IGES Conference Report No. PMO-2012-01

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

Held on the occasion of
The International Forum for Sustainable Asia and the Pacific
(ISAP2012)
24 & 26 July 2012

YOKOHAMA
CITY
UNIVERSITY
Global Cooperation Institute
for Sustainable Cities

IGES
Institute for
Global Environmental
Strategies

Editor:

Hidefumi IMURA, Yuka HAYAKAWA (YCU)

Akira OGIHARA (IGES)

This joint seminar was organised as a part of the research titled “Design and implementation process of building blocks for realising low carbon society” (Led by Prof. Hirokazu Kato, Nagoya University) sponsored by the Ministry of Environment.

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Introduction to the YCU - IGES Joint Seminar

The YCU - IGES Joint Seminar on Low-Carbon and Smart Cities was held on 24 and 26 July 2012 on the occasion of the 4th International Forum for Sustainable Asia and the Pacific (ISAP2012), in Yokohama, Japan. The seminar was composed of two parts: Part 1 on "Urban Challenges for a Green and Smart Economy", and Part 2 on "Urbanization Knowledge Platform for Low-Carbon Cities." Part 1 was held as one of the ISAP sessions which consisted of presentations and panel discussion with speakers from Japan and abroad, and Part 2 was organised as a separate Expert Workshop with participation of experts working on low-carbon and smart cities in Japan.

Part 1 Session highlighted business models of smart cities and discussed actual programmes and projects undertaken by Iskandar in Malaysia, and Yokohama City and Kawasaki City in Japan. Presentations demonstrated current situation and future directions of smart city projects which are expected to play an important role to achieve a "Green Economy." Each local government showed its unique approaches towards low carbon cities such as deployment of 'green technology' including photovoltaic power generation and electric vehicles, regional energy management system and next generation transportation system as well as capacity development through environmental education and training. In addition to technology, participation and initiatives of citizens in urban planning and policy implementation was also underlined as an essential condition for building low-carbon smart cities.

Following the first session, Part 2 focused on 4 primary themes: 1) actions underway to establish low-carbon cities, 2) business models of low-carbon cities and their international development, 3) inter-city cooperation towards low-carbon society, and 4) lifestyle changes for a low-carbon society. Good practices of local initiatives and business models of low-carbon cities were shared by speakers from companies, academia, local government and non-governmental organisations in Japan and Asia Pacific region. Moreover, the ideas of sustainable consumption and basic concept and approaches to realise low-carbon society were discussed.

This two day seminar provided a good opportunity for participants to share information, ideas and thoughts on economic, environmental and social aspects of smart cities, and to promote further collaboration among them towards a low-carbon society and a green economy.

Note) Figures have been extracted from the speakers' presentation materials.
ISAP2012 was organised by IGES and United Nations University Institute of Advanced Studies (UNU-IAS) together with a number of supporting organisations including Global Cooperation Institute for Sustainable Cities (GCI) of Yokohama City University.

Part 1: Urban Challenges for a Green and Smart Economy

- DATE: Tuesday 24 July 2012, 11:00 - 12:30
- VENUE: Room 502, Pacifico Yokohama, Japan

AGENDA
Moderator:
Prof. Hidefumi Imura, Senior Policy Advisor & Senior Fellow, IGES / Professor, Yokohama City University
Keynote Speaker:
Mr. Yosuke Mochizuki, Director, CleanTech Institute, Nikkei Business Publications, Inc.
Speakers:
Prof. Dr. Ho Chin Siong, Deputy Director, International Affairs, Universiti Teknologi Malaysia
Mr. Masato Nobutoki, Executive Director, Climate Change Policy Headquarters, City of Yokohama
Ms. Yoko Maki, Executive Director, Global Environment Knowledge Centre, City of Kawasaki
Panellists:
Prof. Wanxin Li, Assistant Professor, City University of Hong Kong, China
Dr. Akira Ogihara, Senior Coordinator, Governance and Capacity Group, IGES
Dr. Abdessalem Rabhi, Policy Researcher, Kansai Research Centre, IGES
Mr. Lewis Akenji, IGES fellow

Summary of Presentations

1. Introduction

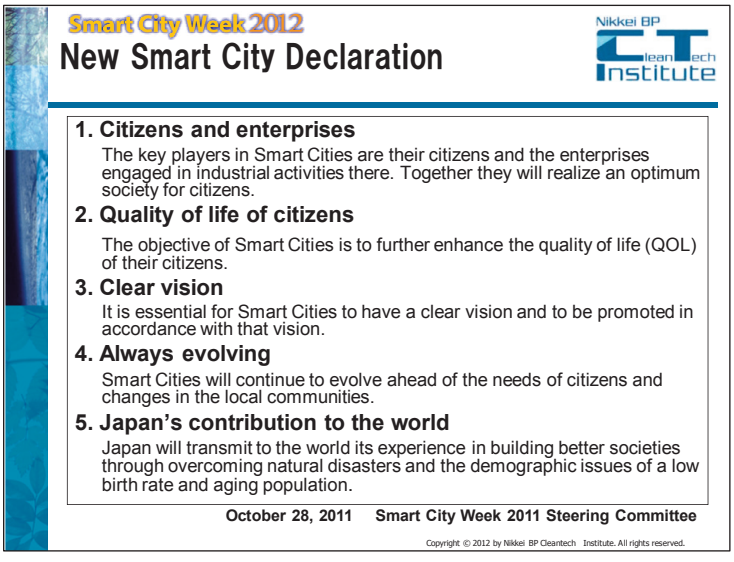
The concept of a "green economy" is essential for the development of a sustainable society that can respond to global issues such as global warming and poverty alleviation. The session focuses squarely on the importance of initiatives at a local level and the necessity of business investment for realising a green economy. Cities in Japan and beyond are highlighted for their initiatives on building green and smart cities.

In this session, the business model of "smart cities" was outlined and then the knowledge was deepened based on actual initiatives of Iskandar in Malaysia as well as Yokohama and Kawasaki in Japan, which are pursuing progressive efforts for a green economy in particular. Moreover, a discussion was held among panellists and the audience on the promotion of a green economy, and collaboration of local governments, citizens and businesses that are essential for this.

2. Keynote speech

Mr. Yosuke Mochizuki, "Smart Cities —Pilot Stage to Real Business—"

According to the research by Nikkei BP Clean Tech, the total market volume for smart grids all over the world for 20 years (from 2010 to 2030) will amount to as much as forty trillion US dollars. For the business development of enterprises, it is important to take stock of the purpose and vision of a smart city in a new light. A key concept proposed today is "Creating Shared Value," which means that social infrastructure is not any more to be provided by only governments and NGOs but it must be integrated into the private business activities so that enterprises can play a more active role in solving social issues. Then a major issue for enterprises today is the question about what kind of ground they should build their business models on.



At the Smart City Week in October 2011, an event held

in Yokohama with approximately 5,000 participants including experts from all over the world, the Smart City Declaration was adopted. This declaration presents five principles as shown in the figure above and sets out the message that it is important to change the way we think in order to plan a smart city that is cantered on people instead of material matters,.

The declaration urges that smart cities should be funded and worked on not by government agencies but by citizens in order to improve the QoL (quality of life) of the people living there, smart cities should not be centred on products, hardware or a technology but on services, software and a lifestyle of citizens, and collaboration among different industries should be encouraged to take off from field tests and shape up real business models.

The actual services we can enjoy in smart cities are divided into the following eight categories: administrative services, home networks, medical care and health, ecosystem services, smart villages, marketing, mobility and energy use. Moreover, these services comprise the following three:

- Improved administrative services that can be made more efficient and advanced by outsourcing to the private sector
- QoL improving services such as medical and health services as well as security and safety services
- Collective services which are provided not at an individual but a community level

It was also pointed out that it is inevitable to manage the information warfare to conduct smart city business all over the world,

3. Presentation

Prof. Ho Chin Siong, "Urban Cities' Challenges for a Green and Smart Economy –The Case of Iskandar Malaysia- GREEN CITIES/ REGIONAL CORRIDOR"

Malaysia launched its efforts after having committed to reducing CO2 emissions by 40% until 2020 at the occasion of COP15 in 2009. The development of green technology and the response to the climate change were established as two major government policies, and

concrete measures are being implemented in each city.

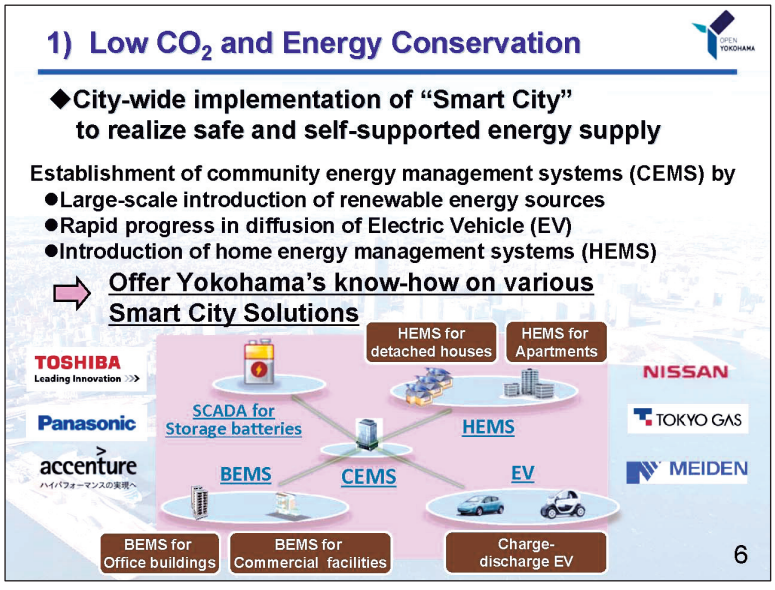
Iskandar is in an advantageous position for attracting investment and is considering future development including smart communities and a green economy. Further, activities are rolled out on the basis of two pillars: a green economy and smart growth. For the green economy, the activities include the low carbonization of the industry by means of environmental education and environmental measures, the raising of human resources contributing to a green economy, the development of green technologies to turn the region into a hub, the promotion of a green freight traffic network, low carbon agriculture outside of the city as well as the development of eco-tourism and the cultural and environmental industry. Regarding smart growth, activities include the promotion of polycentric growth, compact development based on urban growth boundary (UGB), and transit-supportive land use development. Issues for an even stronger promotion of the initiatives for smart cities in this region comprise;

- the strengthening of systematic frameworks, namely governance and monitoring,
- the provision of a conducive environment for low carbon,
- training of human resources for low-carbon technology,
- research and innovation regarding low carbon, and
- a reinforcement of dissemination and education activities on the basis of "education into dissemination and inculcate culture."

Mr. Masato Nobutoki, "Challenges toward 'FutureCity' in Yokohama"

Japan promised to the world that it will reduce CO_2 emission by 25% by the year 2020 and 80% by the year 2050, and is executing a variety of policy measures towards the achievement of those targets.

The population of Yokohama is increasing, and the city faces serious multiple challenges including an increase of GHG emissions, a rapidly ageing population and an increase of single-person households.



In the light of this background, the future vision of Yokohama is envisaged by the expansion of three values of the city: "environmental value," "social value" and "economic value." As initiatives to deal with these issues, Yokohama first provides a variety of smart city solutions for the

realisation of low carbon energy supply and energy saving, including the large-scale introduction of renewable energy such as solar power generation systems, the accelerated spread of electric vehicles and the construction of a community energy management system (CEMS) utilising the home energy management system (HEMS) in ordinary households. In addition, in order to realise a society that is friendly to the water environment and biodiversity, Yokohama is studying international transfer of its advanced technology and know-how. A challenge for the further development is to make efforts for a low carbonization of the harbour as a whole in order to increase its international competitiveness.

Ms. Yoko Maki, "Green Innovation in Kawasaki"

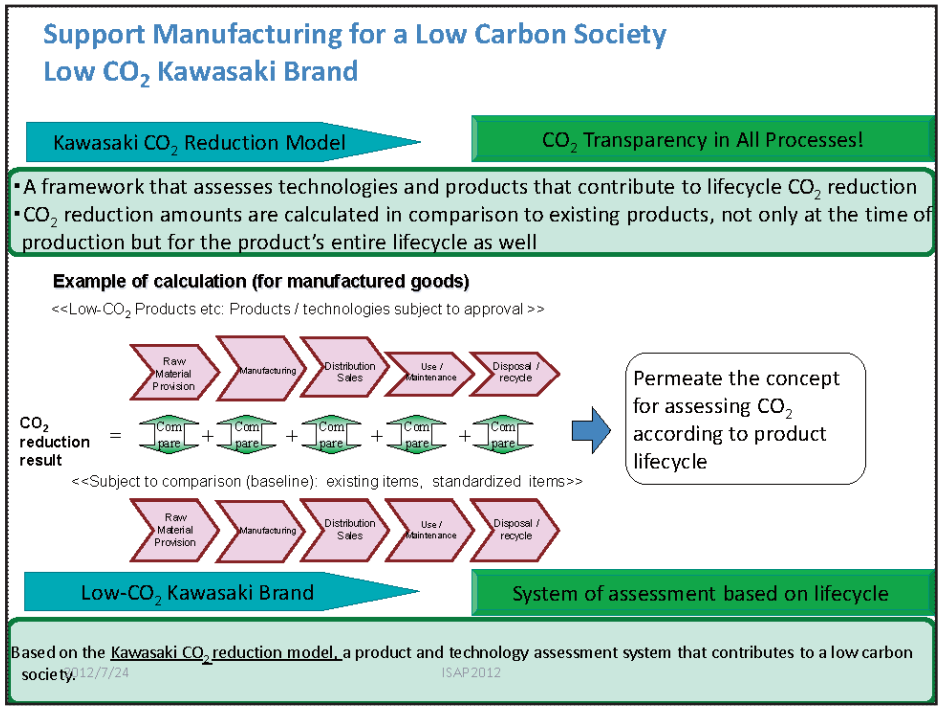
Kawasaki is an industrial city that has been supporting the high economic growth of Japan. In the past, it used to be perceived as a "grey city" with serious industrial pollution, but today Kawasaki finds its way out of that situation and is slowly turning into a "green city." The city has a high population density, and urban environmental problems are still severe. In the light of this background, Kawasaki took active measures such as the enactment of an environmental assessment ordinance as the first local government in Japan. Further, the city intends to make use of its experiences such as the municipal solid waste management in addressing similar environmental problems faced by other Asian cities, and help them make a leap-frogging towards sustainable development avoiding environmental problems.

