to the concentration of high-rise buildings

in central Tokyo, it has been found that solar power is not a feasible means to supply electricity to all the offices. Mitsubishi Estate has thus decided to purchase “raw green electricity” from renewable sources outside Tokyo, resulting in a reduction of 20,000t CO₂ compared to the previous year. As introducing renewables makes the energy supply unstable, demand-side management has become essential, as well as electricity storage. In order to reach its emission reduction target, Dai-Maru-Yu district will have to make use of external sources by balancing the supply and demand of energy through effective energy management systems.



Expand EV’s Value – Mobility and Beyond – :

Mr. Tsunehiko Nakagawa, General Manager, Planning and Advanced Engineering Development Division, Nissan Motor Co., Ltd.

The distribution and uses of electric vehicles (EV) in Japan, Europe and the US were introduced, taking the “Leaf” model (Nissan’s EV) as example. Leaf models generate data on battery charging and transportation mileage, which are stored in a data centre. This data serves as the basis for development of the smart grid technology. With over 3,800 Leaf models running in Japan, EVs are now attracting interest as a backup power source for households in case of disasters, as well as potential batteries for storing electricity from renewable sources to the stabilise the supply. One Leaf model can store 2.5 days worth of household electricity, and technologies for smart-house/EV combination are already being developed by Nissan Motors. The challenge now is to identify the regulations that apply to these technologies and to explore possibilities for institutional reform in partnership with government bodies.

Discussions - Key Points

SUMMARY BY THE MODERATOR

The session has shared unique experiences in energy management, with cases like Kitakyushu where factories represent an alternative source of electricity, highlighting the collaboration

potential between industrial and household sectors. Potential for linking rural and urban areas has also been demonstrated through the case of Mitsubishi Estate Co.

The generation and provision of electricity requires the dissemination and use of certification systems such as green energy certificates. New technologies for electricity storage may bring about drastic change in energy supply systems in the future. Information Technology is also becoming the centre of interest as a basis for controlling energy demand and allowing the reduction of supply, as well as for increased efficiency in the transport sector.

FINANCIAL MECHANISMS

A member of the audience commented that the calculations of return-on-investment from nuclear power never include the costs incurred for the treatment of nuclear waste. If the true costs and security risks of nuclear power technology were correctly accounted for, solar power would be less costly. Thus, introducing “Solar Loans” is a good idea, but Kanagawa prefecture should conduct a precise cost analysis of solar power and nuclear power to give more credibility to its policies.

A question was raised from the audience regarding the application of subsidies to solar water heaters in addition to photovoltaic panels. He pointed out that as the majority of energy used in households is for heating water, it would be more cost-effective to provide subsidies for solar water heaters instead of the costly photovoltaic panels. Municipality officials answered that the target of subsidies, whether it be photovoltaic panels, solar water heaters, or co-generation technologies, will be considered based on their extent of distribution and citizens’ demands.

INSTITUTIONAL BARRIERS

One participant raised the topic of institutional barriers to the introduction of new energy management solutions. Smart grids and renewable energy are assumed to come in tandem, but in reality, peak-cuts through the use of electricity storage technologies would suffice to overcome energy shortages in Japan without using renewables. However, there is a regulatory barrier to the development and distribution of electricity storage devices such as EV batteries because they are considered by law as exclusive property of power companies. Regulatory reforms should thus be the centre of debate in order to address energy issues effectively. Panellists replied that there are indeed numerous regulatory barriers to the wide dissemination of electricity storage, thus consultations are currently being held with the Ministry of Economy, Trade and Industry to examine how they should be addressed.

TECHNICAL INNOVATIONS

Regarding technological concerns, a participant pointed out that many of the technologies introduced in this session seem to be much more developed in Europe, and asked the panellists for their views on this situation. Panellists answered that as the speed of technological development is extremely fast, Japan has hopes of changing the trends.

Another question was raised from a participant on whether there is a possibility of considerably increasing the number of battery charging stations in order to boost the distribution of EVs, as there is currently a serious lack of infrastructure. A presenter replied that the increase in the number of EV battery charging stations is currently being discussed with local governments, and would indeed contribute to further distribution of EVs.

Expert Workshop < Concept and Implementation of Smart Cities >

Tuesday 26 July 14:45-17:00

Pacifico Yokohama, Japan

AGENDA
Moderator:
Prof. Hidefumi Imura, Senior Project Manager, Global Cooperation Institute for Sustainable Cities, Yokohama City University and Senior Policy Advisor, IGES
Presentations:
Mr. Fuse Tsutomu, President, Yokohama City University
Dr. Shobhakar Dhakal, Executive Director, Global Carbon Project – Tsukuba International Office
Ms. Yohko Maki, Senior Director, Global Environment Knowledge Centre, Environment Bureau, City of Kawasaki
Dr. Kanako Tanaka, Senior Researcher, Center for Low-Carbon Society Strategy (LCS), Japan Science and Technology Agency (JST)
Dr. Hidefumi Katayama, Senior Scientist/Coodinator, Institute for Global Environmental Strategies (IGES)
Dr. Leena Srivastava, Executive Director, The Energy and Resources Institute
Roundtable:
Special Lunch Session presenters and Expert Workshop presenters

Opening Remarks

Yokohama City University and IGES Collaboration:

Mr. Fuse Tsutomu, President, Yokohama City University, gave the opening remarks to commemorate the signing of the Memorandum of Understanding between YCU and IGES, and gave a description of YCU's activities within its Global Cooperation Institute (GCI) for Sustainable Cities. A consortium of universities, city governments and research organisations has also been established in September 2009, linking stakeholders within the Asia-Pacific region for sustainable urban development. Recently the concept of smart cities and low-carbon societies constitute the core of international interests, and the value of our society is questioned after the March disaster in Japan. GCI aims to tackle the challenges through collaboration in research, and academic exchanges.



Summary of Presentations

Urban policy: In order to integrate diverse approaches for reducing GHG emissions from the energy sector, urban policies need to move beyond individual technologies and shift towards a systemic approach.

