

The 38th SGRA Forum

Better City, Better Life

～ Energy Situation of Cities/Buildings and Lifestyle in East Asia ～

■ Purpose of the Forum

This forum was organized by the SGRA “Environment and Energy” Research team, and is the first to be held in Tateyama. With economic development and the improvement in living standards, East Asian countries will seek comfortable urban architectures. Energy consumption of the architectural structures, as symbolized by air-conditioning energy consumption, is projected to rise rapidly. In countries and regions having high population densities, with the increase in cars, congestion and other problems in urban transportation are expected, possibly leading to a rapid rise in Green House Gas emissions. On the other hand, energy consumption in Asian cities are largely inefficient, and there is a lot of room for improvement in energy conservation. Having a good grasp of the development situation of energy conservation enterprises in Japan and Asian cities is considered to be a way of providing beneficial information for firms engaged in energy conservation in Japan and Asian countries. It is, at the same time, important in the deliberation of energy conservation policies in each country. With the occurrence of global environmental problems and the development of social economic globalization, there is a demand for a system for international cooperation, which would cope with the various problems, including that of energy and environmental problems, through an exchange of young researchers in this field.

Better City, Better Life

～ Energy Situation of Cities/Buildings and Lifestyle in East Asia ～

Overall Coordinator | Jin Hwan Jeon | Kajima Corporation
 Time | July 3, 2010 (Sat) 10:30～18:00
 Venue | The Tokyo Chamber of Commerce and Industry Tateshina Forum, Seminar Room A
 Sponsor | University of Kita Kyushu
 Co-Sponsor | Atsumi International Scholarship Foundation, Sekiguchi Global Research Association (SGRA)
 Cooperator | The Japan Society for the Promotion of Science (Exchange for Young Researchers), and the Tokyo Chamber of Commerce and Industry

10:00-10:10	OPENING REMARKS: JUNKO IMANISHI SGRA GREETINGS: SOICHIRO KUROKI University of Kita Kyushu	
10:10-10:30	【Statement of the Problem】 Energy Situation of Cities/Buildings and Lifestyle in East Asia	7
10:30-11:00	Weijun Gao University of Kita Kyushu 【Keynote Speech】 Energy Use and Quality of Life in Cities, Buildings, and Houses of East Asia	12

Kenichi Kimura | International Research Institute on Human Environment

East Asia, with a huge economic circle equal in rank with that of Europe and North America, is expected to make further economic development, to improve its quality of life, and to increase its energy use, which in turn would possibly affect the global environment. East Asia, endowed with water resources for its large population, will inevitably increase greenhouse gas emission. The Conference of Parties has been held every year since COP 3 as agreed among advanced nations and is requesting developing nations to control energy use. Large cities of East Asian countries are exhibiting similar features to those of advanced countries and the rural areas wishing improvements in quality of life will gradually follow the urban areas. Japan, with 2% of world population, is using more than 5% of energy in the world and is promoting efficient measures for energy conservation and natural energy utilization, which could be a good reference to East Asian countries to some extent. In very hot regions of East Asia, traditional vernacular houses adapted to the local climate and natural environment can be seen everywhere and it is important to utilize those vernacular technologies in modern houses and buildings as well as high technologies. Such new attempts are now starting to emerge. Instead of following bad examples experienced by industrially advanced nations, it is expected to lessen the gap in quality of life

What is SGRA?

Sekiguchi Global Research Association was inaugurated in 2000 and formed by foreign researchers, from various countries, who know Japan well after long residence in Japan in pursuit of their doctoral degree in various fields. SGRA proposes many researches and solutions which are useful for policies or strategies for the globalization of individuals and organizations and through various media, such as forums, reports, and websites, publicize their results to the world. Research teams are formed by researchers from various fields and nationalities on each theme. The research is based on the analysis and study of multi-disciplinary data gathered through the team's rich knowledge base and networks. SGRA aims for international and academic activities which comprehend a wide range of researches for whole societies rather than for specialists of certain fields. As its basic mission, SGRA aims for contributing to the realization of good global citizenship.

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SGRAフォーラム等のお知らせと、世界各地からのSGRA会員のエッセイを、毎週水曜日に電子メールで配信しています。SGRAかわらばんは、どなたにも無料で購読いただけます。購読ご希望の方は、ホームページから自動登録いただけます。
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between rural people and urban people without resorting to energy intensive technologies. Thus the leadership of excellent young researchers in East Asian countries must play an important role to attain these purposes.

11:00-11:30 【Session 1】 (Indonesia)

The Influence of the Development of High-Rise Buildings for Low-Income People in Sustainability and Energy Saving

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Mochamad Donny Koerniawan Bandung University

Urbanization results in the lack of housing provisions and settlements in the cities. In the developing countries, housing demands increased enormously and continuously. The problem is more complex than in the developed countries because the population growth is faster. Plans for the development of a thousand high rises for low-income people have been announced in Indonesia. These high-rises will be built in every city in Indonesia. At a glance, it seems to be an interesting initiative; unfortunately, there are a lot of issues. Energy and sustainable development model that is able to improve the quality of life is one of issues to be considered. In the early stage of this research it was mentioned that a high-rise building with a large open space can mitigate the urban environment and reduce carbon emission. This research is part of the large ongoing Urban Sustainable and Energy Research in the Tropical City that aims to investigate the influence of the development high rise buildings for low-income people on sustainability and energy saving. The project is in its early stage and more studies will be performed within the framework of the project. Keywords: high-rise building, low-income people, sustainable, energy saving.

11:30-11:50 【Session 2】 (Philippines)

The Challenge of Environmentally Sustainable Transport (EST) in Mega Manila City

~ Focus on EDSA ~

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Max Maquito University of Asia and the Pacific, Philippines

Considering that, in the Philippines, the energy consumption of the transport sector is higher than that of industry or residences, the environmental problem brought about by transport cannot be ignored. Having the highest volume of traffic in one of the most densely populated cities in East Asia, Epifanio De Los Santos Avenue (EDSA) in MetroManila has been the focus of the government's Environmentally SustainableTransport (EST) program, underlining the importance of this problem. The discussions about this problem in the 12th SGRA Shared Growth Seminar held in Manila will be touched upon.

11:50-12:20 【Session 3】 (Vietnam)

Energy Conservation Counter Measures in Vietnam Cities

33

Pham Van Quan Hanoi Architectural University

Currently the problem confronting Vietnam, namely environment, energy, and economy, has become more and more important. It is estimated that by 2015, Vietnam will have to import energy. During the dry season, in order to supply electricity to the big cities, rotating blackouts in Vietnam's rural sector have been instituted. Since electrical consumption in the countryside is not large, this is an irrational counter measure. In order to conserve energy, Vietnam has been utilizing various counter measures such as home solar energy, energy conservation, and environmental-friendly architecture. In order to promote energy conservation in industry, construction, and transport, various sanctions are applied, under laws and regulations that have been strengthened accordingly. The major problem in Vietnam right now is to increase the citizenry's awareness about energy conservation. It is only after this problem is solved will energy counter measures become effective.

14:00-14:30 【Session 4】 (Taiwan)

Taiwan's Energy Conservation Consciousness and Transport Situation

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Wenchang Yeh Shimane University

This session will present a comparison of Taiwan's energy situation with that of Japan, based on an investigation of Taiwan's energy resources, demand and supply, and carbon reduction policies. The discussion, which would include a case study from Taiwan's and Japan's experience, will be about the advanced consciousness of the Japanese masses with regards to energy conservation. A survey will be made of the transport usage situation in Taiwan, which has been cited as having the highest density of motorcycles in the world. The presenter will also discuss his opinions about why motorcycles have become so popular.

14:30-14:50 【Session 5】 (Thailand)

Turning Alternative to Mandatory Energy in Thailand

52

Supreedee Rittironk Thammasat University

Most part of the world has now been facing the same crisis: energy. Natural resources will be running out if nobody does anything about it. Research and studies are now focused heavily in seeking alternatives and ways to reduce usage. Commercial Energy usage in Thailand has increased at an average of 2.2% annually, and the demand continues to increase further. Thailand still relies on fossil fuel as their main sources. These sources are 55% natural gas, 20% coal, 17% crude oil, and the rest is from renewable sources. However, Thailand still spends money in energy imports to supplement the increasing demand. Thailand is such a small country and is not energy independent, but there are many ways to utilize the physical characteristics of Thailand to produce alternative sources of energy. Powerful sunlight and mostly clear sky days can aid in the harvest of solar and heat energy. Solar thermal power can turn the sun radiation to hot water, then we can use it as heat sources. The southern coast of Thailand can harvest energy from wind power fairly well. The utilization of alternative energy of natural resources is now limited and has not been seriously studied. This study now initiates the idea of a mandatory development of alternative

energy sources with the overall objective of reducing dependence on fossil fuel. The idea is not new, but there is a need to be more creative on how we take advantages of what nature has given to Thailand.

14:50-15:10 【Session 6】 Korea

A Day of Living (and its Changes) in a Korean City from the Perspective of Energy and Environment

60

Youngjoo Kwak Public Works Research Institute

Due to urban development, Korea's energy situation and lifestyle is seeing total energy growing annually by 2.2% as energy consumption of urban residences increase due to increased use of urban gas (up by 15.2%) as well as upsizing of electrical appliances (up by 13.5%). On the other hand, the energy consumption of the residential sector after IMF in 1998 was marked by a downturn of -8.7%. The energy consumption per urban resident is 0.39 (TOE/person), the same as Japan. From this perspective, this session will consider the counter measures of the Korean government with regards to concrete total energy resources in Korean households.

15:10-15:30 【Session 7】 China

An Engineer's Perspective on Global Warming and Urban Infrastructure Construction

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Jianhong Wang Nippon Koei Research Center

As the theme of the current Shanghai Expo, "Better City, Better Life" is capturing the hearts of Chinese people who draw up a dream-like life in the city. On the other hand, global warming has become a world-wide problem, which remains unresolved and is becoming worse. In order to become a "better city" which could provide for a "better life", it is necessary for urban infrastructure construction, not just architecture, to earnestly grapple with [global] warming. This session will talk first about the historical background, current status, and causes of global warming, and then consider the arguments from an engineer's perspective. The effects thereof, especially the bad effects on urban living, will be analyzed, and a counter measure in terms of urban infrastructure will be arrived at. Lastly, the construction of environmentally-friendly urban infrastructure will be considered as a counter measure against global warming.

16:00-17:50

Panel Discussion

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Moderator Hiroatsu Fukuda University of Kita Kyushu

Panelists: Above Presenters

17:50-18:00

Closing Remarks Tadahiro Shimazu SGRA

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Statement of the Problem



Energy Situation of Cities/Buildings and Lifestyle in East Asia

Weijun Gao University of Kita Kyushu

Good morning. I will talk about this Forum's statement of the problem. We, the environment and energy group, are in charge of this forum. To talk before Kimura-sensei about the statement of the problem is a very brave thing to do, but, with all due respect, let me do so.

Firstly, although the data is a bit dated, looking at urban development and population (Figure 1), in Asia, cities having a population of five million accounts for 60% of the world's cities, while cities having a population of one million accounts for about half of the world's cities. Population has been rapidly increasing, and there are a lot of big cities. In terms of energy, Asia's energy consumption since the [beginning of the] 21st century (Figure 2) has been