While promoting industrial development and international cooperation by means of environmental technology it owns, Kawasaki is strengthening measures to improve the convenience and quality of life for citizens in response to an ageing society with fewer children, as well as to ensure security and safety.

As to the smart city, Kawasaki is promoting model businesses suitable to the characteristics of individual areas such as the seaside and inland areas. In the seaside industrial area, Kawasaki aims to transit from heavy and chemical industry to a recycling-based eco town. With the support of subsidiaries from the national government, private-sector investment to recycling facilities and the like was invited. In contrast, in the inland area, there has been a notable conversion in the type of enterprise facilities from conventional production factories to research and development institutes.

With respect to measures against global warming, Kawasaki already achieved a CO_2 reduction of 13.8%, which is beyond the national target of 6% reduction. The city promotes the transition to a green industry while shifting to renewable energy. Specifically, mega-solar power generation plants were built in 2011, and Kawasaki Eco-Life Museum for the Future was opened as a "facility for the citizens." The latter is an information and education centre for a lifestyle for energy and environmental preservation. Moreover, Kawasaki confers a "Low CO_2 Brand" to products and technologies that contribute to a CO_2 reduction through lifestyle change,

and the "Kawasaki International Eco-Tech Fair" is held annually considering the entire city as the showcase. The city hopes to serve as an environmental knowledge hub for Asia, utilising its technology stocks and experiences.



4. Panel Discussion

Prof. Wanxin Li :

The realisation of smart communities and green cities is a complex and interdisciplinary effort. All stakeholders in society must think about what kind of city they want to live in. Various stakeholders desire and demand different things and city planners, industry, and the communities must take into consideration different generations and different social backgrounds for a better QoL. As Mr. Mochizuki mentioned, all stakeholders, including government institutions, environmental NGOs, citizens and enterprises, must share information in a creative way. By engaging in dialogues and learning from each other we can build business models that are able to change things that we have been used to in the past.

The examples of Kawasaki and Yokohama were a very good reference. China is consuming large quantities of energy in the process of urbanization. This is why it is necessary to learn from Japanese cities and other regions. It is a task important for academics to learn from good examples and introduce the best practice.

Dr. Abdessalem Rabhi:

"Smart city" or "future city" is achievable in developed countries, however huge opportunities for GHG mitigation exist in cities in developing countries as well. Sustainable cities doe's not necessary need to be smart cities, but should be designed with consideration of environmental impact and inhabited by people dedicated to mitigate climate change and to protect the environment.

The technology deployment and diffusion, from developed countries to developing countries, can play a key role in developing sustainable cities. In this regard, the focus should be on:

- Promoting the transfer of proven and commercially available technologies;
- Low carbon technologies which match the needs of recipient cities;
- Transferring combined packages of hard technologies, technical knowledge and skills;
- Cobenefit technologies, which simultaneously enable GHG emission reduction as well as other benefits such as improve water quality, air quality, waste management, health, etc.

To achieve the above points, a multistakeholder approach should be followed. For example: Multinational funding organisations provide the necessary funding; Research institutions and academia from developed country conduct technology availability assessment; Research institutions and academia from developing country conduct technology need assessment; Private sector dispatches their experts, and customises their technologies to fit local conditions in developing countries; Finally, Governments should create enabling environment to match the seeds with the needs.

Mr. Lewis Akenji:

Reference was made to smart communities also on Rio+20, but that was different from the concept in this session. In a smart community, technology and the role played by enterprises are essential, but social and cultural elements are also of great significance. We would like to propose thinking not only in terms of smart communities but under the concept of sustainable cities. The difference between a smart community and a sustainable city is as follows. A smart community means city development centred on technology. It is a concept that focuses more on functionality than on the sense of safety or happiness of the citizens. Meanwhile, a sustainable city is a space that pays attention to both the happiness and welfare of people, and to the environment on a wide basis. As elements of a sustainable city, I would like to point out three pre-conditions that must operate in concert with each other. One is the proper attitude of the stakeholders. It is necessary that enterprises, politicians, citizens and private organisation take an attitude of contributing to making the city smarter and sustainable. The second is the importance of the presence of facilitators - to convert the attitude of the shareholders into action

of various forms. Examples of facilitators are regulations, social norms, MOUs, standards, positively discriminating pricing, etc. The third is sustainable infrastructure. Even with the best urban plan and facilitators, if there is no suitable infrastructure then people's behaviour cannot be sustainable. It is necessary to keep in mind that if attention is paid only to infrastructure, as proposed by the concept of smart cities, while attitudes and behaviour are overlooked there will be smart cities and very unruly or unhappy citizens.

Dr. Akira Ogihara:

Regarding the "degree of intervention by Japanese companies," the presentation by Mr. Mochizuki of Nikkei BP pointed out that, in the smart city market of the world, the presence of South Korean companies is strong while that of Japanese companies is relatively weak in spite of their excellent technology. In the past, when conducting a research regarding international environmental cooperation, it was found that "package-type business development," which Japan had positioned as a new growth strategy, was not proceeding very smoothly. The causes identified for this included the high risks and the difficulty of the project management. In addition, the Japanese are not able to respond to the information warfare that is the key for the participation in the global market. In a border-crossing field such as smart grids, business risk management is difficult, and it frequently happens that investors do not provide capital. Regarding project management, one could point out that there are few human resources or consulting companies that are capable of managing complex projects in an integrated manner. These will become important matters in the business development of Japanese companies in the smart city mark.

5. Conclusion

In this session, we learnt about the actual situation in cities such as Yokohama, Kawasaki and Iskandar which are implementing projects related to smart cities and a green economy. Further, it was discussed how cities should respond in the light of great changes in economic and social circumstances. Just introducing smart grids is not enough – a smart community should be formed in response to the requirements of society and the change of the times. For example, enterprises should participate in a wider range of social infrastructure services. They should even implement welfare and nursing care services in response to the increasing requests from society and from the perspective of business or corporate social responsibility. Moreover, it was pointed out that not only technology is important but also the question of what kind of services would be optimal for the citizens.

6. Question from floor

1) In Japan, "smart" is a name focusing only on network technology, but cities are more complex than that. With the dimming of industrial civilization of the 20th century, the communities need to be formed after a completely new social model. When constructing infrastructure to last for 100 years, the society itself will sometimes change while that infrastructure is being built. If smart communities are not designed under the premise that society will fundamentally change, the society that actually came up and the purpose will very probably not match each other. "What is a city?" - If we do not reconsider this fundamental question, there will be no true smart community.

- Regarding the point of how to get over the industrial civilization the 20th century and form the smart communities of the future, Mr. Mochizuki pointed out that, while complex considerations are necessary, the positioning of the national government will be particularly uncertain. While the economy is becoming globalised, the residents are able to discuss matters on a community and city level. When considering, in the light of this background, what kind of function the national government should preferably fulfill, and when thinking in the scale of centuries, it is also necessary to consider the industrial civilization, the role of the national government and the future of capitalism. However, expanding discussions up to that level will lead to nothing in the end. Separate discussions on civilization itself are required, but presently, social accounting should start with the citizens being able to live their lives with peace of mind.

2) How are Yokohama and Kawasaki securing the "participation of citizens in the decision-making process?" Were steps were taken for citizens to participate also in the consideration process of the "future city" project? Could citizens take part in the decision-making process for building a future of a sustainable smart community?
Further, Kawasaki is shifting to a green economy, and we heard that the transition of society required changes in the mindset and attitude of the citizens. How was this change in the mindset of society realised in addition to the actual changes in the system?

- Regarding the participation of citizens in the municipal government administration, Mr. Nobutoki presented initiatives related to "citizen power and renovation," which is the theme of Yokohama's policy measures. Since Yokohama adopted "Yokohama G30 Plan" in 2003 for reducing waste by 30% in 2010 compared to 2001 level, it achieved a waste reduction of 43.2%. The efforts were completed at four of seven waste incineration facilities and led to a reduction of CO2. This result was achieved in cooperation among local communities, business and municipality. Regarding measures against global warming, the construction of HEMS in 4000 households is planned as a field test for a smart grid. Participating in this field test also means making the own privacy open to the public. It was

pointed out that, even if there are many citizens with a high public consciousness, it was necessary to execute the field test upon sufficient explanation to the citizens.
Furthermore, referral was made to the Yokohama Eco School (YES), where a network of citizens, civic organisations, enterprises, universities, government and the like hold learning programs and events to share seminars, lectures and events, and this framework is also used to absorb the opinion of citizens and provide information from the municipal government with regard to smart communities. Last year, 35,000 persons participated in the YES. Mr. Nobutoki said that Yokohama makes efforts to absorb the opinion of the citizens by this kind of initiatives.
Regarding environmental technology, the high level of the waste processing technology in Yokohama has a high reputation also overseas, but what will be important when transferring this technology to overseas is a social system for collecting waste. Japan has a waste separation system, and plants can survive only because of this system. Yokohama is also considering transferring the social system together with the technology to overseas. As the "branding of Yokohama," it is considered to be important that, when a citizen of Yokohama goes overseas, he or she is regarded as a "professional in waste separation," or that an enterprise that succeeded in Yokohama is regarded as a company that contributed to a sustainable city which is friendly to the environment. Yokohama intends to continue promoting the collaboration between citizens and the public sector also in the future.

- Ms. Maki mentioned the focus on citizen participation in the municipal government of Kawasaki city, which is a municipality. In the case of Kawasaki, the speaking up of citizens was what most helped to solve the increasingly serious environmental problems. Environmental assessment, an effort that Kawasaki was the first city in Japan to work on, was also realised upon the request of citizens. Kawasaki was also the first city in Japan to establish ordinances guaranteeing the disclosure of information and participation of citizens. Ordinances are positioned below laws and regulations, but by creating these ordinances in advance of the national government, the voices of the citizens were delivered to the local and national government, and this is regarded as a history of leadership of local governments in Japan. This point should also be made known to the world. As for the changes in attitude, one could point out that the citizens themselves are very conscious of the environment. Ms. Maki said that waste separation and the efficient use of energy etc. is also advancing under the lead of the citizens.

- Prof. Ho pointed out the importance of forming a consensus for smart community city planning by input from the communities and by discussions in focus groups. As an example of Malaysia, Prof. Ho explained that in one case of a direct technology transfer from Japan, this technology could not be applied to the city smoothly and citizens left that area. On reflection of this, city planning in Iskandar now actively takes in the input from communities. Prof. Ho said that this experience taught them that it is necessary to involve a variety of stakeholders in the region, including business communities and citizens.

Part 2: Urbanisation Knowledge Platform for Low-Carbon Cities

- DATE: Thursday 26 July 13:00 - 17:00
- VENUE: Room 502, Pacifico Yokohama, Japan
- ORGANISERS:
  Global Cooperation Institute for Sustainable Cities (GCI), Yokohama City University
  Institute for Global Environmental Strategies (IGES)

AGENDA
Moderator:
Prof. Hidefumi Imura, Senior Project Manager, Global Cooperation Institute for Sustainable Cities, Yokohama City University and Senior Policy Advisor, IGES
Keynote Speakers:
Dr. Shuzo Nishioka, Senior Research Advisor, IGES
Mr. Kazuhiko Takemoto, Senior Advisor to Ministry of the Environment / Senior Fellow, United Nations University Institute of Advanced Studies (UNU-IAS)
Presentations: **Session 1: Actions Underway to Establish Low-Carbon Cities**
Mr. Satoshi Koikari, Deputy Director, Photovoltaic Power Generation Promotion Division, New Energy and Global Warming Counter-measures Department, Environment and Agriculture Bureau, Kanagawa Prefectural Government
Mr. Tsunehiko Nakagawa, General Manager, Global Government Affairs Deparment Environmentaland Safety Technologies, Planning and Advanced Engineering Development Division, Nissan Motor Co., Ltd.
Mr. Shigeru Inoue, Depty General Manager, City Planning Project Office, Mitsubishi Estate Co.,Ltd.
Mr. Masato Nobutoki, Executive Director for the Future City Promotion, City of Yokohama
Ms. Yoko Maki, Executive Director, Global Environment Knowledge Centre, City of Kawasaki
Mr. Akihiko Tateya, Consultant for Future City Promotion, Department of Environment, Toyama City
Ms. Emiko Murakami, Manager, Energy Strategy Section, Office for Environmental Future City Promotion, City of Kitakyushu