Roles of Cities and Urban Energy in Climate Policy:

Dr. Shobhakar Dhakal, Executive Director, Global Carbon Project – Tsukuba International Office

Dr. Dhakal presented his views on the roles of cities and urban energy in climate policy. He underlined the urgent need to limit climate change, which has in the recent years been following one of the worst scenarios from 2,000 onwards. If climate change is to be contained within the 2 degrees threshold, emissions should be peaking now but this is not the case. The role of cities in these circumstances is central. In developing countries, which will soon overtake the OECD countries in GHG emissions, there is a need for strong policy initiatives beyond individual technologies, so that urban systems can integrate the diverse approaches for emission reduction. In order to make this transition, we need to determine how much “low-carbon” is needed for different cities, monitor the plans and achievements of mitigation measures, and be able to compare internal “energy smartness” against exported emissions. There is a vast improvement potential but most require management of systemic change such as recycling, cascading, system integration, urban form, land use, and transport. The hierarchy paradox in urban CO₂ reductions and governance (the order of policy priority and greatest achievable leverage are inversed) need to be acknowledged and overcome.

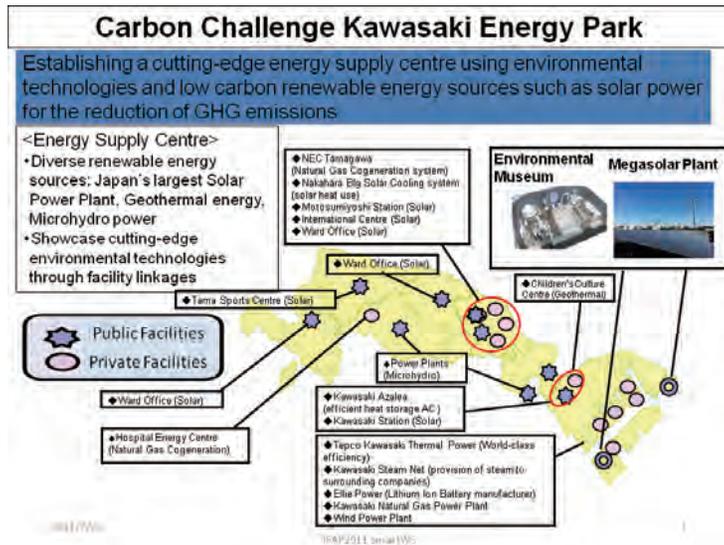
Diversification of energy sources: Strong municipal back-up should be provided for the introduction of renewable and alternative energy production technologies through diversified financial support and policy reforms.

Carbon Challenge Kawasaki:

Ms. Yohko Maki, Senior Director, Global Environment Knowledge Centre, Environment Bureau, City of Kawasaki

Kawasaki City has a long history in tackling pollution issues. Being a highly industrialised city, Kawasaki has opted for the promotion of emerging industries and R&D as a strategy to maintain competitiveness in a context of industrial decline.

There is currently a strong interest in renewable energy, in particular the mega solar plant in the coastal part of Kawasaki City which will be in operation from August with a generation capacity of 20,000 kW. The plant will comprise of an environmental education facility for visitors to learn about technologies that support the 3Rs (Reduce, Reuse and Recycle), solar power, water management, ground source heat pumps, lithium ion batteries, and smart metres. The city aims to increase installations of household solar panels from 600 to 1,500 households this year, and will explore new policies to provide support for solar panel installations in apartments. Also in response to high demand, financial support will be provided for solar water heaters. Large scale installation of LED lamps has been approved by the city council, and green electricity has been introduced to the city hall buildings. By purchasing green electricity, the city supports renewable energy production businesses in rural parts of Japan. The city focuses on regional level energy saving, and places importance on demand-side energy management.

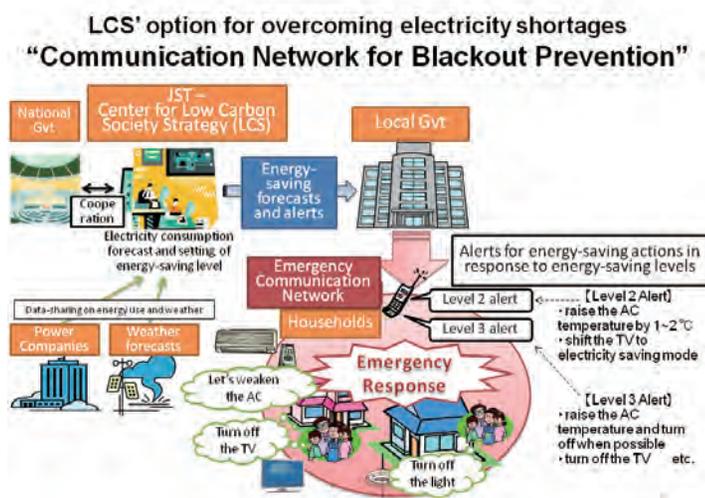


Demand-side energy management: To induce effective peak-cuts and energy-saving actions among consumers, it is essential to assess detailed consumption patterns and to select adequate messages that can be conveyed in a timely manner.

Network for Blackout Prevention:

Dr. Kanako Tanaka, Senior Researcher, Centre for Low-Carbon Society Strategy (LCS), Japan Science and Technology Agency (JST)

LCS is contributing to overcoming the electricity shortage from a research institution's standpoint. The large consumers of energy are ordered to make a 15% cut, leaving some space for balancing supply and demand. But if consumption levels rise to over



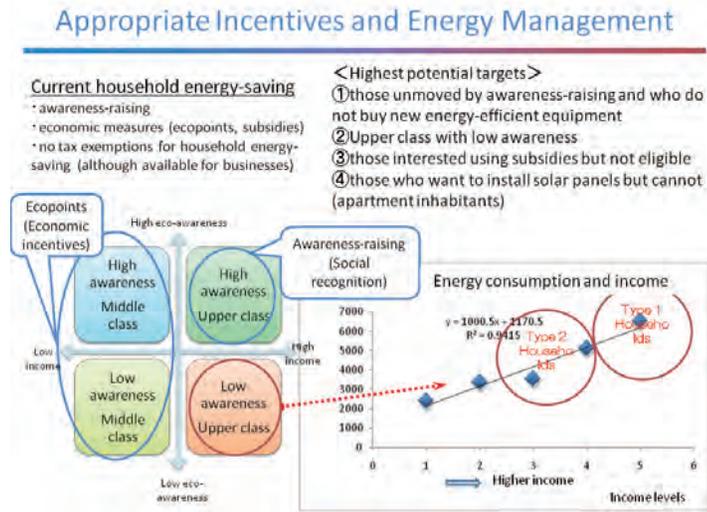
97% of the generation capacity, a planned blackout will have to be introduced. This will have strong impacts on SMEs and will constitute a considerable barrier to post-disaster economic recovery. Thus the LCS has developed a “Network for Blackout Prevention” which releases forecasts on power shortages and sends alerts on peak times, providing electricity-saving know-how through mobile phone messages. It is a service provided by local governments and distributed by the LCS. Owing to the energy saving efforts, consumption levels are lower than last year’s records show, but with rising temperature in the following months the risk of power shortages will increase. The result of a preliminary experimental study showed the effectiveness of the network: 25% of electricity consumption at subjects’ homes was cut as a consequence of the alert system. The merit of using the Network for Blackout Prevention is that energy saving advice is provided in a timely and easily implementable way. 66 local governments are now preparing for the introduction of this system. The network will need to encourage both bottom-up commitments by individual consumers, as well as information sharing from the supplier side.