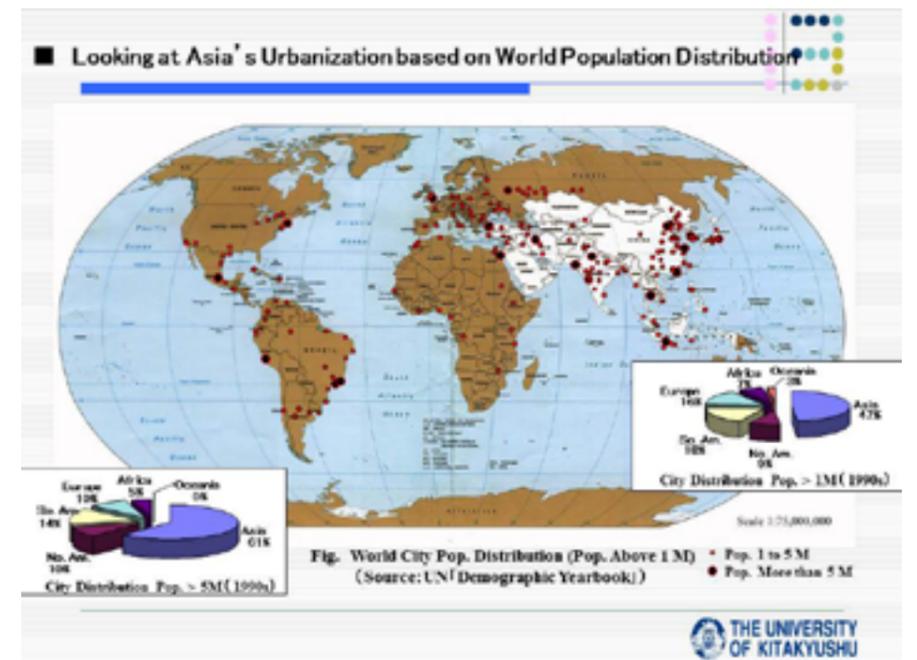


Figure 1

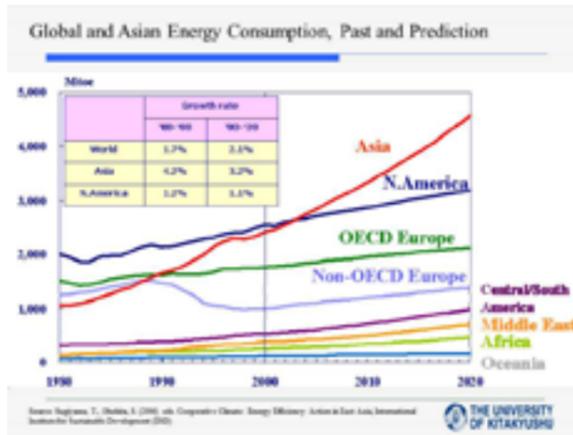


Figure 2

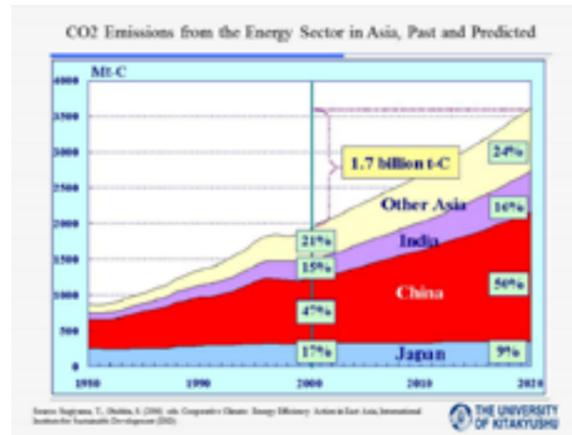


Figure 3

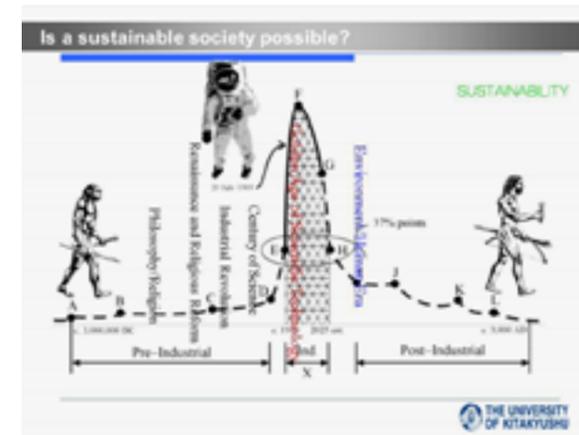


Figure 6



Figure 7

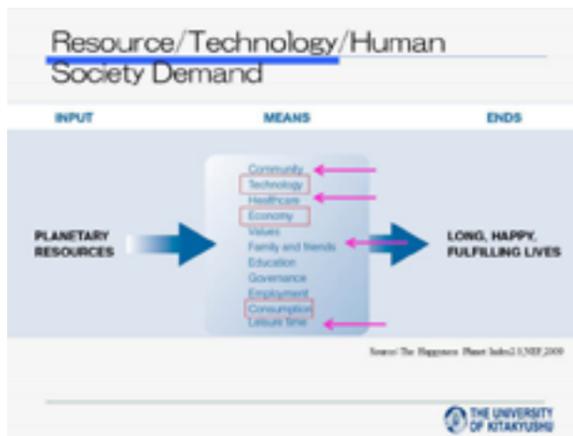


Figure 4

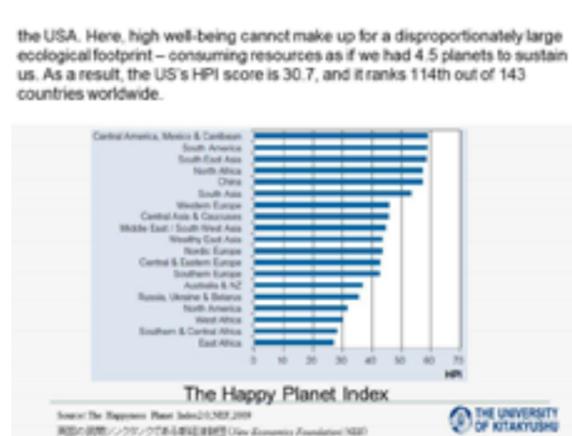


Figure 5

rising together with economic growth. Naturally, where energy consumption is highest, the quantity of CO2 emissions must be also high. Looking at the actual breakdown for Asia, the quantity of CO2 emissions from hereon of Asian countries, particularly India and China would account for an extremely large share (Figure 3).

This slide (Figure 4) shows the relationships among resource, technology, and human social demand. In thinking about our happiness, people live long or are happy or very satisfied with their lives, using our world's resources as inputs, and through different ways, using well these resources. In particular, modern society has developed the economy by means of technology, and we have made a society of mass consumption. This cannot be sustained, and we have lost a sense of community, the time to converse with friends, and leisure time. It is doubtful as to whether or not we could have long lives and happiness. In relation to this, there is data about actually how happy we have become (Figure 5). As you can readily see, our Asia has become very happy. The US has adequate welfare but looking at the happy figures, it is ranked 114th.

In order to sustain the world in the future, it is necessary for the Asian region to separate once more from the advanced countries, bringing about once more what I call a mutation, and, as mankind have come to be through some mutations of the DNA, return to a sustainable society. Like mobile phones, it is everywhere. Even in a place like Africa, where there is no electricity, there are mobile phones. I would like to point to a sustainable path for Asia, by citing mutation in economic technology. Taking a brief look at history while referring to this slide (Figure 6), there was the 16th and 17th century which were best known for the renaissance and religious reformation. In the 18th century, the industrial revolution started. What is important is that machines, and its development stood out. I would say this was the era of hardware. Since that era, science separated from philosophy, and within science, the word technology was not used often. Actually, the world "scientific technology" started being used upon entering the 19th century. Since the 20th century, this time, the era of IT started, and we had the software era, which was supported by information, software, and hardware. We were able to achieve rapid economic growth since then, but more and more there are problems. I will talk more about this later, but I would like to propose an era of environment human ware from hereon, so as to be able to avoid these problems. Figure 7 summarizes this concept: first, the era of hardware; then software; and the so-called information age. It is also an age when we have to think about our welfare. I would like to talk about two points (Figure 8) with regards to the information society. One is that information and software are democratic. The most democratic society in the world is the internet. The problem of privacy and security, when everyone has freedom of transmission or to copy through the internet, is actually a big problem confronting us, mankind. Another is that information could be freely obtained. In the old times, it was obtained from newspapers, letters, or the television, but now it could be obtained anytime,

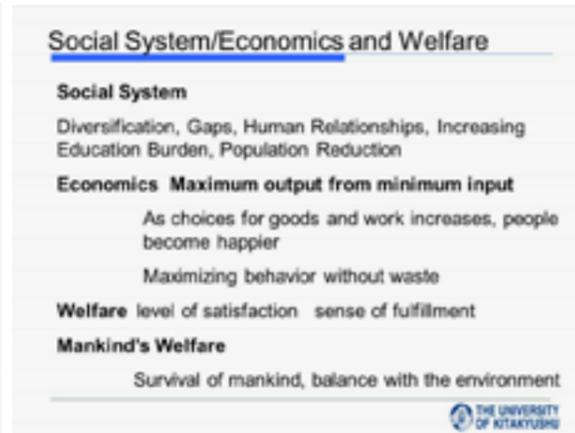
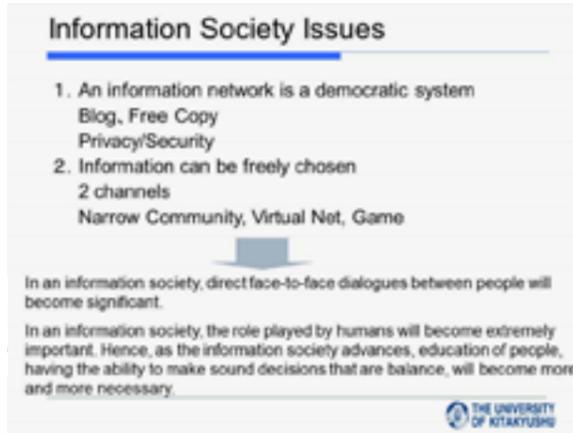


Figure 8

Figure 9

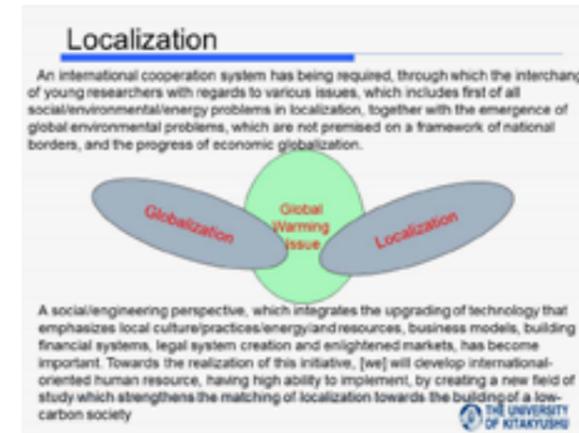


Figure 10



Figure 11

anywhere. But, this then narrows our source of information. For example, a person who watches only two channels has his personality formed by the philosophy in the two channels, and the information in the two channels. It is completely different from obtaining wide information, and society is becoming narrow. Virtual networks and the game generation are formed. I think that face-to-face is important, and I will propose it later, but there is one more thing I would at the same time like to discuss: social system and economics and happiness (Figure 9). Today's social system is becoming more diversified, but, on the other hand, with regards to gaps, we are seeing different types of gaps not only in an economic sense, such as information gaps, and education gaps. Human relationships would more and more depend on the internet, and face-to-face opportunities will be fewer. What is getting to be the biggest problem is that the burden of child education is extremely getting heavier, and the population is dropping. Thinking in terms of economics, our society is extremely severe and is not humane. In today's economics, we have to get the biggest output from the smallest input. According to this philosophy, people become happier as work increases. Stating it simply, the more money people have, the happier they are. That would be a falsehood. Following that philosophy, people search for maximization. Everything is maximized. There is no humanity. If we think about it well, it is also an age of asking what happiness is.

Happiness is the degree of satisfaction. It has been defined as the fulfillment of one's desires. I think it would be nice if, from now, one could be a little bit more leisurely, and become happy within the extent of one's money holdings. The happiness of people must be balanced with continuity, our descendants, and their environment. One more point is that before the financial crisis, for the sake of globalization, different things such as deregulation were done in Japan, and there was a belief that following the U.S.

would lead to happiness. This has already been put into doubt by the financial crisis that erupted in the U.S. two years ago. Consequently, globalization (Figure 10) confronts us with a more severe global environment problem, and the destruction our economy by people who engage in FX and other money games. Globalization will not solve in any way our crisis. To come up with a solution, we must ultimately start from our homes. It is necessary to start from our region, in a so-called localization. What I would like to propose is localization. The environmental problem is a global problem, but it could not be solved globally. The global environmental problem cannot be solved without our individual efforts of localization. I would like to build a mutated society from a perspective that is completely different from the current one, emphasizing local culture and energy resources in order to build a low-carbon society. This mutation is a good mutation. Without following the same lifestyle as the advanced countries, I would like to build, through our own efforts, from now on a society that would bring about happiness to people. For that purpose, we need to form a new field of study. I would like to create the study of localization humanism. I would like to carry out an education that is completely different from the current one. I would like to carry out an education that is not hardware, or software, but human ware. We cannot solve the world only through technology. I am not against technology, but I believe that we cannot achieve happiness with technology alone. As persons, we live together with society, and inevitably need the social aspect of interaction with people. The person is the main constituent of this world, and a world that would support our happiness should be created. What are we working for? It is not only for money. The world's resources have limits, but it is necessary to create a sustainable society, which emphasizes human ware, while slowly utilizing well those resources. I would like to build a new field of study, together with everyone who is here today. I don't know if this has become a

Keynote Speech



statement of the problem, but I would like to end here. Thank you very much.

Energy Use and Quality of Life in Cities, Buildings, and Houses of East Asia

Kenichi Kimura

Principal, International Research Institute on Human Environment SGRA Adviser
Waseda University Professor Emeritus

Overview

East Asia with a huge economic circle in an equal rank with Europe and North America is expected to make further economic development, improve quality of life, and increase energy use, which in turn would possibly affect the global environment. East Asia endowed with water resources for a large population will inevitably increase its greenhouse gas emission. The Conference of Parties has been held every year since COP 3 as agreed among advanced nations and is requesting developing nations to control energy use. Large cities of East Asian countries are exhibiting similar features to those of advanced countries and the rural areas wishing improvements in quality of life will gradually follow the urban areas. Japan with about 2% of world population is using about 5% of energy in the world and is promoting efficient measures for energy conservation and natural energy utilization, which may provide a good reference to East Asian countries to some extent. In very hot regions of East Asia traditional vernacular houses adapted to the local climate and natural environment can be seen everywhere and it is important to utilize those vernacular technologies in modern houses and buildings as well as high technologies. Such new attempts are now starting to appear. As urbanization progresses, it is expected to lessen the gap in the quality of life between rural people and urban people without resorting to energy intensive technologies.

Finally, discussion on the meaning of the theme of this Forum, "Better City, Better Life" would lead the way towards considering what happiness is.

Five Big Problems of the World

Today, there are five big problems which human beings are confronted with¹.

- Problem of Population
- Problem of Food
- Problem of Resources
- Problem of Energy
- Problem of the Environment

First, let's take up the problem of population. The world population is approaching 7 billion and still increasing rapidly in recent years. Especially the population increase in developing countries is significant and it is often said that the problem of population is the root of the other four problems. Next comes the problem of food. About one billion people of the world are suffering from famine, whereas many people are discarding food left uneaten. It makes one wonder how such unbalance could be diminished. The problem of resources is complicated. Many kinds of resources such as minerals, forests, and biological matters, are distributed unevenly in the world, which stirs up serious quarrels in many occasions. Energy is a kind of resource, but is taken up as another independent problem since it is quite a big issue. Energy is food for society to exist. The problem of environment covers the problems of different scale (e.g., indoor environment, urban environment, global environment). Moreover, the phases of the problem are ever changing from the past to the future. These five problems are independent and interrelated with each other. Today, the problems of environment and of energy are especially deeply related. For example, if one wants to enhance the living environment to heighten the quality of life, energy use will increase. On the other hand if energy use is restricted somehow to prevent global warming, the quality of living environment would be lowered. And in each country all of these problems are vitally serious.



Figure 1 East Asian Countries
Source: afe.easia.columbia.edu/.../element_a/ea_rs.html

Table 1 East Asia's Population

COUNTRY	1999	2005	2009
WORLD	6036	6512	6829
CHINA	1257	1312	1346
INDIA	1025	1131	1198
INDONESIA	203	219	230
PAKISTAN	145	166	181
BANGLADESH	138	153	162
JAPAN	127	128	128
PHILIPPINES	76	86	92
VIETNAM	78	84	88
THAILAND	62	66	68
KOREA	46	48	48
MALAYSIA	23	26	28

Source: UN, World Population Prospects : <http://esa.un.org/unpp/>
Bureau of Statistics HP: www.stat.go.jp

East Asia's Population

As shown in Fig. 1, East Asia is covering a large area of the earth surface that is greater than Europe. Whereas population of East Asia is very large, occupying about one half of world's population as shown in Table 1. The reason for East Asia's large population is a large amount of rainfall and this region, blessed with water resources, can afford to support a large number of people.

Although the industrial countries have been controlling population, the population in the developing countries tends to continuously increase. Having a closer look at Table 1, however, a very small increase in population during the period between 2005 and 2009 can be seen in many countries.