Session 2: Business Models of Low-Carbon Cities and Their International Expansion
Mr. Yosuke Mochizuki, Director, CleanTech Institute, Nikkei Business Publications, Inc.
Mr. Shoji Takenaka, Chief Fellow, Smart Community Division, Toshiba Corporation Principal Office
Mr. Yuki Shiga, Policy Researcher, Kansai Research Centre, IGES
Ms. Takako Wakiyama, Associate Researcher, Climate Change Group, IGES
Session 3: Inter-City Cooperation for Low-Carbon Society
Prof. Mitsuru Tanaka, Professor, Faculty of Social Sciences, Hosei University
Mr. Toshizo Maeda, Acting Director, Kitakyushu Urban Centre, IGES
Mr. Kyosuke Inada, Deputy Head and Advisor, Office for Climate Change, Global Environment Department, Japan International Cooperation Agency (JICA)
Ms. Michie Kishigami, Director, ICLEI-Local Governments for Sustainability, Japan Office
Ms. Yumiko Asayama, Research Associate, Sustainable Society System Division, Center for Social and Environmental Systems Research, National Institute for Environmental Studies
Prof. Takahiro Nakaguchi, Professor, Department of Architecture and Environment Systems, Shibaura Institute of technologies
Session 4: Lifestyle Changes for a Low-Carbon Society
Prof. Hideki Nakahara, Professor, Faculty of Environmental & Information Studies, Tokyo City University
Prof. Masahisa Sato, Associate Professor, Faculty of Environmental & Information Studies, Tokyo City University
Dr. Midori Aoyagi, Chief of the Environmental Planning Section, National Institute for Environmental Studies
Dr. Akira Ogihara, Senior Coordinator, Governance and Capacity Group, IGES
Discussion
Overall Comments
Closing

Summary of Presentations

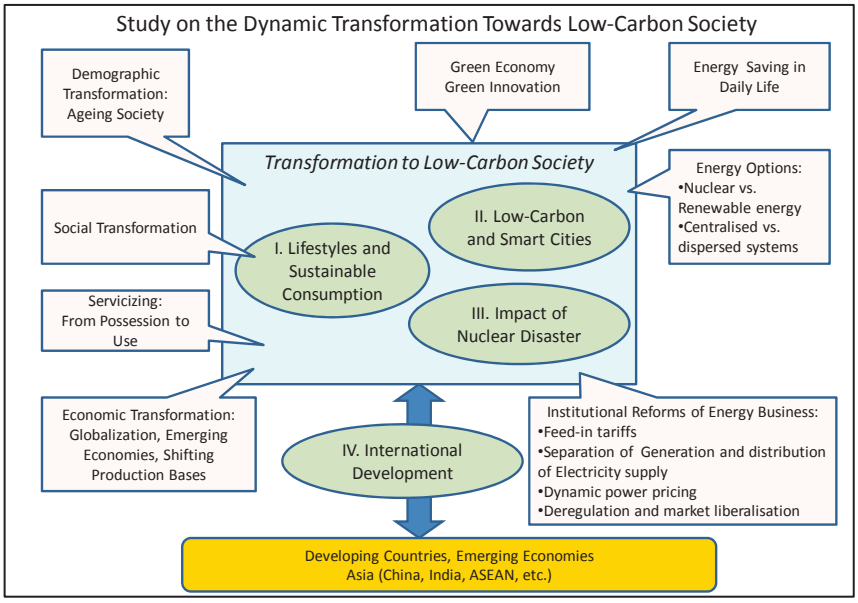
1. Introduction

This workshop was held within the context of ISAP2012. In close cooperation with IGES, the Yokohama municipal government, and others, Yokohama City University is engaged in an independent project: the formation of an Academic Consortium with overseas universities in order to promote research and education dedicated to overcoming contemporary urban challenges. The University also maintains a close network of links with the IGES Kitakyushu Office and Kansai Research Centre, Tokyo City University, the Japan International Cooperation Agency (JICA), etc., to work out specific measures aimed at the realisation of low-carbon cities.

2. IGES Strategic Research on "Dynamic Transition towards Low-Carbon Society"

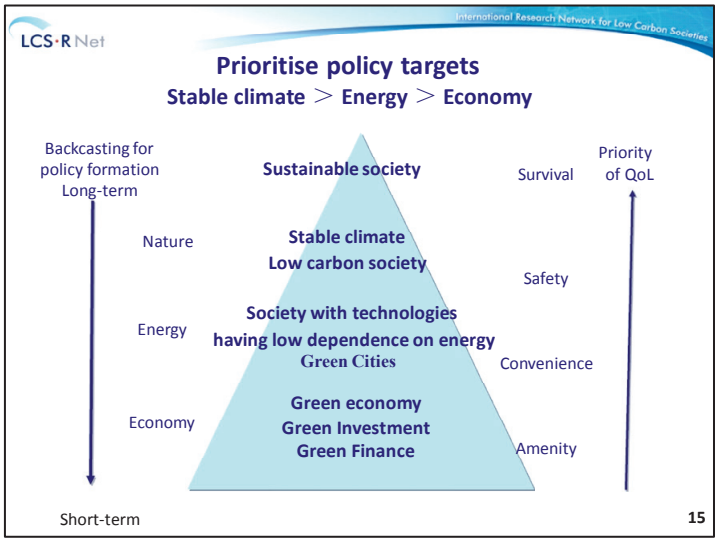
On an international level, while various goals and targets have been set within the framework of UNFCC, Rio+20 and Sustainable Development Goals (SDG), there is a need for technological development, institutional reforms and educational initiatives if these goals and targets are to be met. There is also an urgent need for specific measures aimed at turning consensus-building and consciousness-raising into radical changes in lifestyles and business practices.

This research encompasses the themes of "Lifestyles and Sustainable Consumption", "Development of Low-Carbon Cities / Smart Cities / Future Cities," and "Social and Policy Impacts of the Fukushima Nuclear Power Plant Accident." Within this framework, the research intends to investigate and analyse the factors and paradigm shifts that impact development of low-carbon society, and how these are reflected in international development, incorporating issues such as transition to low-carbon economy, and the shift to super-aging society. Meanwhile, there is a particular focus on the wide-ranging and drastic changes triggered by nuclear power plant accident on 11 March 2011, including reconsideration of the necessity of nuclear power, transition to renewable energy sources, and emphasis on energy conservation. In the course of research thus far, it has been determined that International Development is also an important theme, as it serves as a valuable reference for the development of other Asian cities.



3. Keynote Speech

Dr. Shuzo Nishioka, "Cities: Front Runners of Low-Carbon Asia":



While the realisation of low-carbon society necessitates negotiations on an international level, local grassroots measures for low-carbon society are required if they are actually to be achieved. At the G8 in 2010, a network of researchers contributing to the realisation of low-carbon society identified cities as "frontrunners" in the achievement of a low-carbon society, meaning that it is cities that encompass all the factors required for the formation of such a society. In addition, there was a recommendation that cities be used as the starting point for examination of relevant issues, as municipal governments are capable of effecting dynamic changes in a top-down approach. The following year, the keyword "transition" was emphasised, and there was an expression of concern over the negative financial impact on the actual economy and natural resources. In this context, it was suggested that low-carbon cities could provide momentum for multi-faceted investigation of a wide range of issues. Cities are presently under close examination for these reasons (Berlin, 2011).

As above chart, climate change is a barrier to achieving a sustainable society. The realisation of low-carbon cities is necessary in order to combat climate change, to show but steady change in the direction of energy and economy need to be considered. In this sense, it is a top priority over the medium to long term. Green cities should be realised by greening economic operation in short term toward a paradigm shift to a less energy-dependent society.

The IGES strategic research initiative brings together a broad spectrum of issues currently under debate, including the green economy, behavioural transformation, economic assessments, and raising of standards of living. This research holds much promise, in terms of its focus on cities and their potential to contribute to the realisation of a green economy.

Mr. Kazuhiko Takemoto:

There was a lively debate on the topic of realising low-carbon cities during ISAP2012. All the four themes outlined by Prof. Imura are related to the research issues of UNU-IAS.

With regard to (1) Lifestyles and Sustainable Consumption, we are engaged in joint research with IGES on the topic of education for sustainable development (ESD) with

cooperation of Prof. Sato, Tokyo City University. In the areas of (2) Development of Low-Carbon Cities / Smart Cities / Future Cities and (3) Impacts of the Fukushima Nuclear Power Plant Accident, we have established a team called the Sustainable Cities Future Program, which is pursuing research on urban development with a co-benefit approach incorporating both urban environmental management and global warming countermeasures. Meanwhile, in terms of (4) International Development, we are engaged in various activities of international scope as a UN organisation based in the "international city" of Yokohama.

The nuclear power plant accident of March 11, 2011 made it very clear that urban areas are shaped by energy usage patterns.

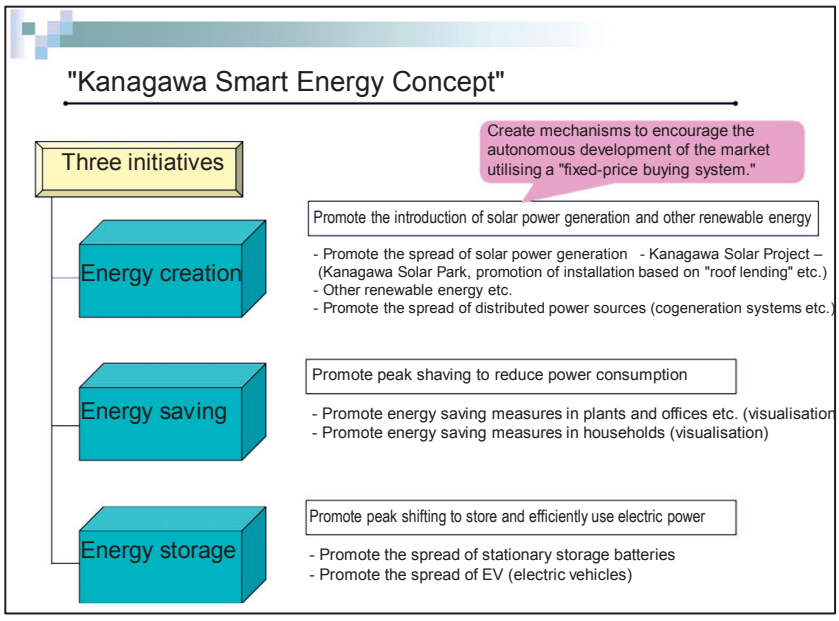
We are promoting cooperation with local governments, and working with the city of Yokohama on joint research focusing on sustainable cities and biodiversity indices. We intend to continue moving forward with cooperative efforts that leverage a wide range of networks, such as the World Bank's ECO^2 Program and the UNU-IAS Promotion of Sustainability in Postgraduate Education and Research (ProSPER.Net) network of graduate schools of environmental studies in the Asia-Pacific region.

4. Session 1: Actions Underway to Establish Low-Carbon Cities

(1) Mr. Satoshi Koikari,

"Solar Project in Kanagawa Prefecture: Promotion of Photovoltaic Power Generation"

The Kanagawa Smart Energy Concept is concerned not only with disseminating solar power, but also with cultivating greater overall awareness of energy systems. Kanagawa Prefecture identifies this as a key policy issue, recognizing that the stable, safe and secure supply of energy is the duty of regional governments in the long term. Setting forth the three basic principles of "avoiding over-reliance on nuclear power," "attentive consideration for the environment," and "local production and local consumption of energy," this Concept proposes a transition to locally-oriented, decentralised energy infrastructure. A

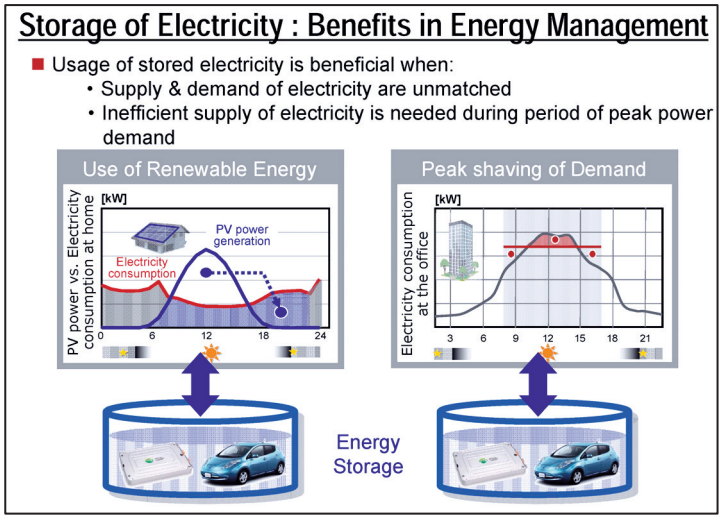


feed-in tariff system was introduced in July 2012, and the Concept aims to popularize solar power by constructing a mechanism for autonomous development.

Kanagawa Prefecture's Solar Project comprises four key initiatives. The first of these is the Kanagawa Solar Bank System, which proposes a model plan for providing prefectural residents with reasonably priced solar panels through a surplus power purchasing system aimed at minimizing the burden on individuals. The second initiative is the Roof Lending Model Plan, a business model that entails lending roofs of prefecture-owned facilities for installation of solar panels. The third is a program for matching landowners with businesses wishing to generate solar power, aimed at attracting mega-solar plants to the prefecture. The fourth is a model project for development of mega-solar plants on prefecture-owned land. In the future, further consideration will be needed to establish mechanisms for energy networking through a mix of generation, conservation and storage of energy.

(2) Mr. Tsunehiko Nakagawa,

"Promotion of Infrastructure Employing Electric Vehicles (EV) "



Established in Yokohama City, a part of Kanagawa Prefecture, in 1993, Nissan Motor Co., Ltd. currently manufactures vehicles in 20 countries and areas around the world, including Japan and offers products and services in more than 160 countries and areas worldwide. The Nissan LEAF, launched in December 2010 in Japan and the United States, and in 2011 in Europe and other markets, is the world's first 100-percent electric, zero-emission car designed for the mass market.

Cumulative global sales of the LEAF electric car have now reached 30,000 units*, and progress is being made on accumulation and analysis of data derived from LEAF vehicles on the road. For example, the collecting system of battery charge record was established. This data can be utilised as a reference for collaboration with solar panel system. Also, the data about parking situation of LEAF indicates their power storage potential. The other data shows EV consumes about 50% of total electric power in battery, then the rest of stored electric energy can be used for other purposes.