Life-stage Energy Management Strategies:

Dr. Hidefumi Katayama, Senior Scientist/Coodinator, Institute for Global Environmental Strategies (IGES)

Life-stage energy management strategies need to be studied in order to find energy solutions at local levels in Asia, with particular energy supply selection based on actual demand data. The energy crisis following the March disaster has brought to light the need for information on the most effective strategies for energy saving at the household level. This will be influenced by diverse factors ranging from geographical location and climate, to people’s age groups and lifestyles. Life-stages also strongly affect the energy consumption

modes within a household. According to research funded by the Agency for Natural Resources and Energy, households show varying consumption patterns depending on the season. Thus different energy saving messages will need to be conveyed. Government offices often convey standardised messages on the



means to reduce energy consumption, but there are in fact diverse options. For instance, it is recommended to increase Air-Conditioner temperature settings by two degrees in the summer, but an easier way to achieve the same level of energy-saving with consideration for health would be to increase the efficiency of the cooling system by spraying water onto the ventilator. The shortcoming of most policies is that they only take into account the “standard” household consumption patterns, thus reducing the effectiveness for those who do not fall into that category. This also applies to Asian cases, where an additional challenge is to identify what and how data should be collected in the future in order to formulate meaningful policy recommendations.

An Asian perspective – case of India: Although urban energy policies are still fragmented in India, the rapid growth of the building sector constitutes an opportunity to introduce efficient technologies on a large scale. Experience in alternative electricity business models could provide valuable lessons to Japan.

Energy Management Opportunities and Challenges in India:

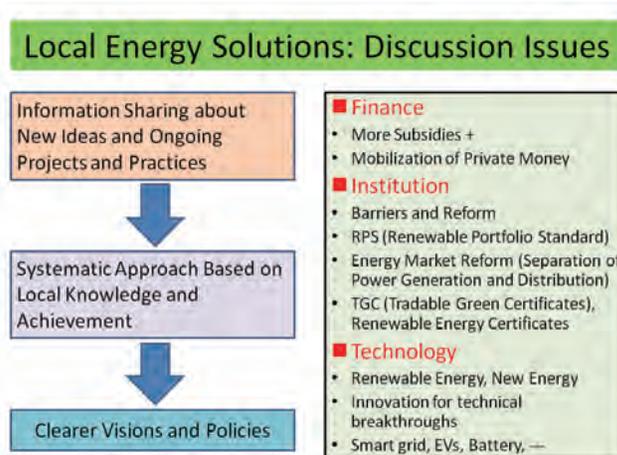
Dr. Leena Srivastava, Executive Director, the Energy and Resources Institute (TERI)

There are various programmes to improve the sustainability and energy efficiency of urban areas in India, but none of the cities have implemented them in a holistic manner so far. Building energy efficiency parameters have been set and new buildings will follow a certain standard. Given the 10-11% growth in the Indian building sector, this can be expected to generate considerable impacts. Urban population is expected to double by 2030, so the demand for housing will increase. Limiting the urban sprawl will be a considerable challenge, but it would also be a chance to introduce efficient technologies. Some municipalities, as well as the Bureau of Energy Efficiency are working in the development of building energy efficiency guidelines. Currently India has a 10% shortage on peak energy demand across the country, thus

rooftop solar power systems should play an important role for energy security. Waste to energy also has a huge potential to generate multiple benefits in the context of limited landfill capacity as well as opportunities for international collaboration. In particular Delhi is experiencing privatisation of electricity distribution leading to large investments in infrastructure and new pricing systems. There has been close work with resident welfare associations, giving people option to choose the pricing system. However, the utility company’s unwillingness to promote energy efficiency and consumers’ lack of trust in the utility companies are challenges that need to be overcome.

Roundtable Discussions – Key Points

As an ice-breaker to the roundtable discussions, the moderator, Prof. Hidefumi Imura of Yokohama City University highlighted the main topics from the previous sessions on low-carbon and smart cities such as financial implications, institutional structures, and technology developments required to progress towards energy efficiency and security.



He raised central questions from the day’s discussions, namely the possibility of continued reliance on subsidies for the dissemination of solar panels, the impediments for the development of electricity storage technologies due to clashes with the electricity business law, and the means to balance local production and consumption of energy with the need for stable grid electricity. In response to the topics raised, the panellists, composed of the five presenters from the lunch session, and the five from the expert workshop, held a lively discussion summarised as follows.

1. Scope of Low-Carbon Cities and Smart Cities

MEASURES TAKEN AT THE DISTRICT-LEVEL

The development of a Centralised Energy Management System is key to the creation of low-carbon districts.

A number of cases presented during previous sessions involve measures for energy management at the district-level. In particular, the Higashida district of Kitakyushu is an area where combinations of co-generation within neighbouring factories, solar power, wind power, and hydrogen fuel cells fulfil all of the energy needs of the district. In addition to the energy supply, demand-side management is introduced through Home Energy Management Systems (HEMS) and Building Energy Management Systems (BEMS). As pointed out by Mr. Kazuhiko Kobayashi of Kitakyushu City, Mr. Tetsuya Nakajima of Yokohama City, and Mr. Shigeru Inoue of Mitsubishi Estate Co., the next step which is required for a true district-level energy management is to evolve from the individual uses of HEMS/BEMS to the establishment of a Centralised Energy Management System (CEMS) which can use the data gathered from individual EMS to balance energy supply and demand at a larger scale.

JOINT INITIATIVES BEYOND THE DISTRICT-LEVEL

Different types of districts can be matched and linked to balance energy consumption and production at a regional scale.