Table 2 East Asia GDP per Capita, \$

COUNTRY	GDP/capita (2007)	GDP/capita (2009)	COUNTRY	GDP/capita (2007)	GDP/capita (2009)
SINGAPORE	35163	37293	SRI LANKA	1622	2041
JAPAN	34254	39731	MONGOLIA	1491	1560
BRUNEI	31830	26325	NORTH KOREA	1092	
HONG KONG	29845		INDIA	1042	1030
KOREA	19983	17074	VIETNAM	836	1059
MALAYSIA	6807	6896	PAKISTAN	884	1016
THAILAND	3851	3939	LAOS	684	877
CHINA	2485	3678	CAMBODIA	597	774
INDONESIA	1918	2329	BANGLADESH	427	573
PHILIPPINES	1640	1745	NEPAL	363	451
BHUTAN	1668	1880	MYANMAR	277	459

Source(2007): World Bank, World Development Indicators (on line 2008.10.29), And CIA, The World Fact Book
Source(2009): IMF – World Economic Outlook (2010.04)

East Asia Economic Circle

East Asia is forming a huge economic circle equal in rank with Europe and North America, and is being expected to make further economic development. Table 2 shows GDP/capita of East Asian countries in 2007 and 2009. A fair amount of difference can be recognized among the countries within the East Asia. Improvement in quality of life will increase energy use. This in turn would possibly affect a global environment. It is necessary to take a population control policy for lessening the difference and attaining economic development. The Chinese policy of "one child per family" seems effective from that respect. It is predicted that the population of India with a high level of ancient wisdom will surpass China in due course of time. A quite low value of GDP per capita in India seems to be dependent on a higher rate of increase in population.

In the countries with GDP/capita of under \$100 a steep increase in economic growth

might not be expected in the near future and it would be necessary for them to receive further assistance from advanced countries than today so that a higher level of economic development could be achieved as soon as possible.

Advanced and Developing Countries

The Conference of Parties has been held every year since COP 3 as agreed upon among advanced countries. Recently developing countries are being requested to control energy use, but that would not be considered impartial.

There is a unique system called CDM, Clean Development Mechanism as defined in Article 12 of Kyoto Protocol. If advanced countries would offer an assistance of technologies or monetary funds to any developing countries to execute such enterprises that could curtail greenhouse gas emission, a certain amount of the curtailed emission could be assigned to a part of the curtailed amount of greenhouse gas emission for the original country of assistance. This rule of operation was officially adopted at COP 7 in Marrakesh, Morocco to be called as Marrakesh Agreement.

The trade of emission right is one of the economic methods based on CDM with such objectives as conceived to control the total amount of emission in the world. For example, once each country is determined to have a right to emit a certain amount of greenhouse gases, then a country which surpasses the amount determined should pay that amount to another country who has the remaining right to emit. This trade can be made not only between countries but also between government bodies or enterprises. This allowable amount of emission right is called "cap" and trading of caps is called "cap and trade".

The United Kingdom established an internal trading market in April 2004 for the first time.

The cap and trade is being envisaged to be conducted among the nations of East Asia sooner or later. Japan promised at COP 3 to curtail the amount of greenhouse gas emission by 6% compared to the 1990 level over the period of 2008 – 2012 on average, but in reality it is 10% higher than 1990 level at present instead of -6%. It would be probable for Japan to rely on the cap and trade system to a large extent for achieving the promised target.

Large cities of East Asian countries are exhibiting similar features to those of advanced countries and might take up the cap and trade with rural areas, thus the rural areas wishing improvements in quality of life would gradually catch up with the urban areas.

Technologies of Energy Conservation Natural Energy Utilization in Japan

Soon after the oil crisis in 1973, energy conservation movement prevailed in all fields of Japan. In the building sector provision of heavier insulation in houses and energy conserving design of air conditioning in buildings were widely proclaimed. In most of office buildings at that time, comfort in indoor environment was satisfied to a certain extent and energy conservation in air conditioning was understood to be needed for maintaining comfort with the least amount of energy.

Even after the 1980's, the quality of life in houses remained still quite low and major



Figure 2 Examples of Contemporary Architecture Developed from Vernacular Houses in Hot, Humid Areas in Southeast Asia

movement was directed towards improvement in thermal environment rather than energy conservation in houses, which resulted in greater energy use as insulation in houses was not improved enough. Thereafter the insulation standards were officially put in effect to a lesser extent compared to those in western countries. In spite of such energy conservation efforts, the increase in the floor area of houses also gave rise to a steady increase in energy use in the housing

sector. Thus the total primary energy use in the building sector comprising of houses and public/commercial buildings occupies about one-third of the total in Japan, for which further efforts towards reduction are being desired.

The industry sector in Japan has gained the largest headway in energy conservation. However it occupies about one half of total primary energy used in Japan, which is far greater than those of western countries. This is considered to be the peculiar situation of Japan, which depends on industry and essentially has no energy resources.

Japan, with about 2% of total population of the world, is using about 5% of primary energy of the world. This could be important in leading vital progress in energy conservation and natural energy utilization. Thus the Japanese experience in this respect might offer a good reference to East Asian countries to some extent.

Modern Version of Traditional Vernacular Architecture

In very hot and humid regions of East Asia traditional vernacular houses adapted to the local climate and natural environment can be seen in many places and it is important to utilize those vernacular technologies in modern houses and buildings, as well as high technologies. Such new attempts are now starting to emerge.

A Singaporean architect, William Lim is practicing a real venture of modern development of traditional vernacular architecture. He edited a wonderful book, "Contemporary Vernacular", introducing quite a few examples designed by East Asian architects with their activities along these lines².

The author classifies "Contemporary Vernacular" into the following four categories:

"Reinvigorating Tradition" – Evoking vernacular

"Reinventing Tradition" – The search for new paradigms

"Extending Tradition" – Using the vernacular in a modified manner

"Reinterpreting Tradition" – The use of contemporary idioms

The wide open space for inviting breeze and various sun-shading devices including deep eaves are basic traditional features of architecture in hot-humid climate. The architects should not only faithfully follow these basic traditions, but also search for something beyond them to a certain extent. The above four categories that the author introduced identify searching attitudes for contemporary vernacular.

From the examples in this book, four houses are taken up here.

The upper left shows a small hotel of apartment house type called The Legian in Bali Island, Indonesia designed by Dedi Kusnadi of Grahacipta Hadiprana Architects. This exhibits contemporary design features with Bali style of environmental design arranging a lotus pond with deep eaves and wide open spaces.

The lower left shows a residence called Rimbun Dahlan in Kuang, Malaysia designed by Malaysian architect Hijas Kasturi. Having a sincere attachment to vernacular architecture, he gave a new breath of such a high level that cannot be seen in traditional architecture, instead of simply copying traditions.

The upper right and lower right are designed by William Lim Associates of Singapore, the author's office. The upper right shows a house at Chatsworth Park in Singapore, an extension of an existing bungalow of colonial style. Based on the architectural language of the preserved house, the design conceives "contemporary vernacular" expression with aligned orientation to the original one, modernizing the past language. The lower right shows a section drawing of a reformed house from a store at Everton Road, Singapore. Architect Mok Wei Wei of Lim Associates stresses clear simplicity utilizing the loft space of the existing shop.

Understanding the meaning of "contemporary vernacular" as described by Lim, one could enjoy a comfortable life instead of seeking novelty of external appearance.

Kimura presented some research results on the modern application of natural utilization technologies of traditional vernacular architecture³ and reported part of it at the third SGRA Forum in 2001⁴.

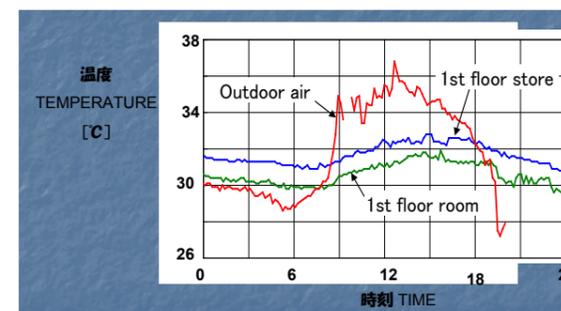


Figure 3 (up) A high density housing model of the old township of Hanoi (The 36th Avenue Area) (down) Measured results of inside and outside air temperature (July, 1999)

Experimental House Project in Hanoi, Vietnam

The following is a project entitled "Development of High Density Housing Model of Environment Load Decreasing Type Adapted to Hot-Humid Climate" (Leader: S. Murakami) FY1998-2002. The purpose of this project was to construct a housing model in Hanoi, Vietnam for improving indoor improvement yet minimizing environmental load in a densely populated district under hot and humid climate conditions.

This is extracted from PPT borrowed from Professor T. Ikaga of Keio University⁵.

In the congested housing district in Hanoi, general houses provide void spaces to allow for natural ventilation in the vertical direction as shown in Fig.3 (left) as seen in the Machiya of Japanese vernacular houses. Looking at the variation of inside and outside temperatures measured in July 1999 in Fig.3 (right), it can be seen that an indoor environment to relieve discomfort by natural ventilation through void spaces is created without air conditioning.

In reference to these results a high density housing project was undertaken using multiple interchanges between inside spaces and outside environment. Thus a sustainable building model of low environment load type adapting to local climatic conditions could be realized as shown in Fig.4 by 1) controlling indoor environment with passive means using natural ventilation, 2) creating

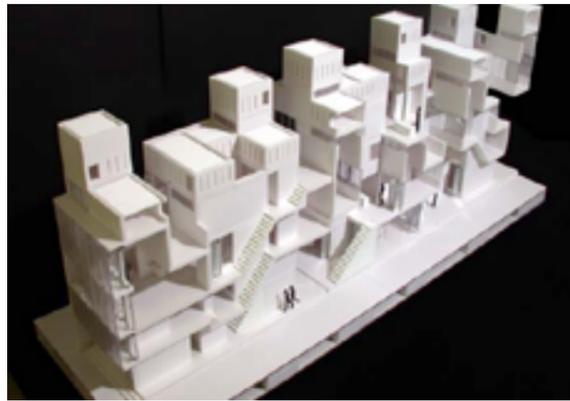


Figure 4 Final version of the experimental housing of porous type with RC construction of 741m² in 4 stories of 6 units finished in May 2003



Figure 5 Indoor perspective of the experimental apartment of porous type

high density living with a minimum psychological stress by providing appropriate separation/connection among housing units through void spaces, and 3) avoiding coded and uniform quality of apartments allowing for individually characterized living spaces with varied "semi-outdoor" spaces. Fig.5 shows an inside view of the experimental house of porous type actually built in Hanoi.

A small type of air conditioner is installed in this house and it is reported that a comfortable indoor environment is realized to make a modern house of low cooling load⁶. Under very hot conditions when maximum outside air temperature was 33 and 38 °C the room air temperature was found fairly high, but 3 and 5 °C lower than outside respectively, while natural ventilation effect gave a certain degree of cool feeling then.

Better City, Better Life

Within the theme of this Forum "Better City, Better Life", various kinds of meaning are conceivable. One of the most familiar examples for the notion of Better Life would be a daily life within a comfortable living space, a safe and healthy life, or a convenient and economically quiet life. Depending on whether it is in the city or in the countryside, the degree of safety, health, economics, and convenience would be different. Furthermore, an overall judgment of it could vary depending on individuals. Nevertheless, it seems that modern people are inclined to take interest towards an urban life. This is the reason why population tends to be concentrated to the city. This tendency seems stronger in developing countries.

As long as one says "Better City", one's standpoint might lie in the preposition to think about things that everyone will live in the city, large or small, in due course of time. Could Better City be defined as such a city, where one could principally spend a convenient urban life and could have a villa or travel somewhere by escaping from the city noises sometimes to enjoy a country life? Some people nowadays move their home to the countryside with its clean air, clean water and beautiful scenery, although it be somewhat inconvenient.

There must be something else that could not be dealt with such a simple way of thinking. It would then be "ethics", which would supersede economics and convenience.⁷

We recall a lively discussion held about "happiness index" which Professor Gao cited in his introductory speech at the 38th SGRA Forum. After all "Better" of "Better City, Better Life" could mean a higher degree of happiness. Of course the happiness index could be different from one individual to another. In fact the happiness index presented was expressed by country averages, but it must be questioned how simply such values could be measured.

I saw one scene in one of the television programs where people living in the deep mountain area are saying that they are happy. According to their definition, the degree of happiness is defined as "reality" divided by "desire". Surely, less desire could make a higher degree of happiness, even if "reality" is poor. Conversely, people spending lavish city lives would feel unhappy if their desire were not fulfilled.

Moreover, the problem of global environment underlies our lives. Even if one's present life might be happy, future generation might become unhappy. It is necessary, therefore, to consider the happiness degree of oneself based on such recognition. In short if one's offspring would turn out unhappy, oneself at present would not be happy⁸.

In the later part of the musical "Cats", Grizabella, the principal cat sings "Memory": "If you find there the meaning of what happiness is, then a new life will begin".

In Closing

Instead of following inappropriate examples experienced by industrially advanced nations, it is expected for East Asian nations to lessen the gap in quality of life between rural people and urban people without resorting to energy intensive technologies. Thus the leadership of excellent young researchers in East Asian countries must play an important role to attain this goal.

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Session 1



Urban Sustainability and Energy Research in the Tropical City

The Influence of High-Rise Building Development for Low-Income People on Sustainability and Energy Saving

Mochamad D. Koerniawan Bandung University

Introduction

Urbanization cannot be avoided in the development of cities. Urbanization is attractive for economics, but at the same time problems emerge. An example of this problem that we could cite is the limitations on the assistance of the government in housing, land speculation, low- and medium-grade housing.

Energy Consumption in Developing Countries

Energy in developing countries is mainly consumed by the transportation and industrial sectors. In Indonesia, energy is consumed in the agricultural and

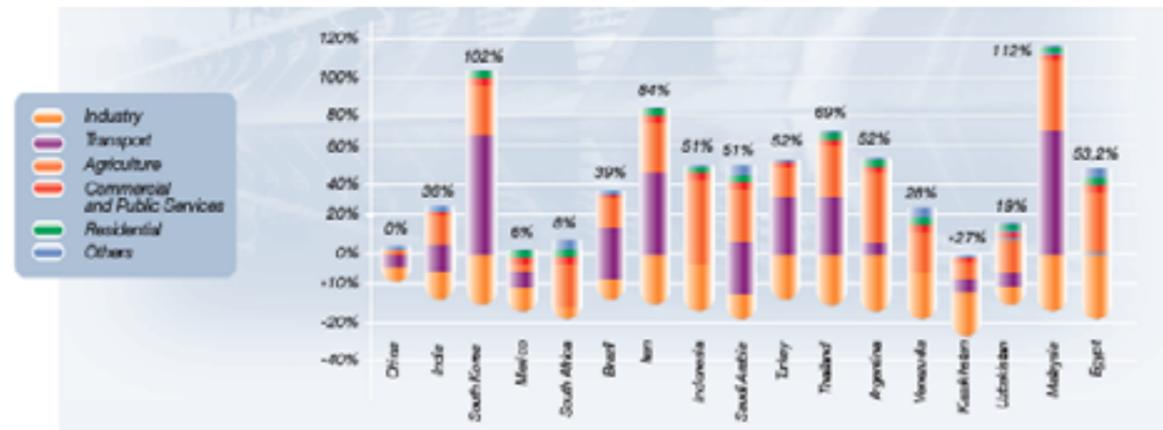


Figure 1 Changes in the Usage of Energy in Developing Countries
Source : IEA (International Energy Agency, 2002)in Building and Climate Change, 2007

industrial sectors, while consumption in residential and commercial aspects is

still low. Moreover, according to the data, energy consumption share even in the transportation sector is low. However, in the development process, the consumption in the residential, commercial, and public sectors tend to rise. This is being watched as a problem of energy consumption in the future.