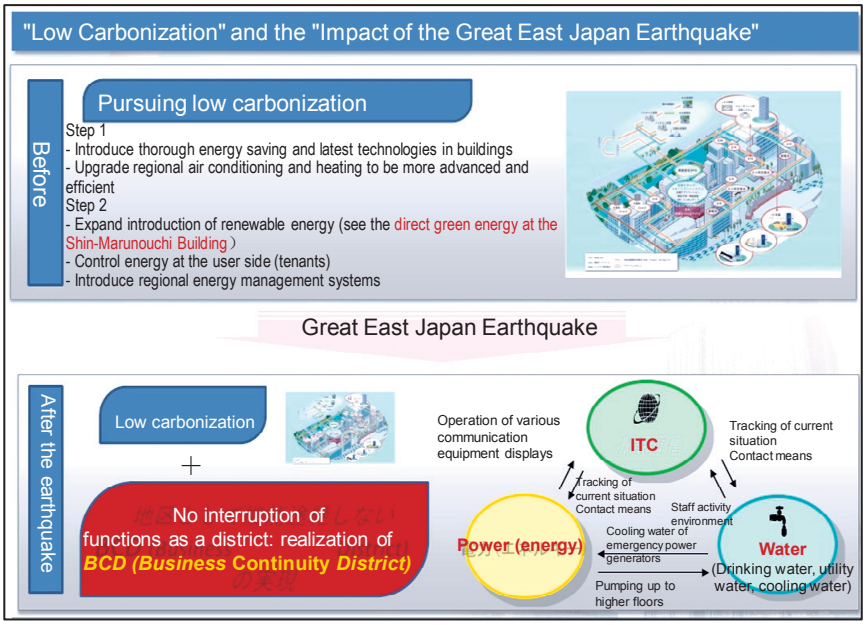
The LEAF is capable of storing enough power to run a household for two days, and it can contribute to maximise efficiency and shave peak of electricity usage through systems

incorporating both solar power generation and EVs, making them highly effective tools for energy management. Thus, EVs are expected to play a role in promoting local production and consumption of energy and reduce the reliance upon power grids through smart energy management, contributing to the realisation of low-carbon cities.

**Sales of Electric Vehicles:*
Cumulative global sales of electric cars reached 52,800 units from 2009 to 2011. In Japan, cumulative sales of electric vehicles are 17,200 units from 2009 to 2011.
(Resource: The Fuji-Keizai Co.,Ltd, "Reality and Future Prospect of Electric Vehicle Market 2012", May 31 2012)

(3) Mr. Shigeru Inoue,

"The Otemachi, Marunouchi and Yurakucho Smart City Vision"



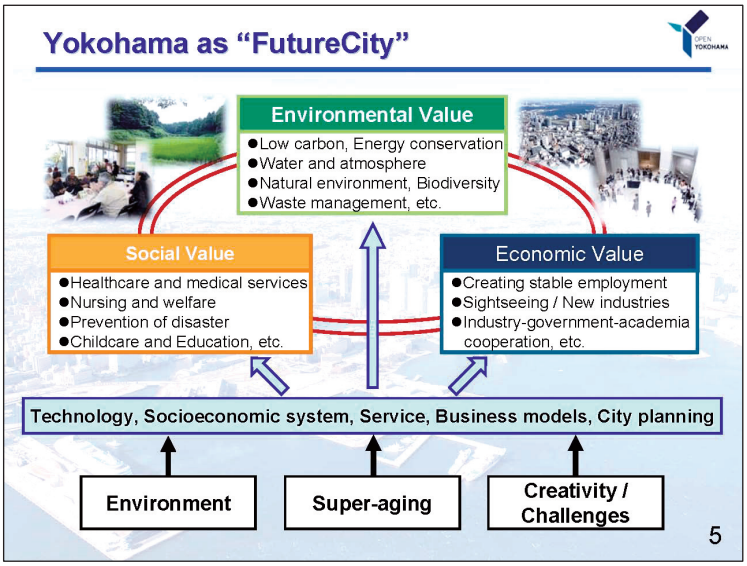
While reducing the CO_2 emission of cities is a vital target, the reality is that urban development inevitably leads to greater CO_2 emissions. As urban facilities become increasingly multi-functional, energy consumption grows accordingly. A plan of Mitsubishi Estate Co., Ltd. aims to optimise energy, waste disposal, water, transport and other systems through telecommunication networks and reduce CO_2 emissions by forming smart communities through integrated management. The plan entails deployment of state-of-the-art environmentally friendly buildings, promotion of community energy management systems (CEMS), diversification of power sources through adoption of renewable and as-yet-untapped energy and flexible exchange of heat sources among inner and outer districts on a district-by-district basis. Executing the project on a district-by-district basis means the different levels of exhaust heat utilisation. The Shin-Marunouchi Building has adopted a "Green Power Purchasing" system that calls for purchase of electricity from 100% renewable sources, which has enabled a 20,000-ton reduction of CO_2 emissions.

Following the Great East Japan Earthquake, the challenge for "realising BCD (Business Continuity Districts) that can continue to function even in the event of a disaster" was added to the already existing urban agenda of "CO_2 emissions reduction."

The Otemachi, Marunouchi and Yurakucho area is one of Japan's top business centres, with a working population of approximately 230,000 employed at the business locations of around 4,200 companies. In this district, the basic framework for a "smart city" is being formulated. With respect to the hardware, a robust fundamental infrastructure is constructed, encompassing energy, information and water networks. As for the software, effective control systems are developed for demand control and cost management, optimal administration of independent power sources based on monitoring and prediction of demand, and CO2 emissions management through procurement of renewable energy. As the energy sources become diversified, systematic management of cost, power sources and CO_2 emissions is a challenge. The most important question about management is who should take the business risk and manage the entire system based on a viable business model.

(4) Mr. Masato Nobutoki, "Challenges toward 'FutureCity' in Yokohama"

In December 2011, Yokohama was designated as a FutureCity, a national strategic project under Japan's New Growth Strategy. It will provide solution models for environmental problems in the face of drastically aging society. Yokohama's goals as a FutureCity go beyond the mere reduction of CO_2 emissions, but encompass the overall design of society.



In many cases, attempts to realise a "low-carbon city" have tended to dwell on development of technology, but a vital point is how advanced environmental technology can be deployed in the real world. Japan's level of environmental technology is among the world's highest, but there are hurdles to its effective application in society.

Currently 14 experiments aimed at demonstrating smart grid technologies are underway in Yokohama. When these are completed, however, the accompanying national subsidies will be cut off, and there is a need of follow up plans. Difficulties include the designation of an implementing body that administer the technology and formulate and implement a road map for

each project. Also indispensable are deregulation and policy transits so as to put Japan's advanced technologies to work in actual society.

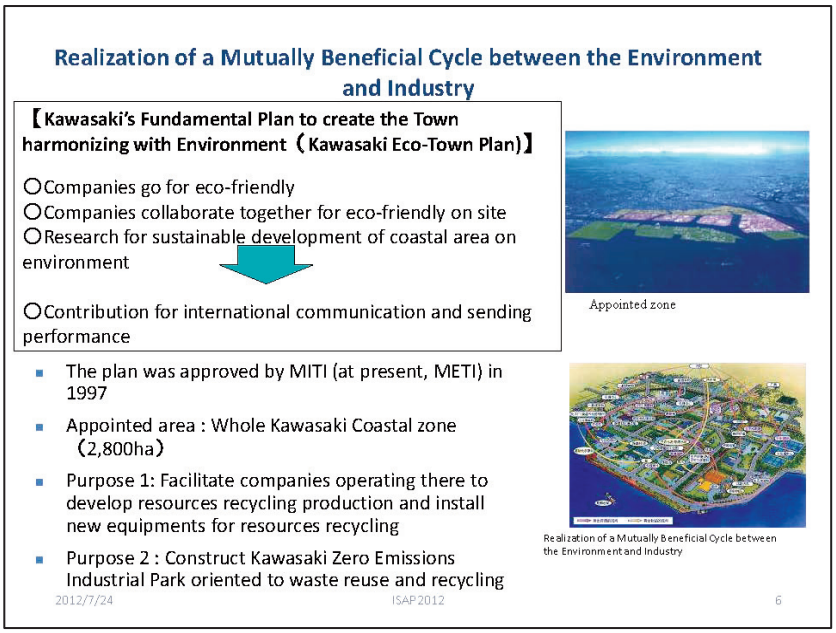
(5) Ms. Yoko Maki, "Green Innovation in Kawasaki"

The city of Kawasaki is in the midst of a transformation from a "grey city" to a "green city," but it must be emphasised that this change will not take place overnight.

As in other large industrial cities in Japan, the history of Kawasaki went through three stages. It started from the first stage of industrial pollution control by energy conservation, shifted to the stage of resource recycling, then entered the third stage of full-fledged global warming countermeasures and transformation to low-carbon society. Kawasaki is the one of the front runners that tackled such a wide range of environmental challenges and used these experiences in comprehensive urban planning.

Kawasaki passed through an era when industrial mass production peaked and then receded. At that time, it must leave a large number of former factory sites inland, which were then converted to residential areas. But the city still maintained its status as an industrial city through a shift of focus from industrial production to research and development. This was achieved through a transition in policy direction by the municipal government, with the necessary funds coming from the private sector. As a result, the seaside area of the city capitalised on its advanced materials technology has evolved into a "recycling-based industrial area" or "eco-town."

In summer 2011, Kawasaki's electricity consumption in the Tokyo Electric Power Company jurisdiction was cut by 18%. This was achieved by reductions in peak power consumption owing to the efforts of citizens and businesses. This energy conservation campaign was not only temporary, as it acted as a catalyst for a lifestyle shift. In addition, the city enacted a global warming countermeasure and is promoting the generation, conservation and storage of energy. In 2007, the city was among the first to introduce competitive bidding for public procurement of electric power. It also followed Tokyo Metropolitan

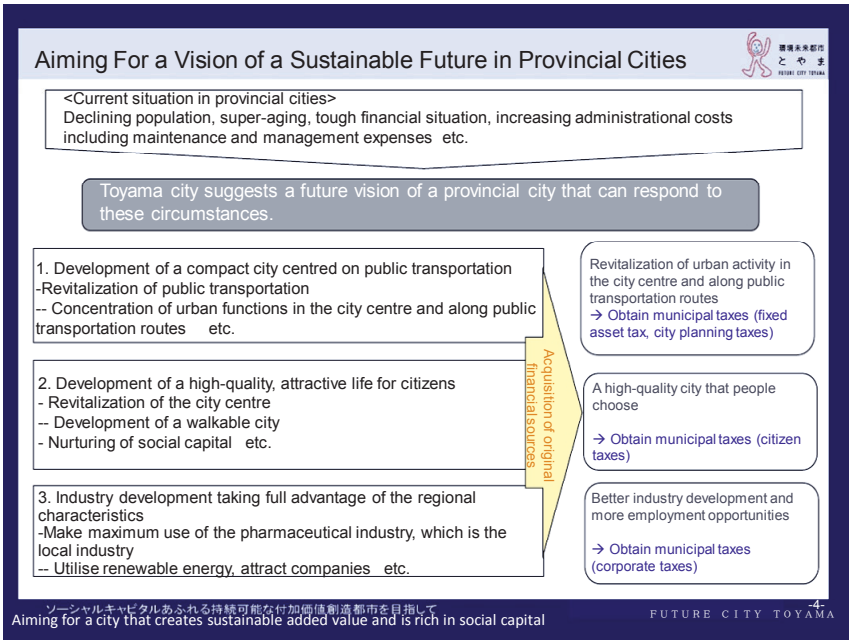


Government in introducing Renewable Energy Certificates to electric power use in government office of Kawasaki City that serve to promote public activities for renewable energy.

(6) Mr. Akihiko Tateya,

"Toyama City's Municipal Administration According to Compact City Strategy —Aiming to Be a Sustainable City Overflowing with Social Capital and Generating High Added Value—"

Toyama City is currently facing numerous challenges including a shrinking and drastically aging population, deteriorating public transportation networks, severe financial difficulties, and ballooning maintenance and administrative costs.

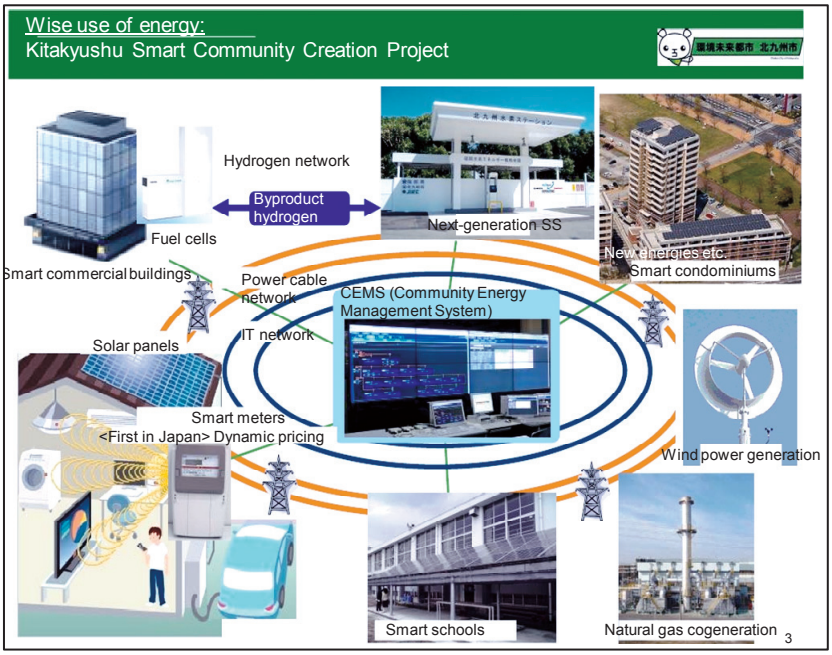


The city is characterised by a low-density cityscape and Japan's second highest rate of car ownership per household (83% of commuters get to work by car.) To address these issues, the city has been moving forward with three initiatives: "development of a compact urban environment based around public transportation," "realisation of attractive, high-quality lifestyles," and "industrial vitalization that amply capitalises on the unique traits of the region," as well as working to secure independent sources of revenue.