Although acknowledging the need for the development of intra-district energy management, Mr. Inoue of Mitsubishi Estate Co. also underlined the fact that in cases like Dai-Maru-Yu district, efforts to introduce renewable energy sources would be insufficient to meet the energy demands. In districts with high construction densities, the challenge is to secure a CO₂-free source of electricity, and the only solution that has so far been implemented is to use green electricity from other districts or regions. However, these measures can also serve as an opportunity for collaborations between urban and rural or industrial and residential districts.

The case of Kawasaki City's mega-solar power plant presented by Ms. Yoko Maki of the Environment Bureau is also an example of such cross-district energy management. The facility which will enter operation from the 6th of August 2011 is built on a landfill containing incinerated non-recyclable waste. Although this land cannot be used due to its contaminated soil, the mega-solar plant is an effective and environmentally beneficial option to make use of what may otherwise be considered as a "negative heritage".

2. Means of implementing Low-Carbon and Smart Cities

TECHNOLOGICAL POTENTIAL

Application of new technologies can facilitate further distribution of renewable energy and allow more effective energy management.

As advocated by Dr. Kanako Tanaka of JST, solar energy is a promising source of electricity, and technological development in this field is vital to avoid the social costs of development

delays. Dr. Katayama pointed out that establishing the linkage between renewable and grid electricity, and finding ways to manage the density and quality fluctuations of renewable energy is a challenge both in terms of technology and institutional structures.

From the technological aspect, the case of Nissan Motor Co.'s EV presented by Mr. Tsunehiko Nakagawa shows a high potential for overcoming stability barriers of renewable energy through its use for electricity storage. In an era where CO₂ emissions need to be limited to a strict minimum, even vehicle manufacturers cannot escape the restrictions, and thus need to strive to provide zero emission products. These technological potentials also need to be acknowledged and supported by the consumers, the products need to reach a certain level of standardisation, and be backed by appropriate infrastructures such as sufficient number of charging stations. However, it was acknowledged that many of the technologies already available to date are often obscured by the financial and institutional barriers to their dissemination.

FINANCIAL MECHANISMS

Subsidies need to target market creation for regional production and consumption of energy, and facilitate cost-recovery from investments in renewable sources.

In Japan, both national and local governments have been attempting to promote the dissemination of renewable energy sources such as solar panels through the provision of subsidies. However, as Mr. Kentaro Yamaguchi of the Kanagawa Prefectural Government, and Ms. Maki of Kawasaki City strongly emphasised, subsidies are not limitless and thus must be regarded as an initial booster of investments and market creation, which should eventually phase out.

When envisaging the introduction of financial mechanisms to support the dissemination of renewable energy, Mr. Yamaguchi also underlined that governments, both local and national, should focus more on supporting the ease of cost-recovery instead of dwelling on reducing initial costs only.

Also when considering financial support by governments aiming to pursue low-carbon development, Dr. Leena Srivastava of TERI pointed out that there is rarely a valid comparison of real subsidies against the costs incurred by perverse subsidies provided to carbon intensive activities. She thus insisted that the first step should be to assess and to identify the perverse subsidies for an efficient use of tax-payers' money.

With regards to the national scheme of Feed-in Tariffs for renewable energy, Mr. Kazuhiko Kobayashi of Kitakyushu City noted that although this measure constitutes a monetary incentive to invest, there is in fact no need to sell away all of the locally produced electricity as Smart

Cities allow a regional sharing of electricity. Local supply and consumption of power could generate new businesses and financial flows to revive the economy at a more local scale. It was suggested that low-carbon development be pursued through energy-use at the “middle-ground” between local and national scales. However, this kind of structural reform cannot be realised without considerable institutional changes.

INSTITUTIONAL REFORM

Increasing the competitiveness of renewable energy and diversifying energy sources requires fundamental reforms in the energy production and distribution sector.

According to Mr. Tetsuya Nakajima of Yokohama City, attaining the Japanese target of reducing GHG emissions by 25% by 2020 and by 80% by 2050 will be extremely difficult if the infrastructure and policies do not evolve to meet the needs of the time, and at the same pace as the technological advances. However, he lamented that institutional support from the national government is weakening at a time when it is most needed. In order to achieve a smart city, reforms are urgently needed both within city infrastructures and institutional structures in order to stimulate private investments.

Mr. Inoue of Mitsubishi Estate Co. provided an appropriate example of institutional reform needed in the electricity business law which impedes the competitiveness of green electricity distribution. Effectively, small scale distributors of renewable energy are required to pay a costly fee to use the electrical grid when supplying green electricity to their customers. Although it is a contentious issue, the separation of power generation and transmission was mentioned as a possible alternative to the current system.

3. Low-Carbon / Smart City Business Model

OVERALL COORDINATION TO ABSORB BUSINESS RISKS

The challenge is to identify a new business entity for the coordination of production, distribution and consumption of diverse types of energy.

For the establishment of a smart city, it was recognised throughout the session, that an innovative business model needs to be developed with focus on profitability for all the agents involved. However, questions still remain as to who can undertake the coordinating role of 1) producing renewable energy regionally, 2) storing the energy, and 3) using it sparingly. It is, as emphasised by Dr. Shobhakar Dhakal of the Global Carbon Project, a systemic function that differs from any role borne by business entities so far in Japan, and the means to absorb the business risks involved have not yet been identified.

Part 2: Low-Carbon Cities in Asia and the Pacific

Expert Workshop < International Cooperation for Realising Low-Carbon Cities in Asia and the Pacific >

Wednesday 27 July 9:30-12:00

Pacifico Yokohama, Japan

AGENDA
Moderators:
Mr. Toshizo Maeda, Senior Researcher, Researcher, Kitakyushu Urban Centre, Institute for Global Environmental Studies (IGES)
Prof. Hidefumi Imura, Senior Project Manager, Global Cooperation Institute for Sustainable Cities, Yokohama City University and Senior Policy Advisor, IGES
Presentations:
Prof. Hikaru Kobayashi, Senior Advisor (Former Administrative Vice-Minister), Ministry of the Environment, Japan
Mr. Shohei Ohtaki, Counsellor, Regional Revitalization Office, Cabinet Secretariat
Ms. Suwanna Jungrungrueng, Director of Air Quality and Noise Management Division, Department of Environment, Bangkok Metropolitan Administration, Thailand
Mr. Ibrahim Zaky, S.T, Manager, Gardening Section, Department of Cleanliness and Gardening, Surabaya City, Indonesia
Mr. Masaaki Taniguchi, Manager, International Technical Assistance Section, Office for Co-Governance and Creation, Policy Bureau, City of Yokohama
Mr. Masayuki Karasawa, Deputy Director General (and Director of Environmental Management Group and the Climate Policy Division), Global Environment Department, Japan International Cooperation Agency (JICA)
Prof. Tsuyoshi Fujita, Director, Eco-City Research Programme, National Institute for Environmental Studies (NIES)
Dr. Junichi Fujino, Senior Researcher, Sustainable Social Systems Section, Centre for Social and Environmental Systems Research, National Institute for Environmental Studies (NIES)
Dr. Bernadia Irawati Tjandradewi, Programme Director, Assistant Secretary General, Asia-Pacific Regional Network of Local Authorities (CITYNET)
Prof. Mitsuru Tanaka, Professor, Centre for Regional Research/Faculty of Social Sciences, Hosei University
Observers:

Mr. Toshio Yamamoto, Regional Revitalization Office, Cabinet Secretariat
Ms. Emiko Murakami, Chief, Office for International Environmental Cooperation, Department of Environment, City of Kitakyushu
Dr. Genku Kayo, Research Associate, Sustainable Social Systems Section, Centre for Social and Environmental Systems Research, National Institute for Environmental Studies (NIES)
Dr. Maiko Suda, Junior Research Associate, Sustainable Social Systems Section, Centre for Social and Environmental Systems Research, National Institute for Environmental Studies (NIES)
Ms. Yumiko Asayama, Junior Research Associate, Sustainable Social Systems Section, Centre for Social and Environmental Systems Research, National Institute for Environmental Studies (NIES)
Mr. Moritoshi Sato, Assistant Secretary General, Asia-Pacific Regional Network of Local Authorities (CITYNET)
Mr. Naoki Masuhara, Centre for Regional Research/Faculty of Social Sciences, Hosei University
Ms. Ikuyo Kikusawa, Researcher, Kitakyushu Urban Centre, Institute for Global Environmental Studies (IGES)

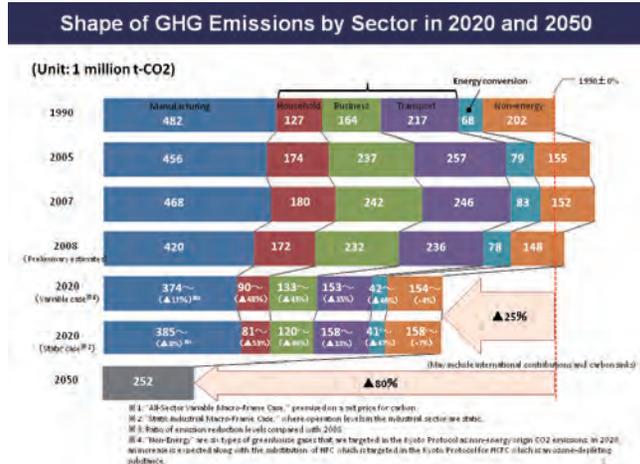
Summary of Presentations

National Government Policies and Programmes for Promoting Low-Carbon Cities

Japan's Actions towards the Creation of Low-Carbon Cities:

Prof. Hikaru Kobayashi, Senior Advisor (Former Administrative Vice-Minister), Ministry of the Environment of Japan (MOEJ)

Prof. Kobayashi underlined the need to promote low-carbon city development through reductions of greenhouse gas (GHG) emissions from the household, business and transport sectors towards achieving Japan's national target (a 25% reduction by 2020 and an 80% reduction by 2050 compared to 1990 levels), and introduced the activities carried out by the MOEJ. He explained the history of the 1998 Act on the Promotion of Global Warming Countermeasures, which led to the establishment of Global Warming Countermeasures Action Plans among local governments and the integration of climate change mitigation and energy management into city planning through monitoring and reporting mandates. Prof. Kobayashi also introduced effective measures taken by the MOEJ and other ministries to support local government initiatives in waste heat recovery, improvement of public transport, or the promotion of energy-efficient housing.



for 2020 and 2050

The Eco-Model City Project and Future Directions:

Mr. Shohei Ohtaki, Counsellor, the Regional Revitalization Office, Cabinet Secretariat

The Eco-Model Cities Programme led by the Cabinet Secretariat was introduced, together with its history, purpose, selection criteria, and selection results. The initiatives undertaken by the 13 selected Model Cities, their GHG emission reduction



Main activities by the 13 Eco-Model Cities

targets (50–80% reduction by 2050), their progress, and evaluation results were also presented. These Eco-Model Cities have established a Promotion Council for the Low-Carbon Cities (PCLCC) to share and transfer effective measures for low-carbon development through newly setup working groups and organising international seminars for disseminating such information abroad. In parallel to the PCLCC activities, the Regional Revitalisation Office is also preparing a Future Cities Programme in line with the New Growth Strategy of the national government. This programme focuses not only on environmental values such as low-carbon or resource circulation, but also promotes social values including health, medical care, child-rearing support, safety and security, and economic values such as stable employment, emerging industries, and in particular, the maintenance of social vitality in the context of a super-ageing population. In order to implement this, the development of human resources and the establishment of a consortium of corporate, industrial, educational, and local government representatives will be indispensable. The know-how and successful cases accumulated through the programme are to be disseminated widely in Japan and abroad.

Local Government Perspectives and Efforts in GHG Emission Reductions

**Low-Carbon City Development in Bangkok:
Ms. Suwanna Jungrungrueng, Director of
Air Quality and Noise Management Division,
Department of Environment, Bangkok
Metropolitan Administration, Thailand
(BMA)**

BMA aims to reduce its GHG emissions by 15% during the period 2007 to 2012, and is promoting the development of public transport, dissemination of renewable energy and energy-efficiency, development of waste management and wastewater treatment systems, and increase of green spaces.

Targets for Reducing Greenhouse Gas Emissions

Target : By 2012 Ultimate Goal: 15% reduction of GHGs emission through the implementation of activities under the preceding 5 initiatives

1. Expand Mass Transit and Improve Traffic Systems
2. Promotion the use of Renewable Energy
3. Improve Building Electricity Consumption Efficiency
4. Improve Solid Waste Management and Wastewater Treatment Efficiency
5. Expand Park Areas

BMA's 2012 target of reducing GHG emissions by 15%

These activities involve cooperation from diverse organisations including national government members, private companies and industrial associations, and international cooperation agencies such as the World Bank, JICA, and UNEP. To date, initiatives in solid waste management, wastewater management and greenery expansion are approaching their respective targets, but the transport and energy management sectors are behind the schedule because it takes time (1) to assign responsibilities for public transport development between national and local levels and (2) to obtain the understanding of the public on construction site preparation and compensation.