The energy consumption in the residential and commercial buildings in the member countries of the Organization for Economic Cooperation

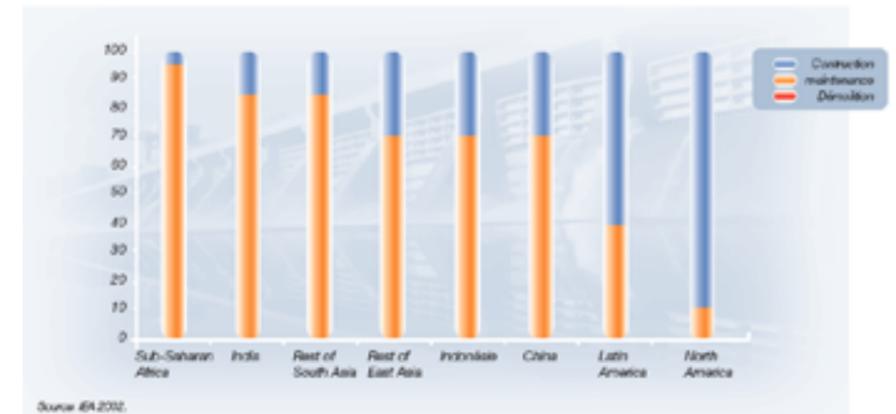


Figure 2 Consumption of Energy in Developing Country Residences
Source: IEA (International Energy Agency, 2002) in Building and Climate Change, 2007

and Development (OECD) is 30%. The consumption of energy in the newly industrializing states, such as in Africa, India, and China, is mostly used in residential and commercial buildings.

In developing countries, most of the consumption of energy of residences is being used for the maintenance of buildings. In Indonesia, 75% of the energy is being used for the maintenance of buildings. As could be understood from this, the energy problem in newly industrializing states is the problem of the maintenance of the building after construction. This is because the maintenance of the building after construction uses a lot of energy.



Figure 3 Changes in the Energy Consumed in the Residential Sector

Source: IEA (International Energy Agency, 2002) in Building and Climate Change, 2007

From the figure below, the tendency of energy consumption in Indonesia could be gleaned. In the low-income households, biomass (fuel) is being used as energy. Following the increase in incomes, gas and liquefied petroleum gas (LPG) are included in the options. Electrical energy is an energy resource, which has been processed in a modern way.

Residences in Indonesia are mainly one-story houses. Indonesians are not

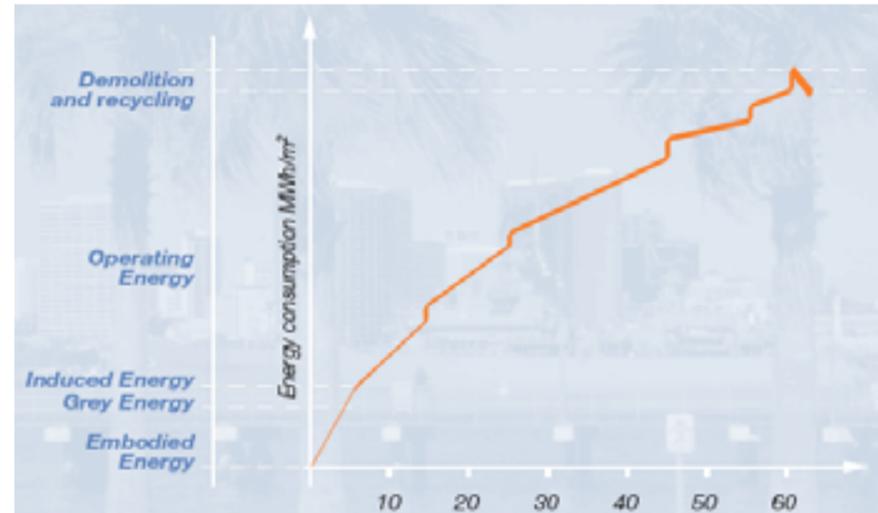


Figure 4 Energy Used in Buildings
Source: Jones, 1998, in Building and Climate Change, 2007

used to high-rise residences. Hence, such types of residences are still few. The next picture shows the housing complex along Bandung's Cikapundung River, where the residences of the low-income class are tightly built. Such area is highly preferred by the low-income class, who live in such areas close to their workplace.

According to the joint research in 2006 of the Building and Residence Central Research Institute (Puslitbangkim) in Bandung and the National Institute for Land, Infrastructure, and Management (NILIM) of Japan's Ministry of Land and Transportation, the highest energy consumption or the highest emission of carbon dioxide is households, followed by transportation and building usage.

Indonesia's energy is mostly electricity and fuel oil. In Indonesia, the fuel used for cooking is 40% fuel oil, 28% gas, and a combination of fuel oil and gas. However, the use of fuel oil compared to electricity is low.

In the transportation sector, heavy oil and gasoline are the mainly consumed energies. Gasoline is the most consumed, and is the highest emitter of carbon dioxide in the transportation sector. From the aspect of raw materials of buildings, bricks, tiles, and roof tiles, in the process of construction, operation, and maintenance, consume the most energy and emit carbon dioxide.

The Problem and Issue of Medium-Grade Residences for the Low-Income Class in Indonesia

A residence, in addition to clothing and food, is one of mankind's most



Figure 5 Housing complex along Bandung's Cikapundung River
Source: 2009, taken by the author

basic necessities. In Indonesia, the supply of residences is still an unresolved problem. About 14% of the 250 million Indonesian population, are in poverty, because about 43% of the total population lives in the city. With the acceleration of land speculation and government housing assistance, residences are coming to be the most important problem.

On the other hand, in order to make way for one-story houses, urban development in Indonesia has not been pushing forward. Hence, residences are built on such lands as forests, rice paddies, and marshes.

Preparing affordable residences is the government's policy for fiscal year

2009. The former Yusuf Kalla administration ordered the construction of 1000 units in medium-grade housing complexes in Indonesia's big cities. However, will such housing complexes be a true solution for the residential problem? Prior to the promulgation of such policies, aren't there points that should first be considered carefully?

Evaluation of the Medium-Grade Housing Complexes in Indonesia

Housing complexes that have been actually constructed have produced



Figure 6 A housing complex for the low income in Jakarta
Source: 2008, taken by the author

results which are very far from the expected objectives. As could be seen from the graph below, the construction of housing complexes is not in concurrence with the urban plan.

Moreover, Indonesians have a strong culture of living in one-story houses, and, since there are still a lot of craftsmen and farmers who own one-story houses, these have become barriers to the housing complex construction. The use of housing complex itself, compared to its construction, preparation of construction materials, operation and maintenance, consumes a lot of energy.

The comfort of housing complexes is also insufficient. This is because there is poor matching between the initial design plans and the desired plans of the residents. Another important factor is the environment surrounding the housing complex.



Figure 7 Comparison of preferred and actual housing complex
Source: 2009, created by Gunawan

The next factor that should be considered in the design of a housing complex is safety. With respect to housing complex safety, we could cite fires and earthquakes.

It is necessary to design a housing complex with localization and continuation in mind. With respect to energy consumption, the construction of a housing complex must include energy conservation in the planning. An energy conservation technology for the construction of a housing complex is a technology for the selection of building materials which would allow the adjustment of humidity, light, and sound for the lowest consumption of energy, air recycling, and consumption of electrical energy, as well as the administration of natural and processed light.

Through the integration of the basic plan and the field of construction, we can implement a housing complex construction in the city and its



Figure 8 Integration Continuous Development
Source: Suntools, 2007.

continuous administration. If we can continuously manage the cost, quality, and time of construction, and integrate the economy, society, and the environment, a continuous and sustainable resource would emerge, leading to a healthy, pleasant, and safe development, which emphasizes diversification and localization.

Conclusion

The construction of a housing complex in Indonesia needs a development that respects the culture of the people who will live in that area. By knowing the culture of the residence of a housing complex, it is possible to have a long-run continuous use of and energy conservation in the housing complex.

This draft is the prologue for a big research called city and continuity.

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Environmentally Sustainable Transportation in Manila

Mega City Focus on EDSA

Ferdinand C. Maquito

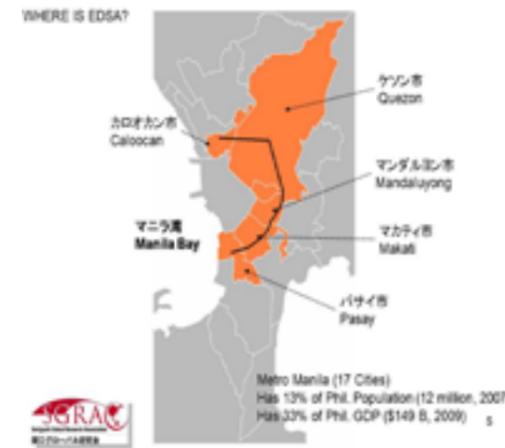
University of Asia and the Pacific, Philippines

Where is EDSA?

EDSA is one of the major avenues in Metro Manila, Philippines. Before going into an explanation of EDSA, I would like to use Figure 1 to show the location of Manila in East Asia, using circles with a 3000-kilometer radius. Figure 1 roughly shows the position of the capital city of the home country of the presenters in the 38th SGRA Forum in Tateshina. As could be confirmed, the circle centered on Manila covers all of the capital cities of East Asian countries.



Figure1 Positioning Metro Manila thru 3000 KM-radius circles
Map Source : http://www.lib.utexas.edu/maps/middle_east_and_asia/asia_east_pol_2004.jpg (circles made by the author)



EDSA is a road named after a Philippine historian called Epifanio delos Santos. Formally, it is known as Circumferential Road Number 4 (C4).

Up to 1959, perhaps under the influence of the colonial period under the United States, it was called Highway 54. It runs about 54 kilometers from North to South of Metro Manila, the capital of the Philippines (see Figure 2), and passing through five cities. Currently, Metro Manila's

Figure 2 Metro Manila Map
Source: Wikipedia (labels by author)

electric train network is centered on EDSA.

Why EDSA? (the 3 Highs of EDSA)

I will summarize the significance of focusing on EDSA through the "3 Highs".
The 1st High: Manila is an East Asian city with a high population density.

The data is a bit dated, but as could be seen in Figure 3, based on population, Metro Manila is one of the top 20 cities in the world. The data was calculated taking into consideration the differences among cities in definitions and other aspects. It is not something to be proud of, but if we exclude the Indian cities,

TABLE 5. THE 20 LARGEST WORLD METROPOLITAN AREAS, 2003: DATA FOR FORSTALL DEFINITIONS (Populations in thousands estimated for 1 July 2003. Ranks below 20 not shown.)

Name	Rank	Population	Average Annual Change: 2000-2003	Area (km ²)	Population per km ²	
Tokyo	1	32,450	213	0.66	8014	4049.2
Seoul	2	20,660	227	1.12	5076	4048.5
Mexico City	3	20,450	307	1.54	7346	2783.0
New York	4	19,750	120	0.61	17884	1104.3
Mumbai (Bombay)	5	19,200	472	2.53	2360	8170.2
Jakarta	6	18,900	225	1.21	5100	3705.9
Sao Paulo	7	18,650	299	1.57	8479	2223.1
Delhi-New Delhi	8	18,000	696	3.86	3162	5645.4
Osaka-Kobe-Kyoto	9	17,375	28	0.16	6930	2507.2
Shanghai	10	16,650	335	2.07	5177	3216.1
Manila	11	16,300	461	2.96	2521	6465.7
Hong Kong-Shenzhen	12	16,800	797	6.42	3061	5478.6
Los Angeles	13	15,250	205	1.38	10280	1474.7
Kolkata (Calcutta)	14	15,100	257	1.74	1785	8459.4
Moscow	15	15,000	103	0.69	14926	1005.0
Cairo	16	14,450	257	1.89	1600	9031.3
Buenos Aires	17	13,170	79	0.62	10888	1209.0
London	18	12,875	112	0.87	11391	1130.3
Beijing	19	12,500	301	2.49	6562	1904.0
Karachi	20	11,800	370	3.43	1100	10727.3

Figure 3 Asia's Mega cities¹

Metro Manila would be the mega city with the highest population density.

The 2nd High: EDSA is a main road in Metro Manila, which has a high traffic volume.

According to the estimate of the traffic volume of EDSA in 2007, everyday there are 2.34 million vehicles. It is considered as the road with the higher traffic volume not only in Metro Manila but in the Philippines, as a whole. In short, it could be said that EDSA is a major road that is indispensable for the

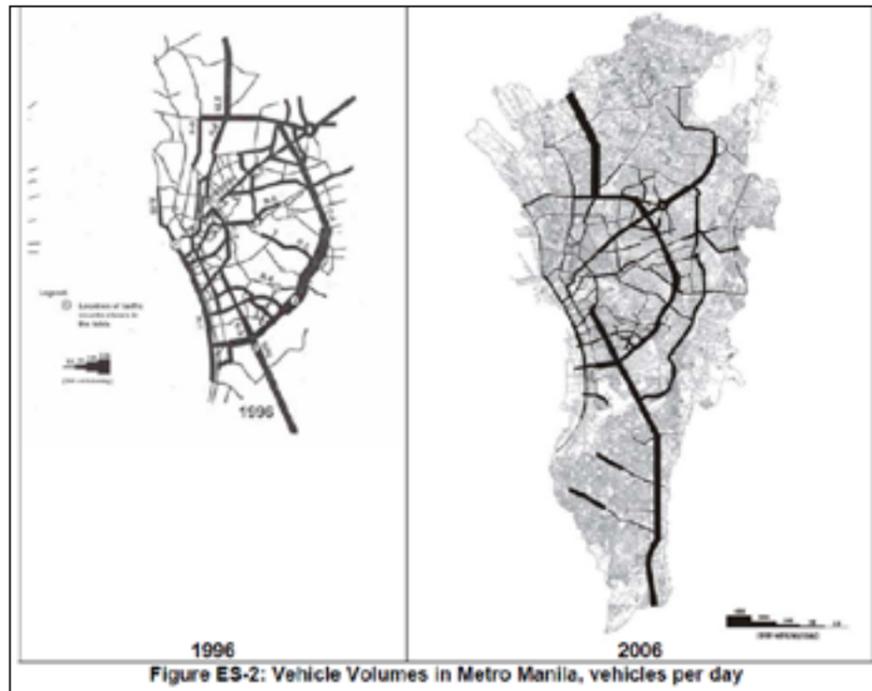


Figure 4 Metro Manila traffic volume map for 1996 and 2006.
 Source: JICA (2007) Mega Manila Public Transport Study
 Note: The Philippine government plans to expand to Mega Manila by adding the four surrounding provinces to the current 17 cities. A “mega city” is a city with a population of at least 10 million.

daily living of many Filipinos.