In terms of concrete steps, a top priority was the construction of a public network of LRT (light rail transit). Completion of the network led to a drastic increase in public transport users, approximately 2.1 times the number on weekdays and 3.6 times on weekends compared to before the switchover to light rail. The expansion of the light rail network and "Centram" (intra-urban loop line) has also led to a surge in urban redevelopment projects. Other distinctive projects in progress include development of renewable energy utilising local resources, development of safe and green smart model communities incorporating environmentally friendly housing and barrier-free, universal design, and vitalization of industry by cultivating medicinal plants in the light of Toyama's venerable history as a pharmaceutical capital.

(7) Ms. Emiko Murakami, "Kitakyushu FutureCity —Kitakyushu's Efforts to Introduce Renewable Energy and Promote Energy Conservation—"

The Kitakyushu Smart Community Development Project is part of a program in which regions are selected for demonstration experiments aimed at cultivating smart grids as an industry that will underpin Japan's future economic growth. Kitakyushu was selected for the five-year period from 2010 through 2014. In terms of generation and efficient use of energy in Kitakyushu as an area not to utilise central grid power supply, the project entails demonstration experiments to use local energy sources. It is also tested how the setting of peak rates of electricity affect public awareness of saving energy in summer 2012.

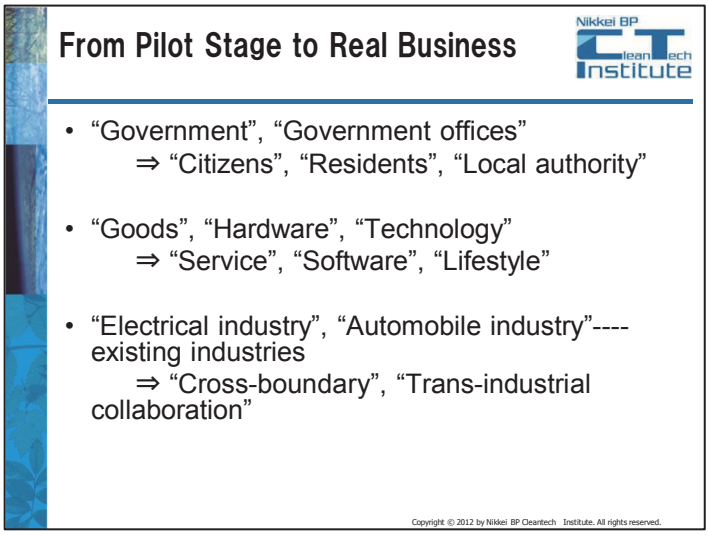


As a means of raising public awareness of energy conservation, the city implements an "urban heat escapes" program that encourages people to leave their homes and beat the heat at various spots in the city during peak power consumption hours, so as to reduce residential peak power consumption and boost local commercial activities. Other measures include subsidies for businesses that provide training courses for energy-saving consultants, and "Energy Conservation Champions project" that uses the excitement of competition to encourage elementary school pupils and members of the general public to save power. In addition to small hydroelectric generation and waste power generation, the city adopts natural energy such as solar and wind power. Tidal power generation in the Kanmon Straits is experimented as one of on-going experiments.

While Kitakyushu has a surplus supply of electric power, peak electricity rates are set so as to encourage the public to save power. In addition, the city provides early installation support for environmental facilities and a technological development subsidy programme.

5. Session 2: Low-Carbon Business and International Development

(1) Mr. Yosuke Mochizuki, "Smart Cities —Pilot Stage to Real Business—"



The promotion of the Smart Cities Program entails tackling various fundamental challenges including the "designation of the implementing body for the program," "continuation of the program after the end of government subsidies," "non-energy-related issues such as low birth rate, aging society and mobility," and "construction of a business model for corporate participation in the project." A wide range of demonstration experiments is being conducted in preparation for realising smart cities, but there is a need to actually put the program into practice.

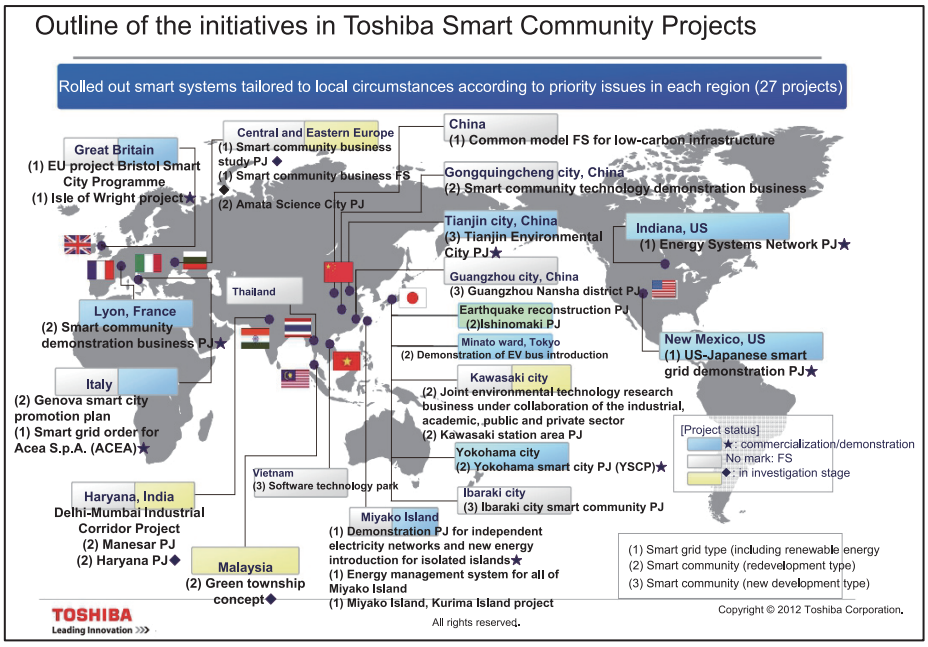
In preparation for entry into the global market for smart grids, etc., winning hearts and minds is a key point. Even if Japan possesses highly advanced environmental technology, it will not translate to business success if it remains internationally unknown. There are currently as many as 180 smart city-related projects underway in Japan, but in order to appeal them to overseas market it is necessary to show that these projects are systematically interlinked.

(2) Mr. Shoji Takenaka, "Toshiba Smart Communities Initiative"

To help construct a society capable of growing sustainably while at the same time reducing emissions of CO_2 and other greenhouse gases, Toshiba is working to develop and manufacture a wide range of products underpinning a sustainable society including power generation and transmission equipment that places minimal burden on the environment. The company is also pursuing the development of smart communities based on the experience of the electrical power network operation developed in cooperation with power companies. Toshiba is conducting smart community development projects overseas as well.

The introduction of smart grids entails both large-scale centralised power sources and dispersed power sources, and it has been pointed out that it is important to take into account social costs when considering the best mix. For example, in countries such as Japan where centralised social infrastructure is already well developed, it is more cost-effective to introduce large-scale centralised power sources employing this infrastructure. Meanwhile, in developing nations where social infrastructure is not yet sufficiently developed and smart grids are only to

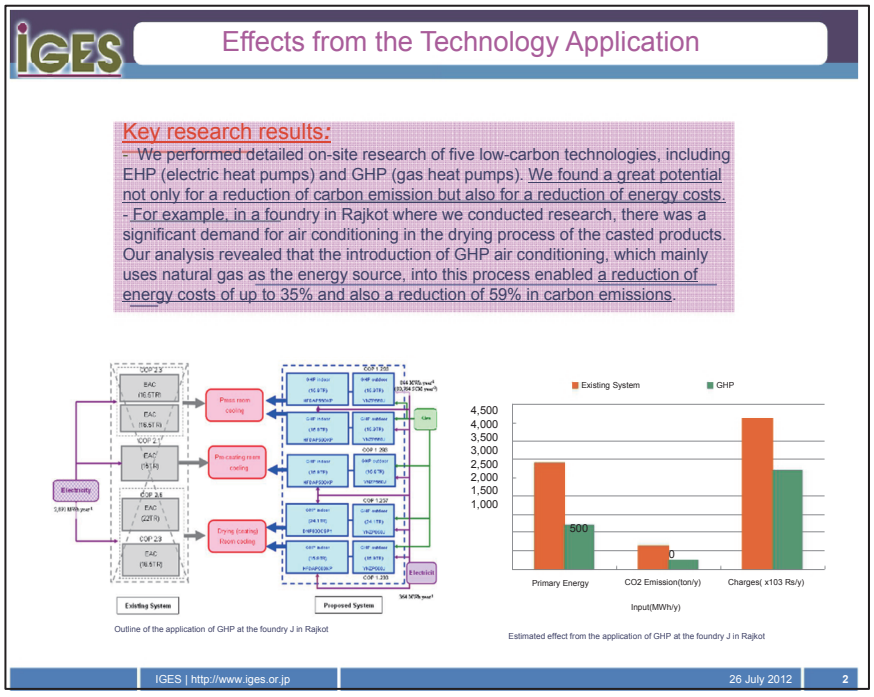
be introduced in certain urban areas, dispersed power sources could be more effectively utilised. Also, it is essential not only to make cost comparisons, but also to provide explanations that ensure user understanding about the value of smart grids, and to hold repeated discussions on the matter. The introduction of dispersed power sources is possible only with users' correct recognition about the contribution to the quality of life and with their acceptance of the costs incurred.



Furthermore, if the businesses involved cannot establish the smart grid as a business model, it will be difficult for them to enter the market. For manufacturers, it is desirable to help alleviate social costs through an optimum mix of technology and social systems. The key to the realisation of smart communities lies in both "minimising the social costs" and "maximising the social benefits."

(3) Mr. Yuki Shiga, "Low-Carbon Technology and International Technical Cooperation"

In India, ongoing growth of both population and GDP is leading to an explosive growth in greenhouse gas emissions. The IGES/KRC research project is implementing to promote application of low-carbon technologies (technology transfer project). It entails a four-year



demonstration experiment to verify the effects of technologies applied in India. In addition to technological investigations, the project includes a survey of systemic support measures (two-year cooperative program under the post-Kyoto framework) and accompanying comprehensive analysis. Research results have demonstrated that surveys of five carbon-reduction technologies including electric heat pumps (EHP) and gas heat pumps (GHP) indicate great potential for energy cost reductions as well as CO_2 emissions reductions, and energy costs can be reined in up to 35% and CO_2 emissions reduced by 59% through introduction of industrial processes of GHP air conditioners primarily powered by natural gas.

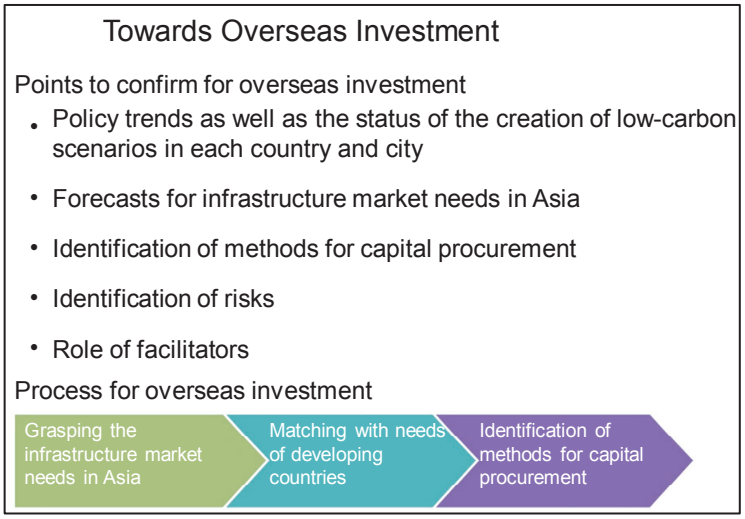
(4) Ms. Takako Wakiyama, "Funding Mechanisms for Low-Carbon Business"

For fund raising, it is important to prepare a grand design that is integrated in a local low-carbon city plan. The plan must investigate the investment potential, facilitate the participation of investors and other stakeholders including practitioners, and identify the facilitator who provides overall coordination for implementing the investment plan.

It can be recognised that there are investment needs for low-carbon cities and high potential of investment in developed cities in the world, especially in Asia. On the other hand, when considering business models for low-carbon cities in developing countries, we must examine what visions, objectives and action plans they have and how they are positioned in national, sectoral and local policies. For example, Thailand is drawing up a low-carbon city plan in cooperation with the EU. Malaysian government is collaborating with Japanese government and research organisations and creating a low-carbon city plan of Iskandar and Putrajaya.

It is essential to promote technology and business matching based on the existing city plan in target countries. In addition, in terms of urban infrastructure investment, it is clear that funding consist of various channels and sources such as public funds like governmental subsidies, pension funds, individual investment, public-private-partnership (PPP) fund, market based funds using carbon off set and emission trading.

Infrastructure investment is generally characterised by its relative stability and cash flow tied to the infrastructure, and it may attract investors who act according to long-term investment plans. Pension fund investors, for example, are willing to invest in long-lasting immobile property and they may be interested in the



investment for low-carbon cities. To draw their attention, it is necessary to prepare an integrated diagram of business model.

Lastly, the role of a facilitator that coordinates a wide range of stakeholders and funds should be underlined. In UK, for example, non-governmental organisations track the needs of corporations and the public and coordinate research projects and programs in which the national government is also involved.