Low-Carbon in Surabaya City – Approaches and Challenges – :

Mr. Ibrahim Zaky, S.T, Manager of Gardening Section, Department of Cleanliness and Gardening of Surabaya City, Indonesia

Surabaya City promotes community-based waste management through free distribution of household compost bins and community cleanliness campaigns, which has led to a 30% reduction of municipal waste in 5 years. The compost produced in the 16 compost centres of the city is used for the maintenance of parks and green spaces, with the planting of over 5 million trees in the last five years and the increase in green spaces by seven hectares. In addition, the city is developing a decentralised wastewater treatment system through the rehabilitation of the Kali River banks. A weekly car-free day has also been set on Sunday mornings where cars cannot access two of the central districts of the city. In partnership with Kitakyushu City which they have been cooperating with up to now in the field of waste management, further projects are being developed in wastewater and energy management, as well as the quantification of GHG emission reductions entailed by these initiatives.

The Effort of City Government of Surabaya to Reduce the Negative Impact of Transportation to Urban Environment

CAR FREE DAY in surabaya

Car Free Day Implementation in Surabaya City Evaluation

CO2 emission savings through the car free day activities:

- Average trip length surabaya society: 13.52 km per person.
- Travel by car each day: 22 people (out of 100 people)
- Distance traveled by car: 23 x 13 = 310.96 km per day (per first day by car)
- Savings vehicle trips by car: 310.96 km per day
- Fuel savings (assuming that the average fuel consumption is 1 liter per 8 km): 310.96 / 8 = 38.87 liters per day
- Emission saving (emission factor for diesel 2.6304 kg of CO2 per unit: (Source: Department for Environment, Food and Rural Affairs of United Kingdom, 2007): 38.87 x 2.6304 = 102.24 kg per day from 100 people
- Thus emissions saving (CO2) in car free day activity per day is: 1.02 kg / person.

Action Plan to be done by City Government of Surabaya:

- Refine and expand the implementation of Car free Day in Surabaya to run better and have more impact to achieve pedestrian day/non-motorized day)
- Improve services and promote public transportation
- Improve services and infrastructure to promote pedestrian safety (Safe walking) and promote cycling (bike to work, bike to school, bike to campus, bike to shop, bike to hangout) and the development of a special cyclist lane
- Implement Car Free Day and non motorized day held on a weekday

Car-free day campaigns by Surabaya City

Yokohama as a Global City - the Compatibility of Economy and Ecology –:

Mr. Masaaki Taniguchi, Manager, International Technical Assistance Section, Office for Co-Governance and Creation, Policy Bureau, City of Yokohama

The history of Yokohama city’s development, rapid urbanisation and associated environmental pollution were presented, highlighting the policy and infrastructural improvements undertaken by the city, and its current

Minato Mirai 21 District: Showcase of Yokohama's urban development

Urban Planning

Greener City Center

- Grand mall park
- Chelyabinsk street

Integration of History, Culture and Art

- Yokohama Memorial Park
- Red Brick Warehouses

Utilization of Renewable Energy towards Low Carbon Emission

- AMA21 Pedestrian Bridge LED Lighting
- Utility lights

Landscape Tower

- Rising rain and wastewater

Showcase of Yokohama City’s urban development

activities in intercity cooperation. In particular, the G30 programme which allowed the reduction of municipal waste by 42% through citizen cooperation was underlined as a model for environmentally and economically sustainable urban development, leading to the selection of

Yokohama City as one of the World Bank’s Ecological Cities as Economic Cities (Eco2 Cities). Compiling the know-how on environmentally sustainable urban development, Yokohama City is providing advice on urban design and support for the development of human resources under its Y-PORT project.

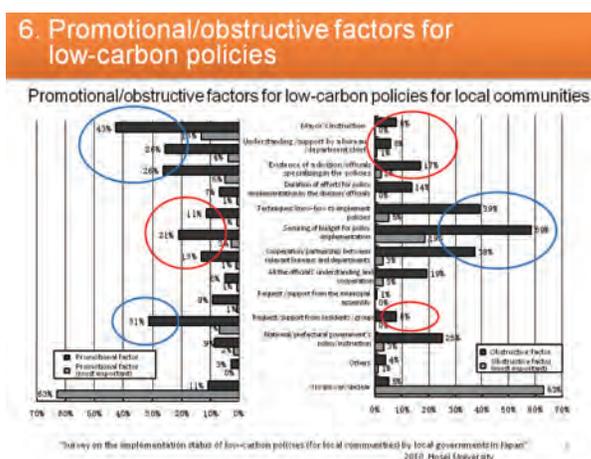
Roles of Research Institutions – Supporting Policy Analysis, Scenario-Building, and Providing Decision-Making Tools

Challenges in Establishing a Low-Carbon Society in Japanese Municipalities:

Prof. Mitsuru Tanaka, Professor, Centre for Regional Research/Faculty of Social Sciences, Hosei University

The results of surveys conducted with 230 local governments on their low-carbon initiatives showed that within local government offices, the most common initiatives were voluntary measures such as electricity-saving, water-saving, or waste sorting, and transportation choices such as reducing the number of office vehicles and using public transport for business trips. Investments in energy efficient equipment, and the use of renewable energy, were less common. In public services, most common measures were those leading to cost-cuts such as waste reduction. Low-carbon initiatives targeting citizens or private companies were limited to informative approaches and direct regulation or introduction of economic incentives were rare.

Promoting and obstructing factors for these local government initiatives have also been identified and sorted into the following categories: the leader’s level of commitment, adequacy with regional characteristics, allocation of responsible personnel, accumulation of technical know-how, securing of funding, sharing of information from other cities or research institutes, and establishment of mechanisms to promote citizen participation. The categories are to be refined and provided as low-carbon policy indicators which can be used by cities to promote low-carbon development. The applicability of these criteria will be tested in Danang City, Vietnam. Participants of this seminar (BMA and Surabaya City) have shown interest in these indicators and follow-up will be conducted with them.