The 3rd High: In terms of energy consumption in the Philippines, the transportation sector is the highest.

As can be seen from Figure 5, in the Philippines, based on 2008 estimates, the total energy consumption was 28.1 million ton of oil equivalent (MTOE), accounting for 42%. Compared to this, the housing and manufacturing sectors were 23% and 25%, respectively. In the transportation sector, the largest consumer of energy is land transportation (based on estimates of 2006, it

1 Figure 3 is part of presentation materials in the 12th SGRA Shared Growth Seminar (12th Manila Seminar) held at the University of Asia and the Pacific(Manila) on April 28, 2010.

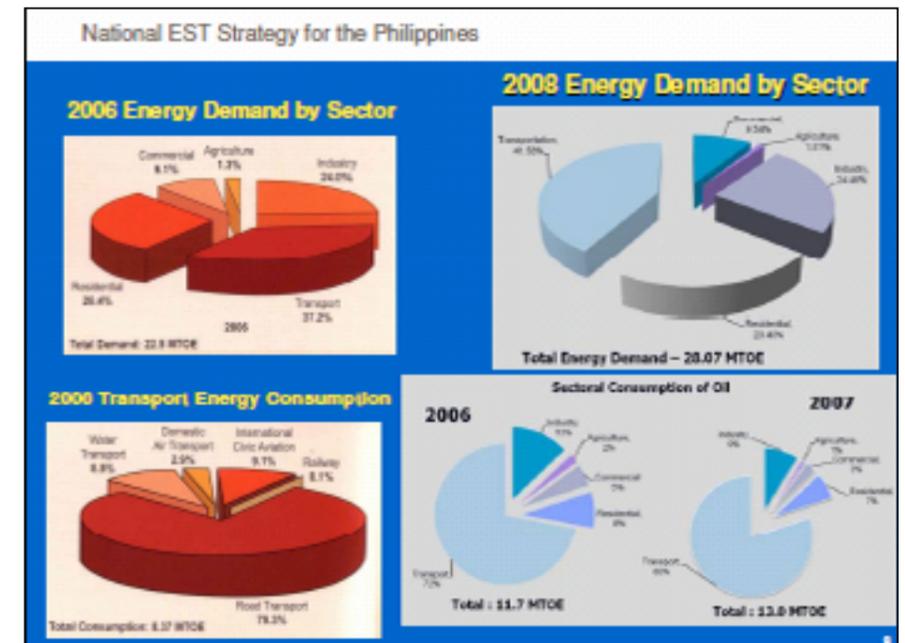


Figure 5 Energy consumption of transportation³
 Source: Regidor (2010), 12th Manila Seminar

reaches 79% of the total consumption of the transportation sector.

The Environmentally Sustainable Transport (EST) Initiative

In terms of transport systems that are environmentally-friendly, the Philippine government is implementing the EST. This initiative was originally thought up by OECD, or in short, by advanced countries. In the OECD, EST goals were established for land use (that would consider the ecology), noise, and emission of greenhouse gases.

The Philippine government promulgated Administrative Order 254 of EST in 2009. In the Philippine EST strategy, the AICHI statement, which was agreed upon in Aichi Prefecture in August 2005, was adopted, and included various ways to achieve the minimization of the environmental and social damages that accompany the increase in demand for automobiles, in addition to the major points of OECD. In short, automobiles are indispensable for developing countries like the Philippines, so the problem is not how to reduce the use of automobiles, but how to utilize automobiles well.

The main difference between the OECF and Aichi Statement is

2 Quoted from the presentation of Prof. Regidor (National Transport Studies Center, Philippines) in the 12th Manila Seminar.



Figure 6 Important themes in the Aichi Statement

Source: Regidor (2010), 12th Manila Seminar

is causing harm to the general citizenship. Every year, this is estimated to cause 5,000 deaths, and medical costs worth two billion yen.

The Problem Caused by the “3 Highs” : EDSA's Lesson from an Economics Perspective

The JICA Survey Report (2006)³ describes the condition of EDSA's transport system as follows:

- Buses abound (the number is very large)
- Loading factor is very small
- The fees for privately-managed buses are higher than that for the publicly-managed train⁴
- The situation appears not to be improving

In his keynote address at the 12th Manila Seminar, Professor Regidor indicated some doubts on the above situation. His simple doubt was about “how could so many buses continue to make money”. Referring to an economics perspective, I concluded that the bus market might be a monopolistic competitive market. Such a market has the following features.

- As in a perfectly competitive market, there are a lot of mutually competing firms.
- But in the case of a monopolistic competitive market, each firm adopts a strategy of product discrimination, so that each firm has a market power that

³ JICA “EDSA Bus Route Revalidation Survey”, January 2006

⁴ A publicly-operated light rail system runs along the middle of EDSA, but since rates are set at low levels in consideration for low-income folks, the train is almost always full.

marked off in the Figure 6, with Japanese subtitles.

In the 12th SGRA Shared Growth Seminar held in Manila on April 2010 (hereafter, 12th Manila Seminar), the following were pointed out, with regards to EDSA's transportation problem.

Social costs are incurred from the traffic of EDSA. It is estimated that about 500 million yen worth of labor time per day is lost. EDSA's pollution is mainly caused by the emissions of vehicles, and

enables it to charge a higher price.

- Another feature of a monopolistic competitive market is the excess capacity. As the price increases, more firms are prompted to enter the market, which tends to increase the excess capacity.

The JICA Survey Report (2006) points out the following regarding the background of the transport system of the Philippines.

- In 1981, the Philippine government attempted the nationalization of the bus transport system in Manila, and established the Metro Manila Transit Corporation (MMTC). However, the MMTC went bankrupt in 1995. The Philippine government then shifted to a market-oriented system, which has become the present monopolistically competitive market.

The World Bank Report (2003)⁵ makes the following observations about the world's bus transportation policy.

- In the 1970s, the bus transport system was generally a state-owned monopoly, but this led to fiscal deficits. The lack of bus services, and the low quality were also some of the other problems.
- In the 1980s, deregulation was implemented, and bus volume rose excessively. Moreover, the market power of bus companies could not be suppressed. In short, the fees rose much faster than cost.
- In the 1990s, the “hybrid” (government + private sector) concept became more popular.

The hybrid concept by the World Bank is as follows.

- Through the command of the government, the interchanges and routes that have high traffic volume are integrated, in order to achieve a lowering of average cost.
- Through the regulation of the government, the number of entering firms and the price are to be controlled. A contract which breaks the link between number of passengers and profitability should be implemented.
- The environmental performance of vehicles should be technologically upgraded.

The manner of the contract between the government and the bus company is the main point of the above implementation of the hybrid concept.

From 3 Highs to 3E: A Leeway for Civil Society Participation

According to the Hybrid concept of the World Bank, looking back at the past, transportation systems did not perform well either in a market-centered or government-centered systems. Referring to the above-mentioned JICA report and others, the Philippines had the same experience. Referring to our research about industrial policy of the Philippines in another field (automotive industry), we think that a hybrid system has a high risk of not doing well in the Philippines. This is because in the Philippine system: weak government system + weak market system = weak hybrid system.

The hybrid system recommended by the World Bank is similar to the 3rd Sector attempt

⁵ Estache, A. and A. Gomez-Lobo, “The Limits to Competition in Urban Bus Services in Developing Countries” March 2003

undertaken in Japan. There are evaluations even in Japan of the failure of such attempt. One big cause may be the lax relationship that develops between the government (local) and private firms. This could also be said about the Philippines.

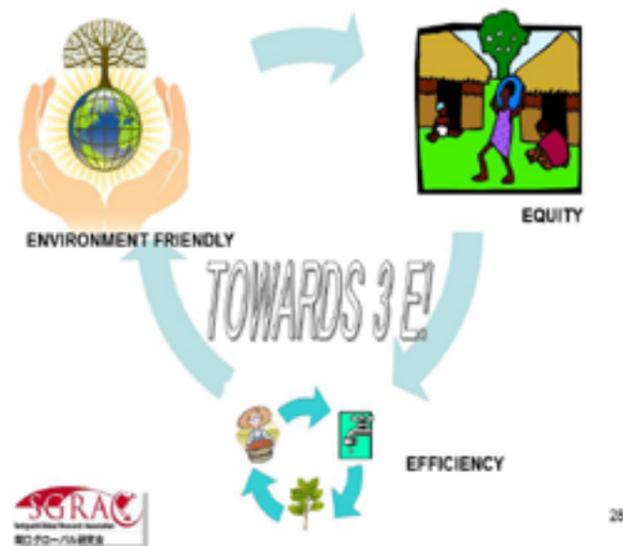
Here, we would like to recommend the introduction of a tripartite system: government + market + civil society organizations (CSOs). CSOs should actively participate in the design and implementation of transportation programs. Through this, the distorted profit-maximizing behavior of the market (stressing efficiency or firms) and the distorted public service-maximizing behavior of the government (stressing equity or consumers) could be somewhat restrained.

It is precisely this tripartite system that would make possible the implementation of a 3E bus transportation system. This 3E was coined by Dr. Bernie Villegas of the University of Asia and the Pacific in his welcome address in the Manila seminar. It stands for Efficiency + Equity + Environment. Efficiency and Equity are the two issues of Shared Growth (the overarching theme of the Manila seminars). The other presenters in the Manila seminar were in general agreement that a 3E bus system should be created in the Philippines.

In Japan, 3 Highs are preferred but 3K (to which 3E translates to in Japanese) are not preferred. The 3 Highs are: high educational attainment, high height, and high salary. These, at one time, are said to be the traits of an ideal husband in Japan. On the other hand, 3K refers to kitanai (dirty), kitsui (demanding), and kiken (dangerous), which is the type of work which young Japanese people avoid. In this paper, we would like to reverse the nuances of these terms. The "3 Highs" are the annoyances of high population density, high traffic volume, and high energy consumption that symbolize the problems caused at EDSA. On the other hand, in this paper, we translate "3K" into "3E", which refers to the terms of a desirable development strategy.

Underlying such reversal of thinking (nuances) is the necessity of a change in human awareness so as to solve such problems as pollution, traffic, and slum proliferation. One of the policy solutions, we think, is the suppression of the migration of people from the rural to the urban sector. For as long as there is no reversal in the present awareness that urban life is best and rural life is worst, the current trend of excessive urbanization would likely continue.

In order to live, people have to consume energy and other resources. The problem is how to ably consume such resources. We would like to call on a way of consuming and producing that would achieve 3E. Prompted by the SGRA forum in Tateshina, we are now considering the further research of 3E in the countryside of the Philippines. We look forward to your support and cooperation in this regard.



Session 3



Energy Conservation Measures in Vietnam Cities

Pham Van Quan Hanoi Architectural University

An Overview of Energy Savings and Development Strategy in Vietnam

Having a special geographical position, climate condition, soil condition, and a mining industry, Vietnam can be called an energy-affluent country. Hence, currently, the core of Vietnam's energy development strategy is the effective use of its abundant resource and the quick implementation of the development activity of potential resources.

Looking at the statistics of Vietnam's amount of energy deposits, there is cause to fear that the fossilized fuel types such as coal, and resources such as petroleum will be reaching their limits soon. In particular, under the pressure of globalism, such energy resources become more and more critical. Not only that, since such resources give rise to emissions, and pollution of the environment, in the future, energy development strategies will be chosen, not only by Vietnam but also by the world. Currently, there is a shift in development strategy of energy resource to clean and recyclable energy sources such as hydro, nuclear, solar energy, and wind energy. However, the economy has not yet reached adequate development. In Vietnam's present condition, where modern technology and technology application have not yet reached a high enough level, precision application of technology such as nuclear power and solar energy is necessary. Energy sources, which have lots of business funds, can be called the future energy sources.

Vietnam's energy development strategy up to 2020 emphasizes the development of hydro power, because hydro power is clean energy that matches the natural condition of Vietnam. Vietnam has to a large extent put in place the technology for developing hydro power. Vietnam has a lot of deep rivers, and is a country with a lot more average rainfall compared to the other countries, thus, hydro power is an energy that is providing electricity for the

Table 1 The Development Potential of Vietnam's Energy Resources

Energy Source	Deposits/Potential	Developed
Coal	200 billion tons	15 million tons
Oil	1.7 billion tons	165 million tons
Gas	0.68 trillion m ³	16 billion m ³
Hydro electric	31.000 MW	10.000 MW
Nuclear electric		undeveloped
New and Renewable Energy:		
Solar Power	daily 4 - 5 kWh/ m ²	small amount
Micro hydro electric	2.000 MW	300 MW
Wind Power	514.000 MW	100 MW
Biomass	500 MW	200 MW

whole of Vietnam. Up to 2020, in particular, a hydro power electric generating plant called Son La, since its inauguration is considered to be playing an important role for using hydro power as its main energy source. Currently, besides the strategy of building hydro power electric plants on a national scale, it is important for Vietnam to make investment policies for the development of hydro power. It is through such strategy that this abundant energy source could be fully exploited.

Currently, since the demand for electricity has been going up, there is a possibility that Vietnam will have to import coal and crude oil in 2015. If large amounts of recyclable energy sources are developed and deployed, future dependence on imported energy could be reduced, the fiscal deficit could be improved, and the environmental contamination crisis could be reduced.

The fossilized fuel sources such as coal, petroleum, and gas are quickly being depleted, and prices have tended to be rising. A strategy for developing renewable energy source is a very important strategy for a strong energy development plan. This is because renewable energy is a clean energy, and accounts for a large share in the total energy consumption. Moreover, the use of fossilized fuels such as coal and petroleum is the cause of the global warming brought about by the air and various pollutions, and the greenhouse effect. The development of renewable energy sources should limit such negative effects, and could bring about the development of agriculture villages and agriculture.

Currently, how to harmonize the objective of securing the environment and the objective of economic development is a major issue. In contrast to the use of fossilized fuels, the blessings of renewable energy, which can avoid the bad effects to the environment, is well understood. However, the evaluation of the additional cost and the application of the burden of the additional cost to the consumer is an extremely difficult problem, and can be said to be difficult to implement at present. The reason is that Vietnam's current primary strategy is to prevent a recession and the return of inflation. Without the raising of electricity prices, in order to pay for the increased cost of renewable energy, one should consider whether funding is to be drawn from the national budget, or from the energy users.