6. Session 3: Inter-City Cooperation for Low-Carbon Society

(1) Prof. Mitsuru Tanaka,

"Factors in international cooperation focused on low-carbon measures in Japanese cities"

The research program on Japanese local government measures for a low-carbon society and global environmental issues is implemented at Hosei University. It analysed the potential of international cooperation among cities in Japan and other Asian countries, and identified essential factors necessary to promote international cooperation. It made the following seven findings.

- With regard to the implementation of international cooperation in environmental field, a questionnaire was sent to 65 cities to determine the areas in which Japanese cities are actually engaged in activities related to international partnership and cooperation. It identified over 30 fields of cooperation, covering the topics such as aquatic environment, atmospheric environment, global warming countermeasures, solid waste management, environmental administration and environmental education.
- The factor identified as most important for promoting international cooperation by local governments was "the intent of the counterpart country." It was cited by nearly 70% of respondents, followed by the "instructions and support of governmental leaders" and the "understanding of related agencies and divisions", cited by over half of respondents.
- Japanese cities have a potential to provide technical support especially in the field of water (water quality management and sewer systems) and solid waste treatment and disposal, where they have strengths. However, Asian cities do not merely need high technology, but "appropriate technology" which they are capable to maintain based on their own capacity.
- The strengths of Japanese municipalities lie not only in single technologies such as the "Fukuoka method" of final waste disposal, or water and air quality monitoring. What many cities can provide is an integrated package such as the waste disposal process extending from garbage separation to intermediate treatment to final disposal, and it is evident that providing this know-how and technology as a set is an effective approach.
- Interviews with experts of five cities revealed strengths in the area of public-sector technologies. On the other hand, among small and medium-sized enterprises, technologies

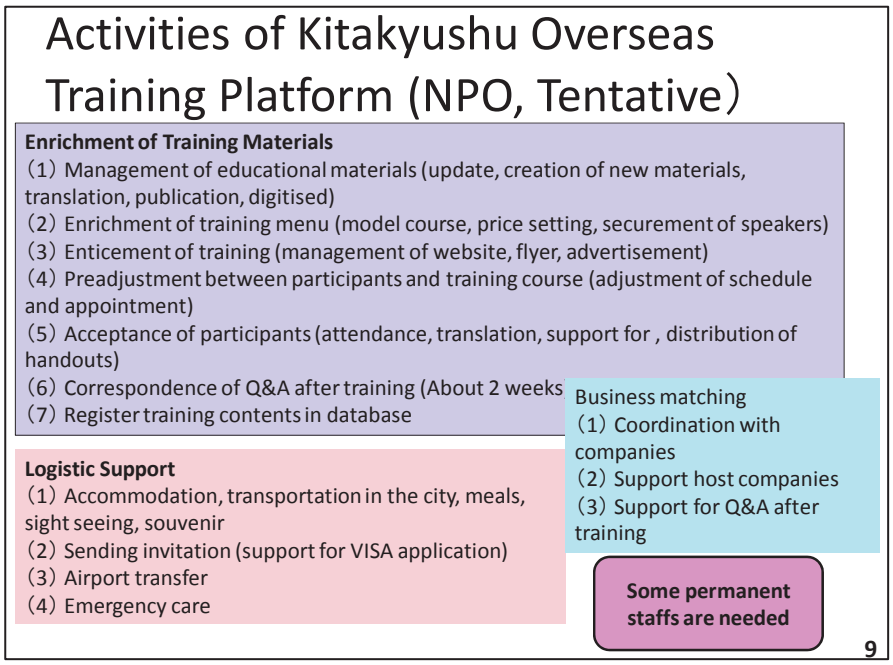
which have a high potential for application in developing countries have yet to be unearthed.

- Funds for international partnerships run by municipal governments are suffering from profit eroding due to low interest rate, and the access to municipalities' general budgets is limited due to the economic slump in recent years. Access to funds at the national level is also limited, but its need will increase.
- Participation in international meetings and inter-city networks provide opportunities for municipalities to find and launch international projects. It is important to give information to Japanese cities in a way that they can access to appropriate funding sources and find municipal partners elsewhere in Asia.

To summarise, there are limitations to the uni-directional paradigm of international cooperation, in which "providing assistance" has prevailed thus far. There is an increasing need to move forward towards "win-win" international cooperation which provides synergistic benefits to both sides, through the involvement of private sector and the use of new financial mechanisms such as clean development mechanisms (CDM), etc.

(2) Mr. Toshizo Maeda, "Kitakyushu City's Involvement in International Cooperation: Preparation of 'Capability Development Module'"

IGES/KUC is planning to develop educational materials and a for-profit training programme based on Kitakyushu City's insights. Due to an increase in the number of observers of eco-towns and other sites, Kitakyushu City has delegated the management of the training programme to IGES/KUC. In order to ensure the high quality for-profit training programme, IGES/KUC is focusing on three areas; enrichment of educational materials, logistical support and business matching. In terms of enrichment of educational materials, the materials are produced to cover such topics as environmental improvement, the history of pollution, eco-towns, garbage reduction measures, corporate

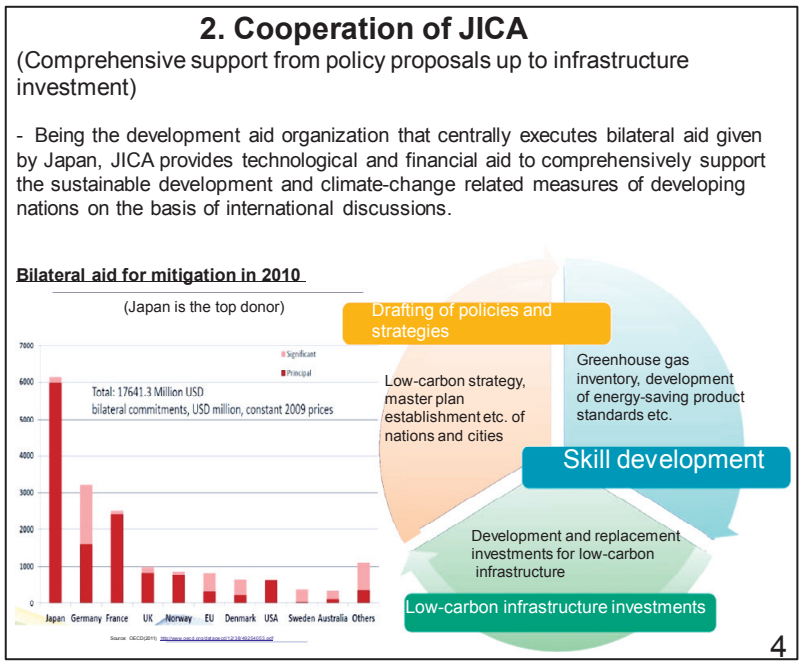


partnerships, energy, and co-generation systems. These materials are being produced in collaboration with partners including local corporations and universities. The implementation of this plan will encompass not only production, but also management and updating of educational materials.

In cooperation with JICA Kyushu, a programme on urban development to counteract climate change is being created, scheduled for implementation this year. Within the framework of JICA Kyushu's NAMA/MRV Capability Enhancement Training (three-week course), it encompasses post-training follow-up and invitation of participants from IGES partner cities including Surabaya, Nonthaburi, and Ho Chi Minh.

(3) Mr. Kyosuke Inada, "Challenges facing Asian Inter-City Cooperation Aimed at Realising a Low-Carbon Society, and JICA Cooperation"

JICA serves as a bridge for technology transfer from Japanese municipalities and corporations to developing countries. In terms of low-carbonisation of cities, potential economic benefits of introduction of low-carbon infrastructure and equipment have been pointed out in the fields of transport, energy conservation in buildings, and waste disposal.



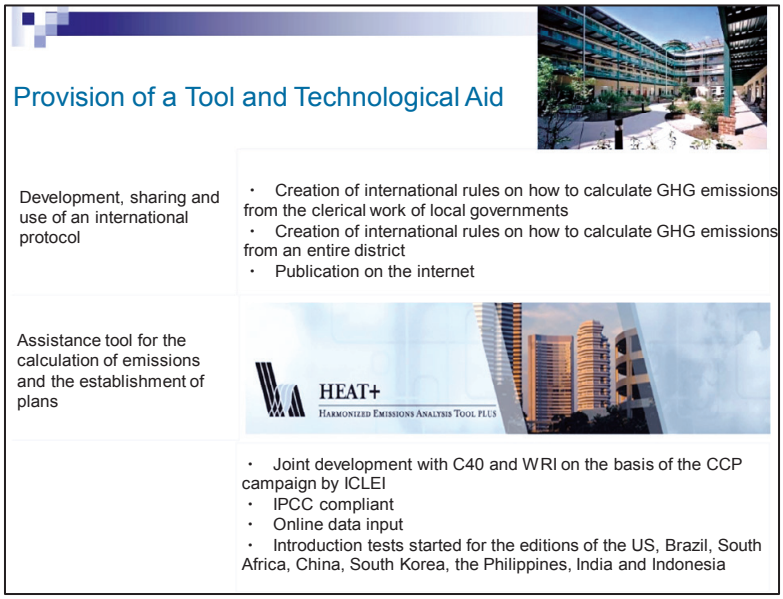
According to the Asian Green City Index 2011 (Siemens AG, 2011, p.13), high-income Asian cities can contribute to inter-city cooperation in the areas of further improvement of resource consumption efficiency, development of know-how that facilitates growth with low resource consumption, and provision of a roadmap for evolution into a high-efficiency city before a tipping point is reached. Japanese cities can contribute to the development of Asia by transferring technology and expertise to rapidly burgeoning developing countries. To this end, as a development aid organisation managing Japan's bilateral cooperation in an integrated fashion, JICA is providing comprehensive technological and financial support for sustainable development and climate change countermeasures in developing countries, focusing on the three areas of "policy and strategy formulation," "capacity building," and "low-carbon infrastructure investment" in every stage from policy proposals through construction of infrastructure.

Towards further improvement, there are three challenges facing these efforts; to systematise Japanese cities' know-how of economic development with a minimum resource consumption and forward-looking policies, to develop simple diagnostic tools that can analyse and monitor the needs of cities in developing countries in accordance with their degree of development, and to share coordination expertise for smooth cooperation between various actors such as role sharing between national and municipal governments, different departments within municipal governments, municipal governments and businesses handling the maintenance and operation of large-scale infrastructures.

(4) Ms. Michie Kishigami, "Inter-City Cooperation Initiatives by International Council for Local Environmental Initiatives (ICLEI) to Achieve a Low-Carbon Society"

ICLEI is a network of 1,200 local governments in 80 countries. In addition to its headquarters in Bonn, Germany, ICLEI has 11 other regional offices, and is engaged in developing and implementing projects tailored to the needs of each region, as well as coordinating between offices in different countries for preparation of tools, convening of international meetings and dissemination of information. The organisation is also notably characterized by its advocacy activities aimed at conveying municipalities' opinions to national governments and international organisations.

In addition to strengthening international partnerships between local governments, ICLEI is implementing programmes aimed at promoting development of low-carbon cities. The representative programme of ICLEI is the Green Climate Cities programme. At the World Mayors Council meeting held in Mexico City in November 2010, the Mexico City Pact was signed, committing signatory municipalities to 10 voluntary actions aimed at fighting climate change. As of the end of 2011, 208 mayors have signed the pact. Cities participating in the programme agree to introduce a cycle of calculating greenhouse gas emissions volumes / setting reduction targets / formulating plans / implementing plans / performing assessments. ICLEI has released a greenhouse gas calculation protocol for municipalities, and developed the HEAT+ online software for emissions volume calculation and plan formulation based on this protocol in collaboration with the C40 Cities Climate Leadership Group (C40) and the World Resources Institute (WRI). HEAT+ is now available in eight languages, and in Asia, is currently in use in India and Indonesia.



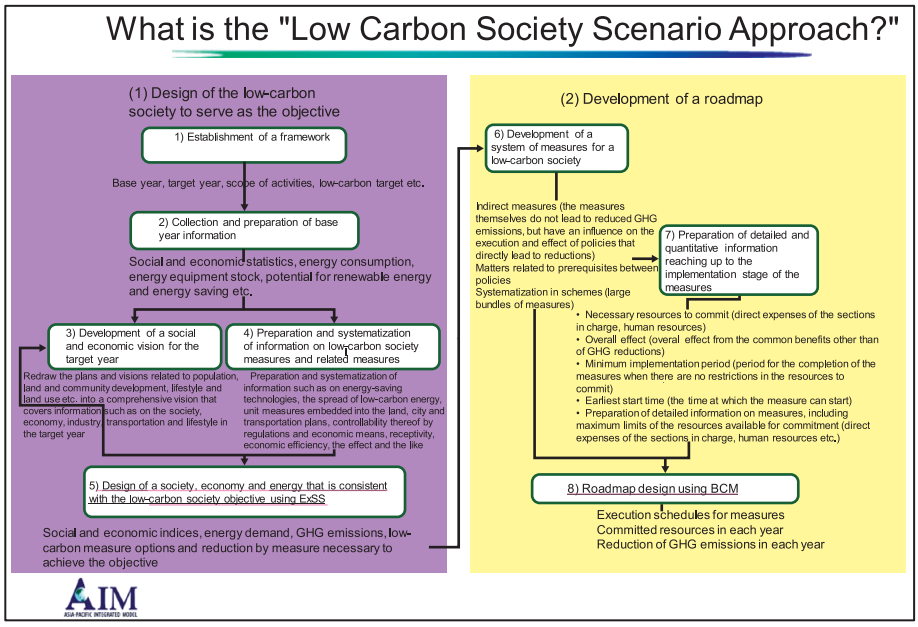
ICLEI has also developed an international registry of municipalities' climate change countermeasure results, which allows each municipality to register its reduction targets, emissions volumes, project plans and results online. The registry contributes to formulation of measurable, reportable and verifiable climate change countermeasures, and is expected to boost accountability and form a foundation for future cooperative efforts among cities.