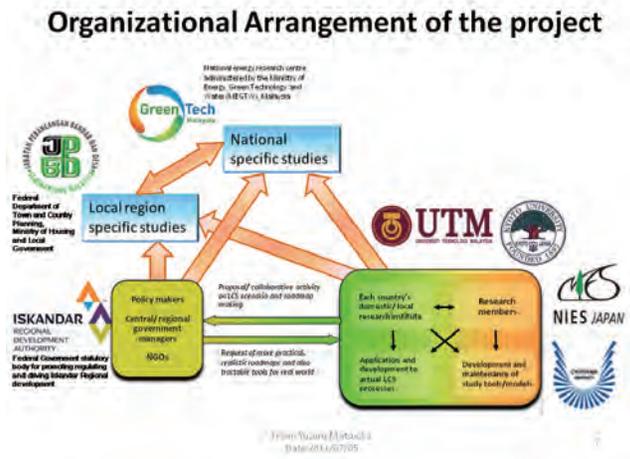


Promotional/obstructive factors for low-carbon policies by local governments

Low-Carbon City Roadmap in Asia:

Dr. Junichi Fujino, Senior Researcher, Sustainable Social Systems Section, Centre for Social and Environmental Systems Research, National Institute for Environmental Studies (NIES)

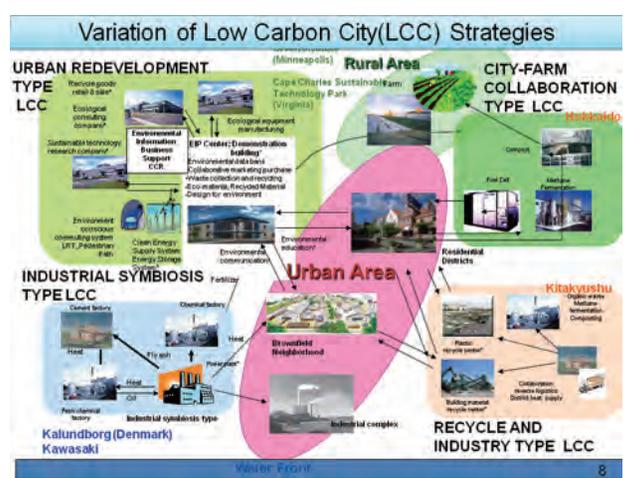
Roadmap and scenario building activities were carried out by NIES in collaboration with Japanese and Asian Cities aiming for low-carbon urban development. In Japan, Dr. Fujino’s group assisted Shiga Prefecture and Kyoto City to build roadmaps towards reducing GHG emissions by 50% and 40% compared to 1990 levels by 2030. The roadmaps included locally adequate measures in the transport, architecture, industrial, forestry, and renewable energy sectors. In Malaysia, Iskandar City, where the population is expected to double from the current 1.4 million to 3 million by 2025, the decoupling of economic growth from GHG emissions is urgently needed. NIES has supported Iskandar in developing its roadmap to reduce GHG emissions by 30-50%. NIES is also conducting research in other Asian cities, contributing to capacity-building of stakeholders through collaborative activities. These roadmap and scenario development activities engage research institutes and universities, as well as members of the city planning department from local governments. There are however additional gaps that need to be filled in order to achieve the formulated targets.



Regional System Innovation from Eco-model Cities in Japan and their Contribution to Asian cities and regions:

Prof. Tsuyoshi Fujita, Director of Eco-City Research Programme of the National Institute for Environmental Studies (NIES)

The research on environmental and economic impacts of Japanese Eco-Towns (eco-industrial parks) was presented. Eco-Towns are renowned for their high level of resource circulation, efficient use of heat and energy, and the promotion of recycling industries. Prof. Fujita presented his studies in building a simulation model of environmental technologies and social systems which can be transferred to other cities.



This modelling method has been applied within intercity cooperation between Kawasaki City, Japan, and Shenyang, China, leading to concrete recommendations for the establishment of a low-carbon industrial city. The Japanese model of low-carbon city development was presented as a package of technologies for tackling pollution, and social systems for public-private and citizen cooperation. Furthermore, by studying and comparing the European model of urban de-industrialisation, high level of citizens’ environmental awareness, and a long history of urban development, this study aims to extract the best practices from diverse development patterns, and to provide a model of low-carbon city development applicable to the Asian context.

Facilitators of Intercity Collaboration – Network Organisations, Knowledge-Sharing Platforms, and International Cooperation Agencies

Low-Carbon City Development and Promotion through Intercity Cooperation - The Case of CITYNET:

Ms. Bernadia Irawati Tjandradewi, Programme Director, Asia-Pacific Regional Network of Local Authorities (CITYNET)

The intercity cooperation activities conducted through CITYNET to promote low-carbon city development were presented. CITYNET was established in 1987 with its secretariat based in Yokohama City, and in the past 24



CITYNET's training programme and partners

years of its history, has developed into a large knowledge-sharing network of over 70 local governments, national governments and non-governmental organisations NGOs from the Asia-Pacific region. CITYNET has been promoting regional collaborations through a variety of joint activities with other intercity networks. It has also been implementing training courses in waste management and climate change mitigation and adaptation with support from international partners (World Bank, Asian Development Bank (ADB), UN agencies), bilateral aid agencies (JICA, GTZ), and other stakeholders. CITYNET and IGES have also fostered partnership through international meetings, and have agreed on further collaborations in joint seminars and training programmes for promoting low-carbon cities. It has also been advised that other organisations make use of CITYNET’s extensive intercity network through joint activities.

Introduction of an ESC Model Cities Programme in ASEAN Member States:

Mr. Toshizo Maeda, Senior Researcher, Kitakyushu Urban Centre, Institute for Global Environmental Studies (IGES)

IGES plays the role of secretariat for the ASEAN Model Cities Programme of Environmentally Sustainable Cities (ESC). This programme funded by the Japan-ASEAN Integration Fund (JAIF) is a result of recommendations formulated at the High Level Seminar on ESC (HLS-ESC) held under the framework of the East Asia Summit Environment Ministers Meeting, and draws on the experiences of the Japanese Eco-Model Cities Programme. The 14 Model Cities selected from among the ASEAN member states were introduced, and participants were invited to attend the 3rd HLS-ESC (scheduled in Cambodia in February or March 2012) where the outcomes of the Model Cities programme will be presented.