From such a situation, it is thought important to form a main standard, and to create a policy that has a high possibility of being implemented, in order to develop energy in Vietnam.

The following three points should be prioritized. The first point is the development of energy sources that can revive the economy. The second point is the increase as much as possible of the profits from the sale of certifications for the reduction of carbon emissions to international entities. The third point is the displaying of development capabilities within the country, as much as possible.

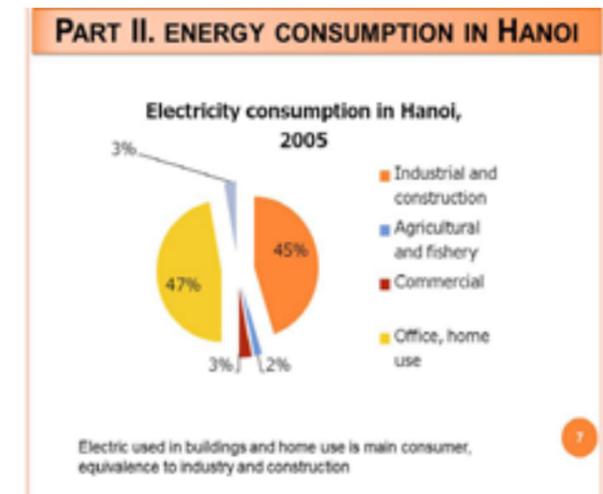


Figure 1 Electricity Consumption Shares per Sector

- Manufacturing and Construction Industry: electricity consumption is 13.121 GWH, accounting for 45.41% of the total electricity consumption.
- Agriculture and Fisheries Industry: electricity consumption is 0.442 GWH, and is mostly used for irrigation. It accounts for 1.53% of Vietnam's total electricity consumption.
- Service Industry (Commerce, Hotel, and Restaurant): electricity consumption is 0.741 GWH, and accounts for 2.57% of Vietnam's total energy consumption.
- Administration (Government Institutions): electricity consumption of citizens is 13.668 GWH, and accounts for 47.31% of Vietnam's total electricity consumption.
- Other Activities (Public Lighting): electricity consumption is 0.918 GWH, and accounts for 3.18% of electricity consumption.

Looking at the above statistical figures, the electricity consumption for manufacturing, construction industry, government institutions, and citizen living reaches 92.72%. So, in the future, amidst Vietnam's industrialization, modernization thrust, and urbanization process, it can be said that the consumption of these two industries will continue to occupy a large share.

Use of Renewable Energy

It is conceivable that Vietnam has much potential for renewable energy such as biomass, micro hydro power, wind energy, solar energy, and geothermal. According to statistics, the potential output of micro hydro power generating plants in Vietnam is about 2000 MW. Together with household scale hydro power generation in remote areas, community-level hydro power projects can satisfy the daily electricity demands of local citizens. A few micro hydro power systems, in addition to state generating systems, have generated electricity. According to 2007 statistics, in total, the rate of electricity generation accounts for 1.8% of the total system of electricity generation, and is about 1.3 billion KWH.

According to a World Bank survey, Vietnam's potential wind power generation total output is estimated to be 514,000 MW. This is about 200 times the output of the hydro power generation plant Son

The Problem of Energy Use in Vietnam

Electricity

According to the total figures of the Vietnam Electricity General Company, the statistics for the electricity amount consumption in 2006 is as follows

La is Southeast Asia's largest. Moreover, it is equivalent to 10 times of the whole country's electricity output in 2020. Since Vietnam is a country with a wide sea surface, it could develop from 800 KWH to 1000 KWH in one year per one square meter of sea surface. Vietnam is considered as a country with a potential for renewable energy sources. Vietnam has the possibility, not only solar energy and wind energy, but also for energy as well as electricity generation sources from 200 hot springs (springs with temperatures from 40 to 100 degrees). (Reference 3)

According to estimates, the output of biomass energy in Vietnam is 500 MW. Currently, the output of biomass energy satisfies the demand for 70% of household cooking in the agricultural regions. The waste from agriculture, particularly for sugar cane, co-generating technology (heat and electricity) is used for making sugar. Moreover, renewable energy sources such as biological gas, solar energy, geothermal, waste from daily living, and tidal have considerable potential. It is estimated that electricity equivalents are 58 MW for biological gases, 4 to 5 KWH per square meter for solar energy, 340 MW for geothermal, 340 MW for waste from daily living, and 100 to 200 MW for tidal power.

Vietnam has the potential for renewable energy, but currently deployment of this potential has not kept up with the present situation. In 2005, the electricity output from micro hydro power, biomass, and wind electricity accounts for more than 2% of total electricity output. Within Vietnam's national energy development strategy up to 2020 and vision up to 2050, the objective is to raise renewable energy output to 3% of total output in 2010. However, this figure (3%) does not yet reach the 10% and 11% for the estimated total output in 2010 and 2020, respectively, by the ASEAN energy minister. It can be said that this is a big challenge, given that various difficulties have to be overcome to achieve this.

Problems Regarding Urban Development and Energy

In Vietnam, the population of cities in 2009 increased by one million, and the rate of urbanization has reached 29.6%. Currently, in the whole of Vietnam there are more than 750 cities (cities from level 5 to special levels). Centering on large cities such as Hanoi and Ho Chi Minh, the rate of urbanization is fast. According to the vision of the master plan for the urban system of Vietnam up to 2025 approved by the Vietnam Prime Minister, Vietnam's population will climb to 116 million by 2020. 45% of which would tend to reside in cities.

The development process of Vietnam's cities can be said to be extremely rapid. Every year, 1.2 million go to live in the cities, and it is necessary to construct 30 million square meters of new houses for these people. Currently, we are constructing various thermal electricity generation plants and hydro electricity generation plans, but we have the problem of deficient electricity. It can be said that the rapid urbanization is the cause of Vietnam's losing its energy demand and supply balance. On the other hand, the energy conservation of construction works has not caught much attention. While fossilized energy sources are quickly being depleted, recyclable energy sources must be effectively developed in order to satisfy the electricity demand for urban living. This is an extremely important and crucial policy.

In Vietnam, the energy consumption of high-rise buildings accounted for 23 to 24 percent of the total energy consumption in 1994. Recently, with the rapid urbanization and increase in investment capital from abroad, this share has rapidly increased. The annual growth rate of construction is 15%, and accompanying the increase recently in high-rise buildings, shopping centers, and supermarkets, the energy consumption of high-rise buildings has also climbed to 35 to 40% of the total energy

consumption. Based on a consideration of high-rise facilities in Hanoi, Danang, and Ho Chi Minh, the energy consumption of high buildings and high-rise facilities is extremely large, but since it cannot be controlled, we see that energy is not being used effectively.

Among these facilities, there are a lot of buildings that were constructed using foreign designs. These facilities are designed with foreign styles, and are not appropriate for the natural climate of Vietnam. Recently, the use of large glass in facilities has become popular. There is a tendency to imitate Western modern designs without considering Vietnam's standard or climate. According to the survey made in cooperation with the Hanoi Architecture University and the Science and Industry Ministry, there are some irrational points in the design of facilities. Insulation and equipment are not effectively installed. This causes an increase in the energy consumption of facilities to increase from 20 to 30 percent. (Reference 2)

Hanoi and Ho Chi Minh cities are undertaking construction several hundreds of new cities, residential construction, and high class mansions, but the investors of these projects do not take much note of energy conservation measures and their economic and social effects. Several high-rise hotels, office buildings, and shopping centers have a floor area of 10,000 square meters and consume two million KWH of electricity per year. Public facilities such as administrative buildings, schools, and hospitals, which were built with old technology and equipment according to low design standards of the past, do not have such a high energy use effect.

In Vietnam's architectural materials market, there are not so many materials that can be said to be environmentally friendly. Moreover, there is not much strong concern about the rules on the effect of facility energy and building permits.

On a global level, it has been emphasized that it is natural to use environmentally friendly architectural materials, so as to apply "green architecture". The sanctions on environmental pollution and energy waste are very strict, but since Vietnam is not currently using the appropriate technology, and environmentally friendly materials, this gives rise to adverse effects. Since there is no variety in material types and prices are high, consumers do not use these materials.

The lack of new products and highly effective architectural practices also is the cause of the difficulties in promoting highly effective energy using facilities. Since highly effective use of energy is an urgent problem, promotion policy, investment priority policy, and tax priority policy are deemed necessary. According to construction specialists, regulation of construction standards such as residential projects and service facilities, and architectural standards need to be set up quickly. If the design to implementation process is done well, it seems that the electricity consumption of high-rise buildings could be reduced by 15 to 30 percent.

Energy Conservation Measures

Policy-Related Measures

Energy Development Policy and Energy Use Policy

At present, Vietnam is a country that exports coal and petroleum, but during 2010 to 2020 the problem of imbalance between demand and supply is being predicted. Vietnam is not blessed with

energy resources, but it could be considered to be the number one country in the Southeast Asian region for wastefully using energy. According to estimates, should the exploitation continue, Vietnam's energy source would quickly become scarce by the end of this century, and possibly disappear. Several decades later, natural gas and petroleum would dry up. However, if the problem of energy use could be effectively improved, we cannot say that such problem will not appear, but we can say its appearance will be slowed down.

From the transport freight and manufacturing to the service industry, there is the problem of wasteful use of energy in all industries and sectors from lighting for each institution. In the manufacturing sector, Vietnam's energy consumption is 1.5 to 1.7 times that of Thailand and Malaysia. This is because in making the same product, Vietnamese firms must use 1.5 to 1.7 times the energy used by Thai or Malaysian firms. More specifically, the capacity of Vietnam's gas furnaces is 20% lower than the capacity of gas furnaces of the world. Hence, to make one ton of steel from steel ore, Vietnam must use three times the energy used in advanced industrial country. To make one ton of steel from scrap metal, Vietnam must use 1.5 times the energy used by advanced countries. Hence, if energy conservation could be adequately done, it can be said that more than 20% of the energy used in industry, and 30% of the energy used in the construction industry could be saved.

At present, to create 1000 dollars of Vietnam's GDP, Vietnam has to use 600 kilos of petroleum. This figure is 1.5 times that of Thailand and twice the world average. In order to advance GDP by six to eight percent annually, Vietnam's electricity industry has to increase its capacity output by 15 to 17 percent. To increase the world average GDP by one percent, output capacity needs to be increased by 1.2 to 1.5 percent.

The conservation of energy and the effective use of energy have been proven by an effective investment policy. The cost for conserving 1 KWH of electricity is smaller than the cost of making 1 KWH with a generating plant. The excessive use of energy is not only a cause for lowering the economic competitiveness of the economy, but is also a cause for lowering the balance of energy and harmful effects to the environment.

In many countries of the world, energy conservation and the effective use of energy is regulated by highly effective laws. In Vietnam, the government has also issued a protocol since 2003, but the content of the protocol just encourages the effective use of energy but there is no concrete mention of a strong sanction.

Consequently, the importation or making of poor quality and cheap equipment, which uses a lot of energy, cannot be stopped. Moreover, it is conceivable that similarly cheap electricity leads to the problem of wasteful use of energy.

Energy Conservation Policy

During the second half of the 1990s, a movement for the effective use of energy was given the term "energy conservation". This term does not seem to represent the concept regarding the effective use of energy that concerns the world, and the preservation of energy sources. Actually, it appears that the energy conservation rate in each industry will reach 10 to 15 percent. (In order to raise the energy amount annually by 14 to 15 percent, five to nine billion dollars is necessary.) Industry, transport and freight, residences, and high-rise buildings consume a lot of energy.

In such a wide range of use, solutions are needed for problems ranging from human resources, quality standards, and quality control systems to policy, budget, and technology. It is necessary to implement promotion policy alongside with sanctions so as to be able to effectively implement energy conservation. The Japanese have been working on energy conservation for about 40 years, turning a challenge into chance, and have been able to create efficient technology and frontline energy conservation technology. This policy perspective is a more pro-active perspective than thinking about the assistance cost in order to enable energy conservation. (Actually, there is a pro-active point to the thinking that assistance should be provided so as to enable energy conservation. If citizens reduce their energy consumption, the government is able to also reduce the costs for supplying that energy and for overcoming the environmental pollution that should have been produced).

Various problems have to be resolved so as to enable energy conservation to contribute to Vietnam's development process. Firstly, Vietnam's government should come up with a policy regarding energy conservation and industrial standards for industries such as manufacturing, transport and freight, and construction. In addition, it should construct a certification for the deployment of programs for standards in output capacity of electricity facilities and energy labels. It should also prepare the financing for investment promotion, use of highly effective energy technology, promotion of improvements, and the education of human resources to manage energy use. This financing could be obtained from international energy programs, but before doing so, it is necessary to create strict sanctions and to raise management capabilities.

Owing to the acceleration of the energy conservation movement and the development of energy conservation market systems, an energy service company has to be created in order for investors, firms, counselors, and makers (education consulting, technology, environment-related makers) to actively participate in energy conservation activities. This plan could be said to be the most appropriate for Vietnam's condition. Taking the example of China, there are 600 of such firms at present. They form a consolidation of China's three strong sectors (government financing and consulting, technology, and trade). Such companies could receive money from the energy conservation effects in the form of investing in advance on energy conservation systems.

It could be said that the regulations issued by the government is not only for the development of robust high-rise buildings but also for generally guiding environmental improvement measures. Through standards and regulations for reducing CO2 emissions and tax systems, the government's will could be clearly shown. In addition, there are concrete stipulations as to which project will obtain construction permits, and for the operation and administration of high-rise buildings. Buildings that have low energy conservation effects will be stringently taxed, while assistance policies will be issued towards buildings with a high energy conservation effect.

In this legal system, the effective use of energy and energy conservation are particularly emphasized. Excluding advanced industrial countries, recently, East Asian countries have created legal systems for energy conservation (China: 1997, Korea: 1995, Thailand: 1995, and India: 2001). Energy conservation is always attached to a country's energy objectives and strong economic development.

Six years ago (September 3, 2003), the government promulgated protocol number 102/2003/ND-CP, after which it promulgated protocol number 19/2005/CT-TT in July 2, 2005. According to this protocol and instructions, each ministry, institution, and region, should at least reduce their daily electricity

consumption, particularly during the dry season (the period from April 1st to June 30th every year) by 10 percent. After the act and instructions are strictly carried out, Vietnam's energy industry was able to achieve its first good performance. The achievements included the effective use of energy, the creation of a national administration system regarding energy conservation, the education of the citizenry regarding this issue, and the promotion of energy conservation behavior.

In June 2010, the Vietnam state formally passed a law regarding the energy conservation and effective use of energy. The scope of the law is wide, and, with the exception of energy production sectors such as coal exploitation and electricity generation, is applied to manufacturing, transportation and freight, service industry, as well as private construction, and public institutions. The energy generation sector will separately be administered in accordance with a specialized law.