(5) Ms. Yumiko Asayama, "Research on Development of Low-carbon Cities by the Asia-Pacific Integrated Model (AIM) Project Team"

Since AIM project team in NIES developed AIM in cooperation with Kyoto University in 1990, the team has been conducting researches towards low-carbon society with other research institutions in the Asia-Pacific region. It selects multiple factors relevant to policymaking from a wide range of phenomena in diverse fields including economy, energy, land use, climate, terrestrial ecosystems and oceans, and examines their relevance. AIM assesses policy options for stabilising the global climate with the objectives of reducing greenhouse gas emissions and avoiding the impacts of climate change.

The Low-Carbon Society Scenario Approach employed within AIM quantitatively and qualitatively indicates a scenario using the back-casting method. This approach starts with a low-carbon scenario and works backward figure out the vision of ideal low-carbon society in the future and to determine what kind of measures need to be taken and by when. In research on low-carbon society at regional and city level, AIM also employs a tool known as an "Extended Snap Shot" which estimates the total volume of greenhouse gases emitted by society as a whole. The approach has thus far been used to prepare roadmaps for political entities including Shiga Prefecture, Kyoto City, and Malaysia. Research on the low-carbon society scenario in Iskandar has been conducted jointly by Japanese universities, Malaysian universities and implementing bodies, local researchers and governmental officers have been trained, and research results was shared with local communities.

In order to implement roadmaps developed by using AIM, cooperation between local governments and inter-city networks is essential. In terms of approaches to formulating specific measures, it is necessary to encourage selection of an optimum mix by considering top-down and bottom-up theory and process.



(6) Prof. Takahiro Nakaguchi, "Efforts of the Coalition of Local Governments for Environmental Initiatives, Japan (COLGEI)"

COLGEI is composed of 53 municipalities throughout Japan, and sets numerical targets for local governments' environmental initiatives such as government agencies' internal environmental measures, energy, transportation, aquatic environment, habitats, waste disposal and resource recycling, community development that capitalises on local resources, environmental administration, environmental education, regional cooperation. COLGEI also plans to implement a project in which local governments cooperate on achieving these targets. Specific examples include implementation of joint projects employing Ministry of the Environment Eco Action Points and joint implementation of a carbon offset project. Other initiatives include the Ohisama Energy Fund Co. Ltd., a privately-funded project promoting solar power, and an environmental community labelling system for local products and eco-tourism.

COLGEI Second Common Target

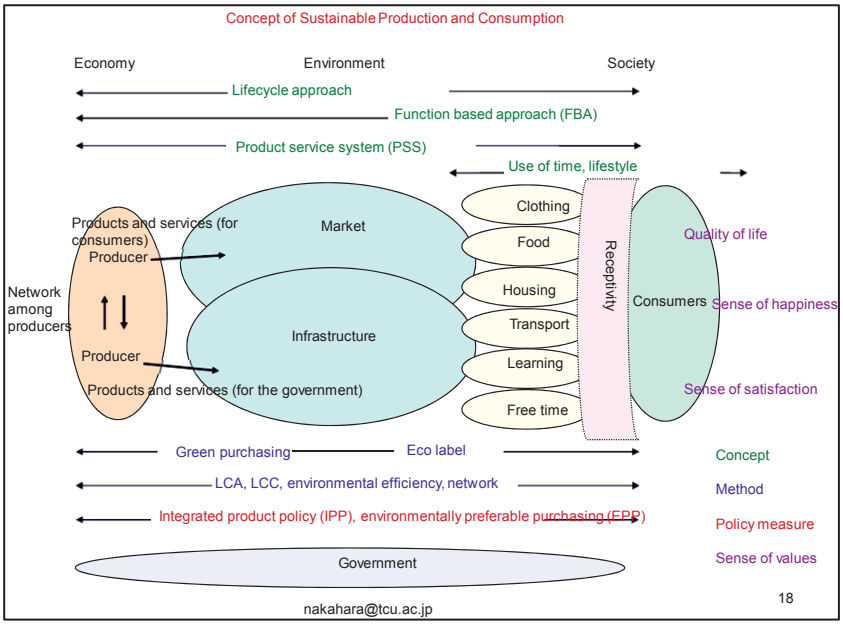
Category	Common Target	Indicator
1. Internal environmental measures	GHG and waste reduction in administrative work, efforts on pro-environmental public project	●GHG reduction in administrative work ⇒minimum 20 % reduction of each municipality from 2010 levels (including introduction of renewable energy)
2. Energy	Establish disaster-resilient and low-carbon city by adoption of renewable energy and implementation of energy saving	●consumption of fossil fuel energy ⇒25 % reduction of energy consumption per person (household and operations division) ⇒200 % of renewable energy production
3. Transportation	Establish environmentally friendly transportation system	●25 % of Reduction of CO2 emission by cars per person ●Utilization ratio of Environmental friendly transportation (foot, bicycle, public transportation)
4. Aquatic environment	Recover and maintain sound water cycle, clean water, and good aquatic environment	●Domestic waste water treatment ratio: 95%
5. Habitats	Preserve ecological service functions of forestry and agricultural land, and conserve biodiversity	●Maintain and increase representative fauna and flora of the region (determined by local government)
6. Waste disposal & resource recycling	Reduce solid waste generation, limit the use of hazardous chemicals, and promote cyclic use of resources	●Amount of daily waste generation per person ・Reduce to the level of national average if the figure is more than 5% larger than that ・Others must achieve a uniform reduction by 5% ●Amount of waste brought to the final disposal Reduce by 50%
7. Community development capitalising on local resources	Nurture local industries and promote community building based on the effective utilization of local resources and inter-community cooperation, and increase the self-sufficiency rate of food and other major resources	●Local resources（agro-products, number of sightseeing tourists, to be decided by local government) 200 %
8. Environmental administration	Establish comprehensive and efficient environmental management systems at all factories, offices and other working sites	●Introduction of EMS which has introduced external evaluation, mutual audit and citizens' audit) Introduced in all local governments
9. Environmental education	Provide environmental information to residents in an easily understandable way, and enhance their environmental awareness and encourage their actions and practices	●Number of attendants at environmental learning courses Increase to the same number as the population in 10 years
10. Local partnership	Promote community building based on collaboration with and leadership of residents	●Increase the number of partnership projects 200 %（Definition of partnership projects is to be examined）

7. Session 4: Lifestyle Innovation for Low-Carbon City

(1) Prof. Hideki Nakahara, "Sustainable Consumption"

A discussion on sustainable production and consumption was launched at the Marrakesh conference in 2002, and the following international definition of sustainable consumption was set forth in the Oslo Declaration in 2005.

> *Sustainable consumption focuses on formulating equitable strategies that foster the highest quality of life, the efficient use of natural resources, and the effective satisfaction of human needs while simultaneously promoting equitable social development, economic competitiveness, and technological innovation.*



Etymologically speaking, the word "consume", originated from a Latin word "consumptio". means "to completely use up something." Thus, "consumption" implies the act of using something until the end, and it is synonymous to such words as depletion, decay, destruction, and corrosion.

The Centennial Light is a light bulb manufactured by the Shelby Electric Company. It has been lighting since 110 years ago. It is cited as an example of planned obsolescence: manufacturing of such products as the Centennial Light is a feat of technology, but these kinds of products do not necessarily bring benefits to manufacturers. In other words, technological development and manufacturing activities are intended to promote economic benefits, and feats that are technically possible may not be performed if they do not bring profits. If we do not abandon the planned obsolescence that has increasingly become the status quo since the 1920s, attempts to change our lifestyles will be meaningless. The problem lies in the gulf between engineers in possession of technical information and the consumers and policymakers who cannot understand the technology.

Whether material consumption can be equated with happiness or not is a fundamental question concerning the quality of life. It is necessary for consumers to think more critically about this question for themselves. In environmental impact assessments and technical evaluations, there has been only insufficient consideration about the social impact of consumption. Consumers International (CI) has outlined the "eight rights and five

responsibilities" of consumers. As we work toward the realization of sustainable consumption, it is necessary to reflect earnestly on whether the rights of consumers are being protected or not.

(2) Prof. Masahisa Sato, "Lifestyle Choices for Sustainability"

Nowadays, not only characteristics and existence of environmental issues has been shifting from industrial pollution to life-related pollution, but also "life-related pollution in global context" has been actualised by economic globalisation. In educational field, programme called "UN Decade of Education for Sustainable Development" (DESD) has been launched towards sustainable development.

Education for Sustainable Development (ESD) focuses on not only traditional capacity development (realisation of their potentialities) but also the development of capabilities with self-control. A discussion is underway on how responsible actions can be taken under uncertain society and environmental carrying capacity. Consumer's acceptability is emphasized in terms of sustainable production and consumption, and it must also be considered during urban planning.

As indicated in the IGES report, lifestyle changes require not only improvements in individual behaviour and social infrastructure, but also a greater sense of environmental citizenship.

Until now, a lack of collaboration between the research and practice of infrastructure development and, education and communication meant that policies for empowerment of citizenship and selection of lifestyles choices failed to be sufficiently considered. It can also be pointed out that policy interventions for promoting connections of individual behaviour change, social infrastructure settings and the development of citizenship, and for changing lifestyles are essential factors in realising a low-carbon society.

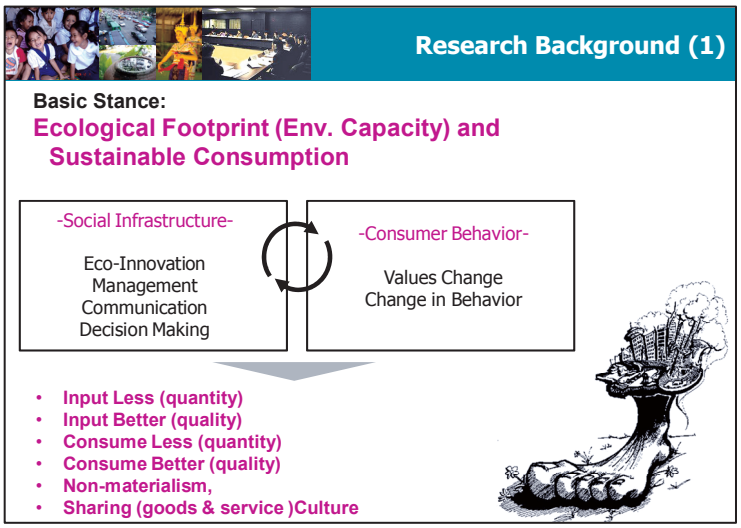
The joint research on education for sustainable consumption conducted in Japan, China and South Korea in 2010 indicated the importance of lifestyle changes based on individual viewpoints, citizenship, social infrastructure and political intervention. While citizenship has not yet sufficiently improved in many Asian countries, making information visible and sharing it through information and communication technology (ICT) and mass media channel will be a key point.

Research on political capacity for promotion of sustainable consumer behaviour and education for sustainable consumption (ESC) in Japan clearly indicated the following findings;

- enactment of the Fundamental Law for Establishing a Sound Material-Cycle Society (2000) including the Law Concerning the Promotion of Procurement of Eco-friendly Goods and Services, and The Law concerning the Promotion of Contracts Considering Reduction of Emissions of Greenhouse Gases and Others (2007)
- quality guarantees for environmentally friendly products and green labelling
- political economic measures on subsidies and reduction tax
- policy for environmental education and consumer education
- linkage with environmental management system

Moreover, it can be said that local governments' green procurement and formulation of environment-related laws have led the drive toward green purchasing. Meanwhile, the Eco

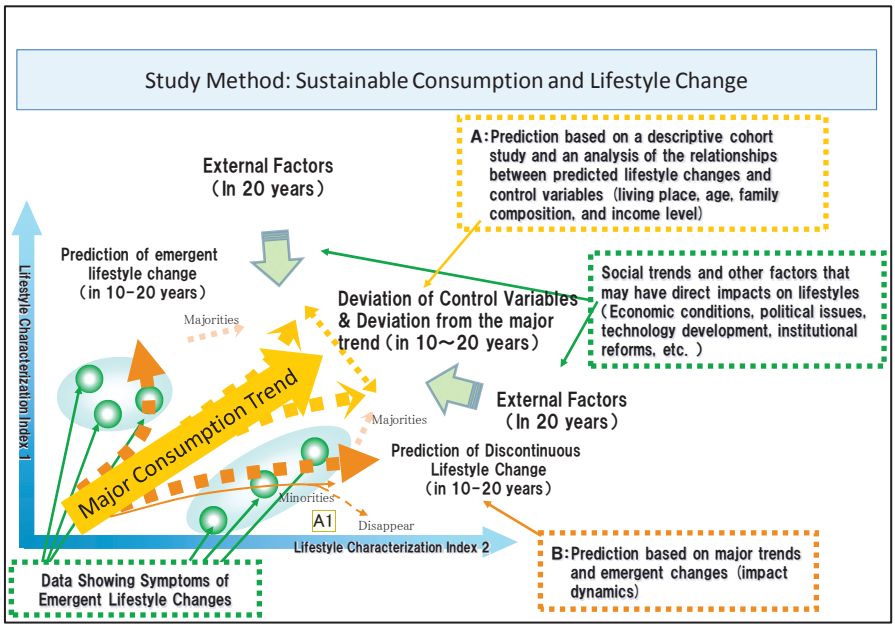
Products exhibition created new opportunities for possibility of communication not only business-to-business as originally purposed, but also business-to-consumer, as not only corporations but also many educational personnel and students took part. It is also necessary to promote consumer education at schools, in line with the enactment of the Consumer Education Promotion Law (2012). A future challenge for the Consumer Agency established in 2009 will be consideration of its role in promoting coordination and cooperation among various government ministries and agencies with regard to production, procurement and consumer policy.