ISAP 2011 IGES-YCU Joint Seminar: Low Carbon and Smart Cities (Part 2)
Introduction of an ESC Model Cities Programme in ASEAN Member States

List of selected 'Model Cities'

Country	Selected Model Cities
1) Cambodia	Phnom Penh, Siem Reap
2) Indonesia	Surabaya, Palembang
3) Lao PDR	Xamneau
4) Malaysia	North Kuching
5) Myanmar	Yangon (t.b.c.)
6) Philippines	Palo, Puerto Princesa
7) Thailand	Maehongson, Muangklang, Phitsanulok
8) Viet Nam	Cao Lanh, Danang

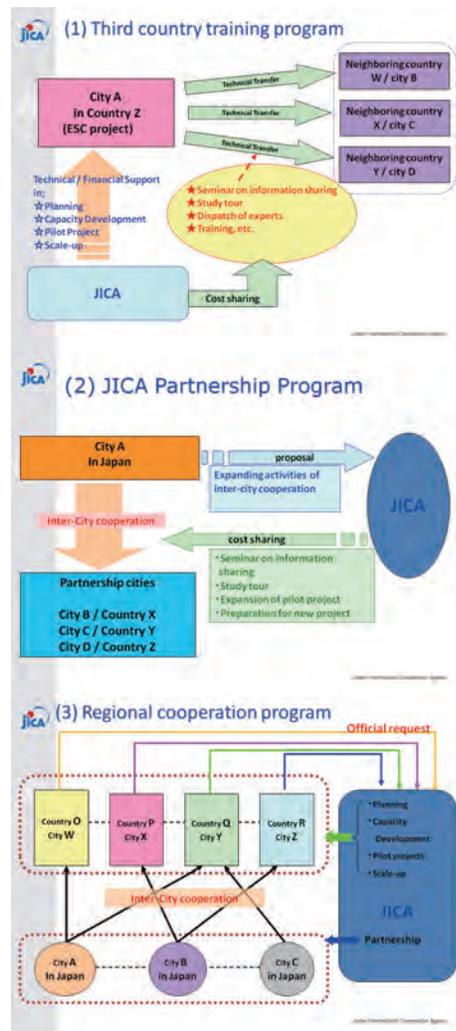
Current status: Proposals are being finalised with the support of the Regional Secretariat

ESC Model Cities selected in member countries

JICA's Effort for Low-Carbon Urban Development:

Mr. Masayuki Karasawa, Deputy Director General (and Director of Environmental Management Group and Climate Policy Division), Global Environment Department, Japan International Cooperation Agency (JICA)

JICA's schemes to facilitate intercity collaborations for low-carbon and environmentally sustainable urban development were shown in this presentation. An example of JICA's capacity-building project for GHG emission reductions has been conducted in Bangkok and elsewhere (presented by Ms. Suwanna Jungrungrueng from BMA, who has participated in this scheme), as well as the roadmap building project in Iskandar, Malaysia, as presented by NIES. CITYNET's training programmes and bilateral cooperation projects led by Yokohama and Kitakyushu Cities are also supported by



JICA Schemes for intercity cooperation

JICA's grass-roots technical cooperation programme and regional partnership programme. Additionally, JICA's Kyushu International Centre collaborates with Kitakyushu City, the Kitakyushu International Techno-cooperative Association (KITA), and IGES to conduct a new training programme in environmental technologies and city planning policies for establishing a low-carbon city.

As a general approach, JICA places importance on adaptation measures in coastal cities which are particularly vulnerable to the impacts of climate change. Mr. Karasawa explained that JICA is currently increasing support towards locally-led initiatives, and is aiming to promote regional synergies through increased collaborations with China, Republic of Korea, Thailand, and the ASEAN secretariat which are the emerging donors in international cooperation.

Results of the Meeting and Prospects for Future Collaborations

Based on this seminar and follow-up consultations, the following results and agreements on future collaborations have been reached.

At the International Conference on Promoting the Low-Carbon Cities to be organised next February by the Regional Revitalization Office of the Cabinet Secretariat, the participation of leading Asian cities committed to low-carbon development will be considered. The know-how accumulated in Japan through various working group meetings within the PCLCC can also be shared with the Asian participants.

Bangkok Metropolitan Administration and Surabaya City have shown interest in the list of local governments' low-carbon measures compiled by Hosei University. The list will be shared in the corresponding departments within the respective governments, to consider the applicability of Japanese measures. As part of the studies funded by the MOEJ's Environment Research and Technology Development Fund (ERTDF), Hosei University will be conducting similar feasibility studies in Danang City in Vietnam. IGES and NIES have also agreed to make use of joint meetings and seminars to disseminate the results their own studies to other Asian cities. A seminar to report on the ERTDF research outcomes is scheduled around January or February 2011, thus possibilities of collaboration with PCLCC's International Conference on Promoting the Low-Carbon Cities will be explored.

Agreement was reached between CITYNET and IGES for collaborating in CITYNET's training and capacity-building programme. A training programme on solid waste management is scheduled in October in Kuala Lumpur, Malaysia, and a seminar on climate change in

November in Dhaka, Bangladesh. Furthermore, it has been agreed to include selected cities of the ASEAN ESC Model Cities Programme among the recipients of CITYNET’s training programmes. CITYNET will be considering the introduction of JICA’s third-country training programme within its training components.

IGES invited the seminar participants to attend the 3rd HLS-ESC (scheduled in February or March 2012 in Cambodia), and obtained consent for collaboration from CITYNET and NIES, of which details will be discussed further.

NIES and IGES agreed to enhance its collaborative activities and decided on IGES’ participation in the low-carbon city scenario development seminar to be hosted by NIES in Iskandar, Malaysia in order to explore further opportunities for joint projects.

JICA expressed the will to continue supporting low-carbon city cooperation through its capacity building schemes including dispatch of experts and provision of training programmes.

IGES and Yokohama City University signed a Memorandum of Understanding on reinforced collaborations in tackling priority issues related to sustainable development in the Asia-Pacific region, and agreed to share outcomes through research and university consortium activities.

Key Points

Through this seminar the importance of defining city-level visions and roadmaps towards low-carbon urban development was recognised, as well as the vital role played by locally-led initiatives in implementing them. The need for external support was underlined, particularly for capacity-building and for providing knowledge-sharing platforms which can serve as an opportunity to foster synergies among collaborating organisations.

Additionally, the need to focus not only on promoting “environmentally-friendly”, low-carbon urban development, but also on securing the comfort and convenience of a “people-friendly” city was pointed out. In order to increase the effectiveness of low-carbon measures at the city level, an evaluation system on the impacts of low-carbon policies and GHG mitigation measures will be needed, together with promotion measures to encourage further commitments.

Institute for Global Environmental Strategies (IGES)

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