The crucial point of this government order is the implementation of an energy monitoring system for energy-using facilities. This will enable the discovery of irrational points in the energy users, and its speedy resolution. Moreover, in order for the monitoring process to be implemented well, the energy using facility should set up a reporting system and a statistical system of energy consumption. This law does not end at simply promoting energy conservation, but is also an observation measure that is enforceable. It enforces a standard system regarding imported equipment, locally produced energy consuming equipment, regulations for national standards, and the disposal of equipment that consumes a lot of energy.

In order to reduce the energy consumption in the construction sector, this law makes for proper planning in construction consulting organizations, designers, and investors so as these are in accordance with the rule of "Vietnam construction standards and effective energy use, energy conservation" .

In order to effectively use energy, a special administrative system and enforcing mechanism is applied toward each facility of industry (facilities which consume 1000 ton of oil annually), transportation, and large construction projects (projects with more than 2500 square meters of area).

This law strengthens the assistance policy, which includes tax breaks, cost assistance, and corporate tax incentives, for the effective use of energy. Together with assistance, it also has stipulations, ranging from administrative guidance up to pursuing criminal liability.

Technological Measures for Energy Conservation

Energy Conservation in the Manufacturing Industry

The potential for energy conservation would depend on the industry. Generally, it could be said that the conservation rate would be ten to fifteen percent. Heavy industries such as the cement and steel manufacturing are currently the main subject of research for methods that would enable energy conservation.

According to statistics, the manufacturing industry is currently using 40 percent of the primary energy of the world, and is emitting an equivalent amount of CO₂. In Vietnam, since 1990 up to the present, the energy consumption of the manufacturing industry is the biggest, compared to agriculture, transportation/freight, trade, and service industries. In manufacturing, with the application of high level technology, the energy conservation rates in the steel and cement manufacturing industries is expected to be the highest.

The cement manufacturing industry can sustain its production capability while increasing the potential efficiency of its energy conservation by more than 20%. From the stage of material preparation up to the clinker melting stage, and the grinding stage, the energy approach and energy conservation method are different. However, within the cement manufacturing industry, there is a high possibility of recovering energy from the heat of the smoke produced from the production process. It is conceivable that with a technology for harnessing the heat of the smoke, the energy conservation potential efficiency of the cement industry would become much higher. In more concrete terms, a cement factory having a production capacity of 20,000 tons per day has an electricity generating capacity of 23,000 KW. Setting up equipment to harness the waste heat from the factory, enables the recovery of 23% electrical power for the production process.

Similar to the cement manufacturing industry, the energy consumption of the steel manufacturing industry is also large. The cause is the use of old technology. Since the capacity of furnace plants of Vietnam is below 300 tons, the use of high-level technology is limited. The energy consumption of steel rolling mill plants having low capacity and using old technology is 30% more compared to the energy consumption of other plants using high-level technology.

Consequently, it is necessary to apply high-level technology in steel manufacturing so as to be able to reduce the consumption of fuel at the heating stage for steel rolling mills. Concretely speaking, in the steel manufacturing plant, it is necessary to use the exhaust to dry the materials before putting these into the melting pot. In steel roll milling plants, the inputting of heated foil into the melting furnace will reduce the consumption of FO oil and electricity. If one steel manufacturing plant sets up one heating furnace that has recyclable combustion, then there could be 20 to 30% conservation in fuel consumption.

Furthermore, it is necessary for steel plants to use such supplementary equipment such as air compressors, conveyors, and engines. Such measures are simple but are considered to have high rate of conservation. For example, in order not to wastefully use energy, proper monitoring is required of such things as compressed air system leakages, and wavelength changes. Caution is also needed in problems such as excess air in the steam system, air leakages, heat exchangers, condensed steam, and insulation. It is necessary to set up variable wavelength devices of engines and soft dynamic equipment. A well known method is the replacement of lights with lighting systems that have an energy conserving effect.

Energy Conservation of the Transport/Freight Industry

In recent years, Vietnam's transport/freight has been rapidly developing. In response to the demands of citizens, the transport firms have been coming out with a lot of public vehicles such as buses, taxis, and coaches. Moreover, the number of automobile and motorcycles have increased. Owing to this, the traffic jam problem in large cities has alarmingly become severe. The large number of vehicles and the severe traffic condition makes for an extremely large energy consumption of the transport/freight industry, and has caused environmental pollution.

The main cause of the environmental pollution is the exhaust gas of vehicles. Currently, in Vietnam, the riding of public buses is taken to be one countermeasure for overcoming the traffic problem, so the exhaust gases can be reduced. The NO_x and CO gas exhaust of automobiles using diesel is fewer than that of automobiles using gasoline, but diesel produces a lot of particles as well as sulfur odor.

In order to be able to effectively use as well as conserve energy, the following measures are necessary.

- So as to effectively operate the transport system, the transport/freight system should be re-organized and re-planned.
- Promote to the people, each institution, and organization, the use of vehicles that consumed little energy. There should be a gradual but steady use of energy-friendly fuels.
- Since the generally used vehicle is the motorcycle, there should be a movement to promote riding in electric bicycles and public vehicles.

Public Lighting and Energy Conservation

According to the calculations of the Vietnam Public Lighting Committee, the gross electricity consumption of the public lighting in 2009 was 21 billion KWH, accounting for 25% of the nationally traded electricity. Moreover, if the measures for effective use of energy are properly applied, it seems possible to save 6.31 billion KWH. This is very significant in the light of the current energy situation for production and daily living. The interest on the public lighting problem therefore is strong. Below are the characteristics of public lighting in Vietnam.

- Public lighting accounts for 3% of the total electricity consumption of the whole country.
- 90% of the road lighting is sodium high-pressure lights, and the remaining 10% are mercury high-pressure lights.
- Lights for decorative purposes are frontal halogen lamps, sodium high-pressure lights, and fiber optic lights.
- PLC cabinets and timer cabinets are both used for the control cabinets for lighting. (PLC cabinets do not yet use light-sensitive sensors)
- In order to conserve energy and to reduce the electricity consumption rate in the evenings, three-phase scheduled brownouts are implemented. Roads which are equipped with single-phase lights are spared from the brownouts.
- The design of or level of consulting for the lighting system is still low. (There are not so many lighting specialists. Lighting system design and consulting are done by electrical engineers.)
- Due to dust build up and poor cleaning, efficiency of lighting is low

Conservation Measures

Looking at the above characteristics, it can be said that the electricity conservation rate of urban lighting is high. More than 20% of the electricity could be conserved, but for this to be realized, the following technological measures should be undertaken.

- Proper discussions must be made with regards to the design of highly effective lighting and appropriate methods of lighting for new transport construction projects.
- The current lighting system must be improved, and building and repairs of the system must be undertaken. Low output sodium lights should be used as much to replace high-voltage mercury lights and high-output, high-voltage sodium lights. As much as possible, nano emitting diodes should be used.
- Use of light types with two levels of output:
 - Without changing the range of 250W sodium lights, ballasts should be changed to two-level ballasts so as to be able to adjust the ballast for the lighting of large roads. Use PLC cabinets for

lighting control cabinets.

- Change 250W high-voltage sodium lights to 150/100W high-voltage sodium lights. (use 2-level ballasts and PLC lighting control cabinets)

- In order to increase the efficiency of public lighting, an appropriate administration system and regular maintenance must be implemented.



Figure 2 Present Situation of Kuam Tien Street

Crucial Points in Energy Conservation

- Choose the direction of the residence and construction: It is necessary to choose the direction so as to let in the cool breeze of summer and the sunlight in winter, while avoiding the heat from the west and the northeastern winds. In the case that a good direction cannot be chosen, as much as possible an effective design must be done in order to avoid the bad effects of weather.
- It is necessary to be careful about the distance distribution by not locating the work place too far from the residential place, so as to make commuting to work convenient.
- Rationally design the greenery and water systems.
- One must be careful about such things as the use of traditional materials, architectural measures, site structure, and technology.
- Appropriately design the public lighting system.
- Since energy sources, energy exploration, and energy use problems are currently global problems, in the course of implementing planned projects, it is necessary to make approvals after a proper inspection of the site. This is very important because it is not only for us, but also for the future generations.

Energy Conservation in Urban Construction and High-Rise Buildings

Energy Conservation in Urban Design and Construction

Based on various empirical researches, energy cost is determined by various factors such as population density, transport system, water supply and drainage system, water surface plant system, public lighting, and population distribution. The research of Dr. David Bannister of Oxford University, UK shows the following.

- The urban structure plays an important role in energy conservation strategies.
- Locating the land use factors and transport system, and work places near the residential places can

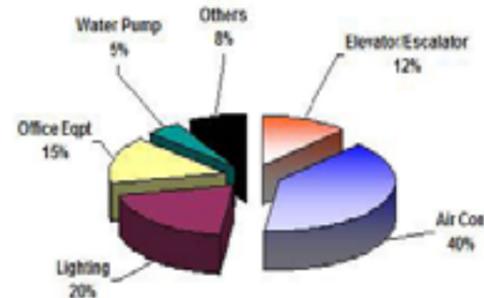


Figure 3 Electricity Consumption Shares of Shopping Centers and Office Buildings in Hanoi

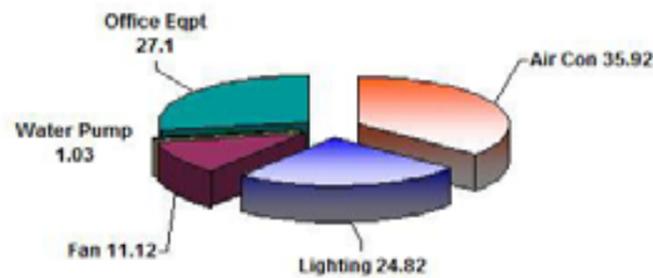


Figure 4 Electricity Consumption Shares of Office Equipments in Public Offices in Hanoi

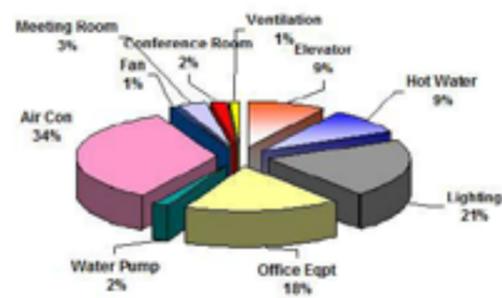


Figure 5 Electricity Consumption Shares of Government Offices and Committees in Hanoi

lower energy consumption.

- Population density also is an important factor in energy conservation. When population density is high, energy consumption is low.

- In order to be able to conserve energy, solving the urban lighting problem is also one countermeasure.

Based on the experience of a number of countries, if the design, construction process, and management stages are properly carried out, at least 15% or up to 30% of the electricity consumption of high-rise buildings could be conserved.

French specialists mentioned that for effective conservation of energy in the big cities of Vietnam, high-density type of collective cities should be built. The head of the Strong Urban Research Center said that "since urban population density has a strong relationship with the energy consumption problem and the ecosystem, huge amounts of energy could be conserved if the urban structure in Vietnam is clustered." However, if population densities are overly high in the cities only, the environmental pollution problem arises. The main point here is seen to be design. A clustered population

model should be matched with an effective design. This is because it a model that has greenery and water, protects the environment, and can conserve energy. It is necessary to re-design Vietnam's water way system, particularly the southern water way system. Vietnam's southern part has an intricate river system. Since the emissions from the water way are less than that from the land, improvements must be made centering on the water way system.

Conclusions and Recommendations

Conclusions

- Currently, energy is negligently being used in Vietnam, but it is an opportunity to deploy various programs for energy conservation.
- The demand for energy in the cities has been growing rapidly, but not much attention has been paid to energy conservation in urban design and construction.
- The regulation and sanctions regarding energy conservation and the effective use of energy has been inadequate and weak

Recommendations

- The creation of Vietnam's renewable energy committee, just like in other countries, to harness knowledge and unity in order to obtain assistance from the government and foreign entities.
- The strengthening of measures such as tax breaks for clean energy and renewable energy industries, taxes on exploration for non-recyclable energy resources, and the punishment of actions that would cause environmental pollution.
- The effective use of the investment funds of the World Bank and the Asia Development Bank for the clean energy of Vietnam. Interest-free lending to firms. The effective application of the country's new technologies for the production of equipments such as solar-energy water heating system, solar panel, wind turbine, and geothermal.
- From the funds of international organizations and the government assistance, 5,000,000 to 30,000,000 VND should be lent out to each registered family in order for poor families to be able to buy such things as solar powered cooking stoves, and devices to heat water using solar energy. Promote using of compact energy, making water clean, making agricultural products clean, and using solar energy for lighting. Should such measures be implemented, we can save on the investments on electricity generating plants and transmission line systems to the hinterlands. We can reduce actions that pollute the environment by the cutting down of trees for cooking firewood, and eradicate hunger and poverty.

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Session 4



Taiwan's Energy Consumption, CO₂ Emissions, and Transport Situation

Wenchang Yeh Shimane University

In this paper, I will explain, with some comparison to other countries, Taiwan's energy consumption, CO₂ emissions, energy conservation awareness, and the global warming suppression objective of the government. I will also show the condition of the use of various means of transport in each region of Taiwan, and the result of an investigation of Japan's situation. Furthermore, I will look into the energy efficiency of electric automobiles and consider its possibility as a means for energy conservation.