(3) Dr. Midori Aoyagi, "Sustainable Lifestyle Scenarios and the UNEP Global Survey"

NIES is pursuing a "Transition to a Sustainable Society" project, sub-themes of which are promotion of sustainable consumption and lifestyles. The project is following a procedure of scenario formulation and modeling-based quantification based on a wide range of current discussions and data regarding sustainable lifestyles. Taking choices at the individual, community, local government and national government levels into consideration, it focuses on the need for multi-layered thinking, and for taking into account factors heretofore considered external to environmental concerns, such as work-life balance and irregular employment issues.

The scenarios set 2020 and 2030 as target years and discuss key trends in Japanese lifestyles as well as future indications likely to impact on these key trends, and form hypothetical scenarios for future change, then

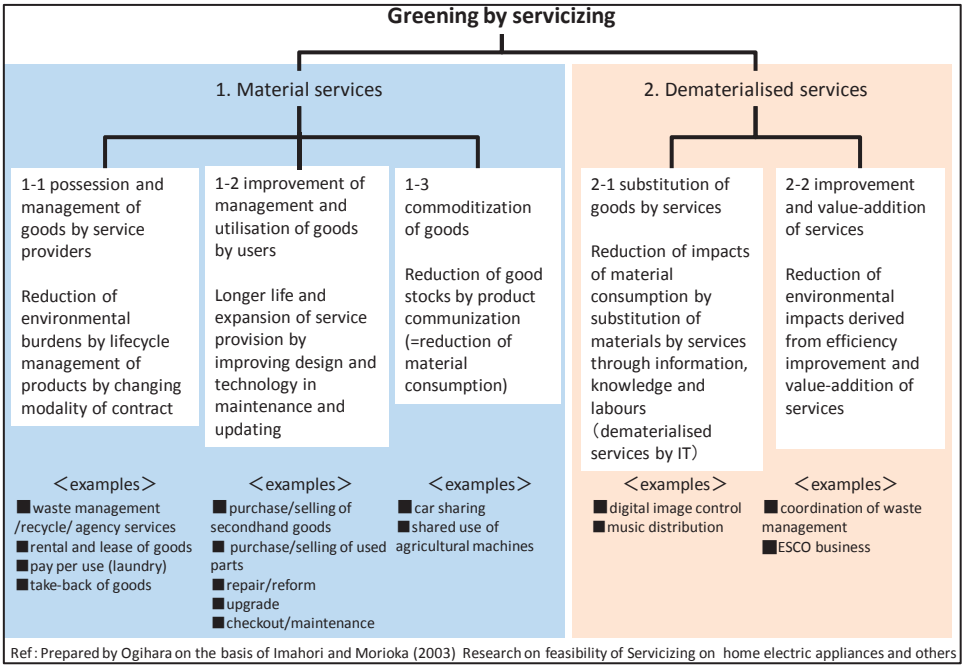


scrutinise these hypotheses. Ahead of this project, NIES participated in the UNEP global survey on sustainable lifestyles, and is tracking international trends regarding sustainable lifestyles, as well as maintaining a "lifestyle portfolio" of nine scenarios covering attitudes and ways of thinking about sustainable lifestyles among young people aged 18 to 35. This survey had multi-faceted findings, showing that young people nowadays are resistant to external interference in their private lives, but have a positive stance toward working cooperatively with others, and are keen to poverty and other social issues.

(4) Dr. Akira Ogihara,

"Servicizing: from Products to Services, and from Private Ownership to Sharing"

"The Fourth Consumer Society" (Miura, 2012) analysing consumer trends in Japan from 1900 through 2030 indicated that against a background of rapid economic growth and ensuing financial and economic crisis, public values have shifted from products to services and from "private ownership" to "sharing" in a process known as "servicizing." It is notable that the fourth consumer society (2005 through 2034) emphasises the values of lifestyle quality, happiness, and satisfaction.



Ref : Prepared by Ogihara on the basis of Imahori and Morioka (2003) Research on feasibility of Servicizing on home electric appliances and others

Also, an analysis of change in GDP and calorie intake of 1985, 1993 and 2004 indicates that in some countries, such as Japan, GDP growth and calorie intake are not directly proportional. It is predicted that developing countries will follow a similar to that in developed countries. From the perspective of low-carbon cities, it is desirable that systems be developed and awareness shifted toward sustainable consumption enabling both economic development and energy conservation, rather than toward the conventional paradigm of mass production and mass consumption.

8. Overall Discussion

The issues of low-carbon cities exist against a backdrop of a wide range of factors and viewpoints that are interrelated in a complex manner. Dr. Ogihara, for example, presented "servicizing" as a change of one's value from possession of goods to reception of services and shares, while Prof. Nakahara posed a fundamental question on "what is consumption?" A variety of such intertwined viewpoints are surrounding the issue of low-carbon society. In the case of a pollution problem, a certain level of success can be achieved by directly tackling that problem of reducing pollution. However, we think that multi-facetted approaches are necessary in the case of transition to low-carbon society; not only the technological aspects but also the viewpoints of regulatory reforms, mentalities of businesses and consumers and lifestyle and others have to be taken into consideration.

Support for developing countries is also undergoing conceptual changes; while it used to be a mere transfer of Japan's advanced technology. Objectives and methods of international environmental cooperation are changing so that they can meet specific situations and demands in each developing nation.

(1) Realisation and Smooth Implementation of Carbon Offset through Cooperation among Local Governments

Prof. Nakaguchi explained carbon offset projects conducted by cooperation among local governments. COLGEI took up this project only this year and considering to put it into effect starting this autumn. At that time, it is necessary to comply with the carbon offset system of the national government. For the integration of two systems, the Ministry of Economy, Trade and Industry and the Ministry of the Environment have already discussed, and COLGEI plans to further develop this project based on how this integration would play out.

(2) Explanations to the Citizens Regarding Increases in Cost and Other Burdens Associated with Smart Communities

According to Prof. Tanaka, it is not easy to acquire understanding of the citizens regarding cost and other burdens associated with the promotion of measures for low-carbon society by local governments. For example, as a measure against environmental pollutions, strategic investment as a mechanism to reduce damages to the citizen's living environment and health can be adopted, while in the case of global problems such as global warming, a regional effort to reduce CO2 may not necessarily be effective. What type of approaches and mechanisms are necessary to acquire understanding of the citizen on local government's efforts to solve long-term, global problems for which the effects are difficult to identify? It was pointed out that the measures for low-carbon cities may be difficult to implement unless not only their conceptual but also practical aspects are understood.

On this point, we received the following opinions.

Mr. Takenaka:

The European countries, especially Germany, have high incentives for low-carbonization, while Japan does not. Japanese, as a national characteristic, are willing to pay higher prices for healthcare services, reduction of traffic congestions and so on only if the addition of values is clear as a merit to individuals.

Children in developing nations look happy although those countries are economically poor compared with developed nations. We have realised that the sense of security provided by family and community leads to happiness of the people in developing nations. However, Japan is lacking in this. We think that the technological advancement might have destroyed local communities in Japan. We consider it important to be "smart" enough to restructure them in a way the residents can feel mutual support and regional connections when building smart communities.

While politicians and public figures are responsible for the transmission of such messages, corporations should provide technological support based on the policy. Meanwhile, we regard the transmission of information known only to technical experts to be a responsibility of corporations.

Mr. Nakagawa:

While a wide variety of data has been accumulated in current efforts to promote electric vehicles, it is thought that what the data really indicates may be obscured because of political interpretations. When looking into the future ten to twenty years from now, the issue of low-carbon cities has to be contemplated based on a new sense of mentality and sense of value that slough off conventional wisdoms.

In the previous year's workshop, it was pointed out that power generation must be contemplated from a total viewpoint, including generating efficiency and others, and that when viewed from a different angle, electric vehicles do not necessarily reduce CO2. It is also the fact, however, that without introducing EVs at a certain rate, CO2 cannot be reduced. On this point, we would like to emphasize the importance of shifting our views and address how we can take advantage of EVs.

(3) Efforts of Local Governments towards Realisation of Low-carbon Cities

Ms. Maki:

While "creation of new environmentally conscious business" and "promotion of international cooperation" are declared as the objectives of the workshop, Prof. Tanaka pointed out the limitations of local governments in making international contributions. Kawasaki city has positioned "contribution to global society via environmental technology" as a city ordinance. Currently, under the local autonomy law, local governments cannot cooperate internationally

unless it is specifically permitted by the national or regional laws or ordinances and regarded as "task in the region." Kawasaki City places the development of industries in the region as the objective of its international cooperation efforts. Based on the awareness that the problem of global warming must be addressed from a global viewpoint, the city regards it important to cooperate with Kitakyushu City and Yokohama City which are putting serious efforts to solve environmental issues. It is our wish that our workshop contribute to the expansion of such networks of cities and related organisations. To our opinion, it is important to contemplate low-carbon cities by placing business at the centre in order to pass the effort to the next generation.

Prof. Nakaguchi:

Merely deploying measures to reduce global warming will not convince the residents. First, it is important to raise awareness that the threat of global warming has extended to each region, given the current situation in which flood, heat strokes and other health hazards are inflicted on residents, although all of them may not necessarily be attributed to global warming. It is thought necessary that local governments share the awareness that they must address the global warming problem for the safety of their residents. In addition, in the efforts at the local government level, investment has to be made to develop the measures to strengthen regions from both viewpoints of adoptive and reduction measures.

On the other hand, there are limitations to what local governments can do. We plan to examine useful proposals made by COLGEI based on current situation on what types of adoptive measures are deployed in local governments and what divisions should be made between the role of local governments and that of the national government. The research outcome of Prof. Tanaka will also be taken into account during this process.

9. General Overview

Dr. Nishioka:

"The realisation of low-carbon cities" and "their realisation in Asia as a whole" are understood as the two most important viewpoints. While there are some gaps between "businesses that try to fulfill consumption demand" on the supply side and "consumption activities that seek satisfaction with what is given" on the consumption side, it is necessary to question how the total global resources should be used by all based on time priority.

With respect to production and consumption in the past, the production that was carried out according to the supply side logic and the strategies implemented by Japanese government to protect consumers need to be reflected. The consumers, who have been content under the protection of the government strategies, have never given any proposal or participation concerning "production and consumption".

It has to be recognised that it is essential to realise green economy not by 'co-benefit of other policies,' but by 'co-benefit of low-carbonisation itself.' It also must be recognised that when co-benefit is introduced, it is possible not only to reduce the total amount of CO2 emission but also to enhance public welfare. It is of importance to call out to residents to understand these issues. What is important is to consider how we can pass natural resources to the next generation.

The society is seeing a drastic transformation responding to the changes in situations represented by recent nuclear accidents at power generation plants, financial crisis, global warming problem and resource problems. In fact, it is cities that can realise a low-carbon society. This research seems to be a great opportunity to carry out the transformation based on a wide range of factors.

Prof. Imura

The environmental problems, which differ from the pollution problems, cannot be solved based on a single-minded logic, and must be contemplated taking into account its surrounding problems. As for consumption, it is also necessary to contemplate "happiness" from a fundamental viewpoint on "what is consumption?", not based on simplistic discussion on "how to lower electricity bills".

Further, it is thought that a true low-carbon society cannot be built without communications among corporations, local governments, research institutions and other various stakeholders that are involved in urban development. It is also true that the local governments' activities are limited to their respective regions, lack interchange and cooperation with other regions. It is important that knowledge platform be formed through these researches and workshops. Towards further in-depth study, the discussion will be continued in workshops with more focus on specific issues.

Key points

Through the seminars on 24 and 26 July, some important ideas and challenges towards smart cities and low-carbon society were recognised. Discussions through the seminar contributed to deepen the understanding on the possible applications of smart city models to rapidly developing cities in Asia-Pacific.

Nowadays, the global market of smart city has been growing continuously, and many countries put great efforts to develop green technology and infrastructure of sustainable energy management. Japanese government initiated 'FutureCity Initiative' and other projects, and supports local government to establish unique smart cities utilising regional resources. Actual smart city-related projects were introduced by Kanagawa Prefecture, Yokohama City, Kawasaki City, Toyama City and Kitakyushu City. As a common key point, these local projects envisage energy management system based on renewable energy such as photovoltaic power generation and hydroelectric generation with a concept of "local production and consumption of energy."

Furthermore, companies, local governments and NGOs recognise the importance of building effective business model of smart cities. It is necessary to encourage companies to enter into business, in which they must deal with not only energy but also other various issues including the social infrastructure services to increase the quality of life of citizens.

Many speakers pointed out the importance of transition from "techno-centric" smart cities to "homo-centric" low-carbon cities, focusing on the need to achieve multiple goals of economics, environmental and quality of life. Participants agreed that transition of lifestyle toward sustainable smart consumption in addition to the development of green technology is one of the most vital elements to build a low-carbon society.

Moreover, the importance of technology transfer package with know-how to formulate appropriate regional policy and improve social infrastructures was pointed out. There are needs for technology transfer to build inter-organisational partnership and cultivation of wider range of skills.

Global Cooperation Institute for Sustainable Cities (GCI), Yokohama City University
22-2 Seto, Kanazawa-ku, Yokohama, Kanagawa, 236-0027 JAPAN
TEL: +81-45-787-8945 / FAX: +81-45-787-8907
E-mail: kokusai@yokohama-cu.ac.jp / URL: http://www.yokohama-cu.ac.jp/iacsc/

Institute for Global Environmental Strategies (IGES)
Governance and Capacity Group
2108-11 Kamiyamaguchi, Hayama, Kanagawa, 240-0115 Japan
TEL: +81-46-855-3830 / FAX: +81-46-855-3809
E-mail: gc-info@iges.or.jp / URL:http://www.iges.or.jp