Initially, I will explain Taiwan's energy consumption. Figure 1 shows the changes in consumption of Taiwan in recent years, and its breakdown. From 1990 to 2007, the energy consumption has been continuously growing in response to economic growth. Furthermore, the CO₂ emissions, as shown by Figure 2, have been increasing parallel with the increase in energy

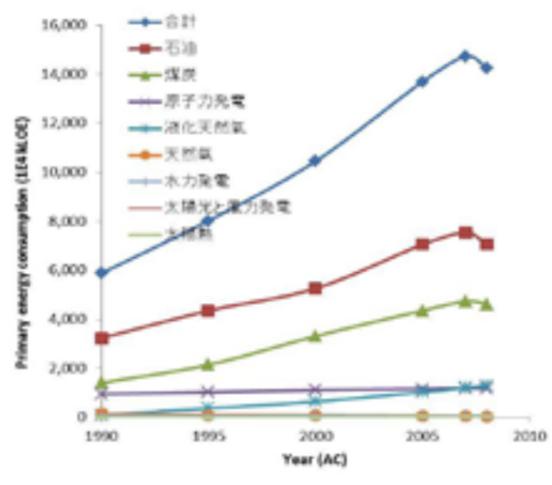


Figure 1 Breakdown and Changes of Taiwan's Primary Energy

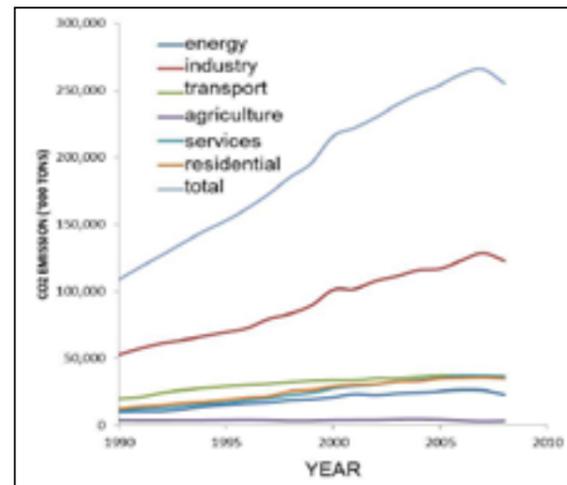


Figure 2 Changes in Taiwan's CO₂ emissions by industry

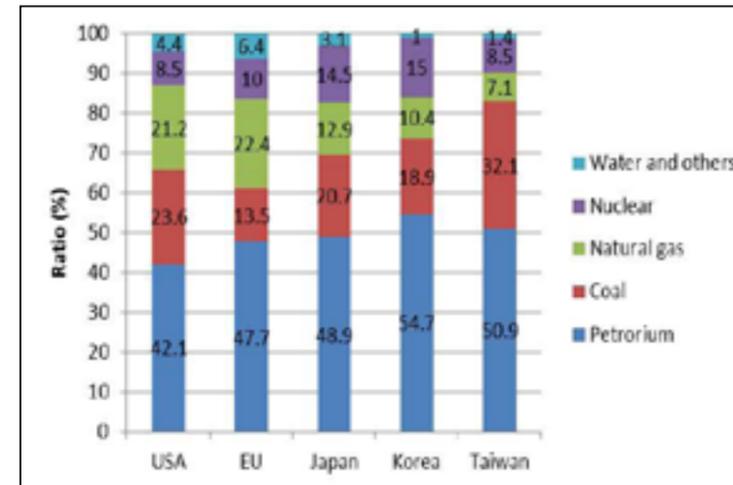


Figure 3 Primary Energy Shares

rate is low. Within fossilized fuels, the use of natural gas by Europe and the U.S. are generally high, with EU having the highest at 22.4%. Since natural gas has a lower CO₂ dissipation coefficient than oil and others, the above situation leads to a reduction of CO₂ emissions. Nuclear-generated electricity also has an effect in reducing CO₂ emissions. Currently, No. 4 electricity generating nuclear plant will start generating electricity in two or three years, hence, the rate of dependence on fossilized fuels thereon is planned to be reduced. The energy consumption and CO₂ emissions in the figure have been dropping fast in 2008, but this is due to the depression in the economy since the Lehman Shock.

Figure 3 shows the energy strength of Taiwan and the world, i.e., the energy consumption per GDP (average purchasing power). The lower this is, the higher the energy efficiency. Canada, South Korea, America, and Australia have poor energy efficiencies, compared to European countries and Japan, which boast of high energy efficiencies. If the population density is high, there is a tendency for energy efficiency to improve. Europe has a population density that is not as high as Japan's but is showing a higher efficiency. On the other hand, Taiwan has a population density of 642 persons per square kilometer, which is about twice that of Japan, but its efficiency is

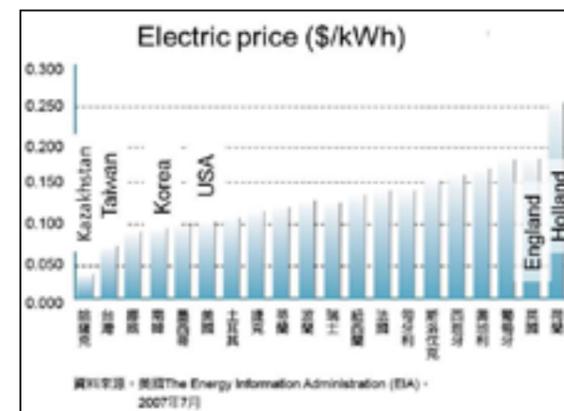


Figure 4 International Comparison of Electricity Rates

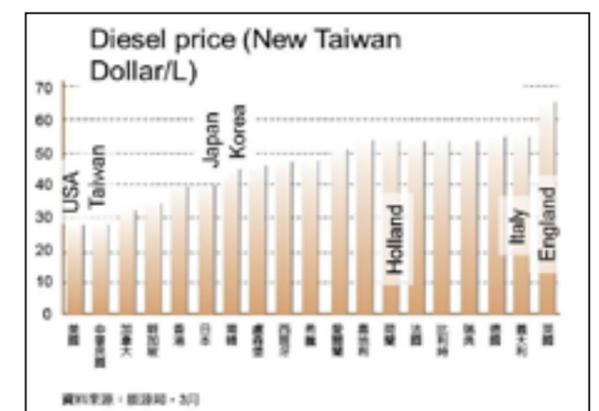


Figure 5 International Comparison of Diesel Prices

Governmental policies for the emission of the Greenhouse gases in Taiwan
 (Energy Bureau of the Ministry of Economy, the platform for the permanent energies)

1. The target of policies (extracts)

(1). An improvement of the energy efficiencies:
 By 2015, cut the energy efficiencies by 20% comparing with the year of 2005, 50% by 2025.

(2). Development of the clean energies:
 CO2 emission shall be backed to the level of 2008 during the period of 2016-2020.
 (my personal question :is it 0.5% up comparing with level of 2005?)

(3). Securing the steadiness of the energy supply:
 Building up a system of the stable energy supply by 2015 which can satisfy the target GDP\$30,000/person.
 (my comment: As the GDP of 2010 is \$18,000, if we keep our growth rate 11%, it will be surely possible to reach \$30,000/person.)

Korea
 (From the Korean Report, The Energy Bureau of the Ministry of Economics, Taiwan)
 Greenhouse gases shall be cut by 30% by 2020 on the condition of "Business as usual". It means 4% cut of the Greenhouse gases comparing with the year of 2005.

China
 (From the Ministry of Environment, Japan)
 The volume of CO2 emission per GDP of the year 2020 shall be cut by 40-45% comparing with the year of 2005. (is it their own initiative?)

Japan
 (From the Japanese Report, The Energy Bureau of the Ministry of Economy, Taiwan)
 Ex Prime Minister Hatoyama announced in November, 2009 that by 2020 Japan will cut by 25% comparing with the year of 1990. Since the target of ex-ex-Prime Minister was only 8%, it was praised highly by international world as Hatoyama's firm decision.

low.

Why does Taiwan have low energy efficiency? This has been cited to be due to low energy prices. Figures 4 and 5 respectively show a comparison of the world's electricity price and diesel price. From Figure 4, we can see that Taiwan's electricity price is the second lowest, next to Kazakhstan, and its diesel price is the second lowest, next to America. At the root of this is taken to be the Taiwanese authorities promoting economic growth by suppressing energy prices^v. However, I would like that [Taiwan] should soon graduate from such a backward country approach, and shift to the direction of promoting economic growth by increasing the value added of products.

Perhaps it is due to the effect of such low energy prices that Taiwan has a lower energy conservation awareness compared to Japan. I will mentioned it later, but in Taiwan's number one city of Taipei the users of personal cars, including motorcycles, accounts for 50%, while in the three largest cities of Japan, it is 30%. I have asked many times the reason for people to take the motorcycle to go to work or school, and most of the time the reason would be it is cheap and convenient. In Taiwan, motorcycles are cheaper than taking the subway. Moreover, urban planning being late, subways came about only after the city has developed so subway stations and nodes are not always near the busy parts of the city. Hence, motorcycles win out in terms of convenience. Since the masses travel by motorcycles, it is perhaps why at commuting time, Taipei's air becomes stale with the combined emissions. As a result, there might be some bad effects on health. I think it is strange that the affluent people living in Taipei would jump to get organic vegetables but are not concerned with inhaling gases into their lungs. Moreover, with regards to environmental education in the schools, even 15 years ago when I was a student in a Japanese national university, we were called upon to conserve energy by the school authority and received guidance from our supervising professor to turn off the PC when going home. On the other hand, when I was living there up to 2010, there was practically no call from the school to save on electricity.

What kind of objectives does the Taiwanese government have with respect to global warming? Table 1 shows the objectives of Taiwan, South Korea, China, and Japan.

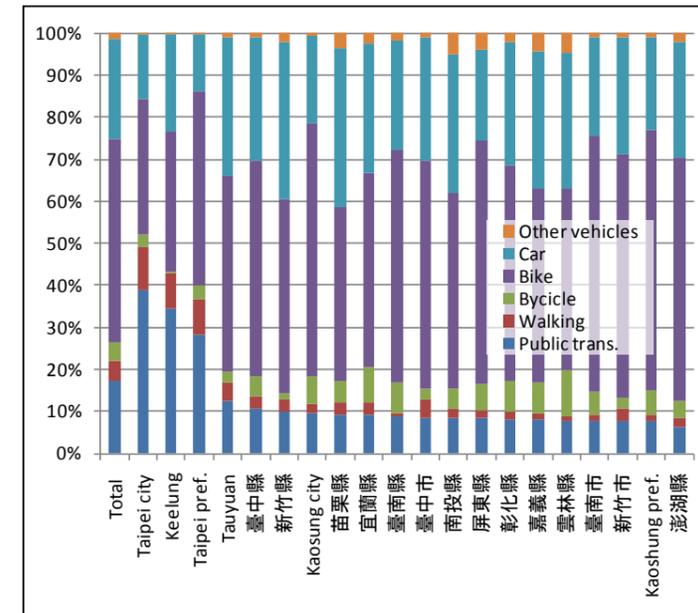


Figure 6. Means of Transportation in Taiwan

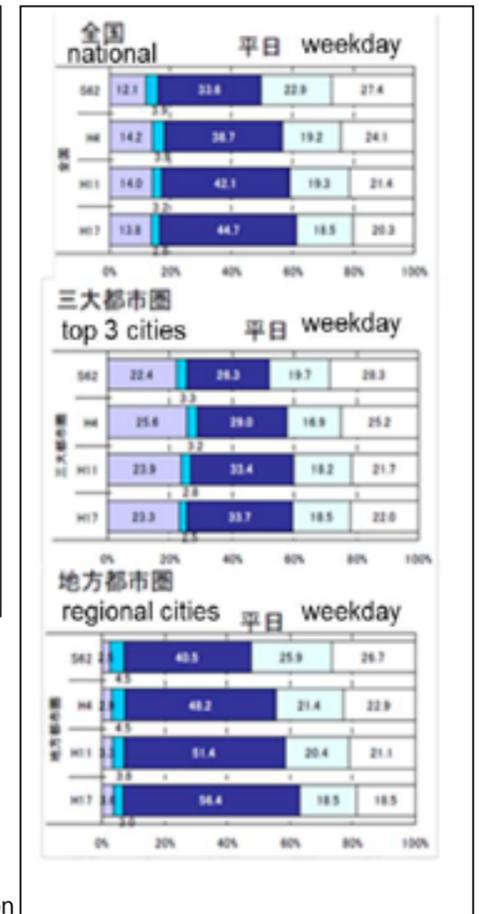


Figure 7 Means of Transportation in Japan

Regarding Taiwan, the government has three objectives. (1) Improvement of energy efficiency so that by 2015 there is a 20% reduction [of CO2 emissions/GDP] compared to the 2005 level, and of 50% by 2025. (2) Development of clean energies, so that the CO2 emissions from 2016 to 2020 are returned to 2008 levels. (3) Securing a steady supply of energy by building a stable energy supply system that could satisfy the objective of 30,000 GDP dollars per person by 2015. Among the three items above, the number (1) objective of improving the energy efficiency is held in many cases as an objective of developing countries. For example, the objective of China is "to reduce the CO2 emissions per GDP", but this is also an improvement of energy efficiency, since as economic growth continues the CO2 emissions actually increase. The number (2) objective is related to CO2 emission targets decided by advanced countries, but the meaning of the figures changes depends on which year was set as the standard. In Taiwan, the standard is 2008, but if we take the standard as 2005, as most countries like South Korea do, then estimating from the trends in energy consumption shown in Figure 1, the increase will become 0.5%. Considering that South Korea's objective is a 4% reduction with fiscal year 2005 as standard, this is a very lukewarm setting. Moreover, with respect to objective (3), considering that currently Taiwan's GDP per capita is about 18,000 dollars, the objective of \$30,000 is impossible for it requires an annual growth of 11% for the next five years. This \$30,000 is also part of the manifesto put out by the current

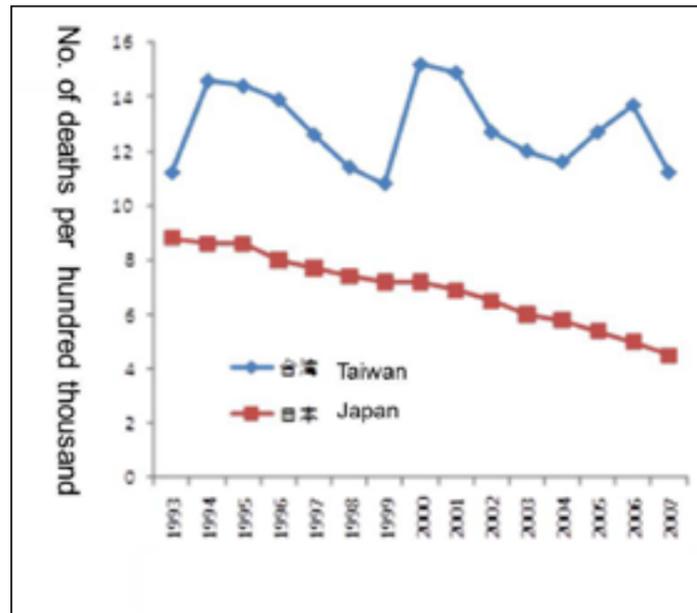


Figure 8 Death by Accidents in Taiwan and Japan (within 24 hours)

President during the 2008 elections.

Next, I will explain about the transportation condition of Taiwan. Figure 6 shows the means of transportation for commuting to work per prefecture of Taiwan. The share for public transportation, walking, bicycle, motorcycle, car, and others are shown. For comparison, Figure 7 shows the share for railroad, bus, automobile, two-wheel vehicle, walking, and others of Japan (nationwide), its three big urban zones, and its other regional urban zones. The two-wheel vehicle figures here include bicycles and motorcycles, but from other data, motorcycles account for only 5% of two-wheel vehicles, so for our purposes, these could be views as mostly bicycles. According to Figure 6, the most ecological means of transportation, namely public transportation + bicycle + walking, has the highest total share in Taiwan: about 50%, for the case of Taipei, wherein public transportation is most provided. However, in cities outside of Taipei, public transportation is weak so [this share] drops to a little less than 20%, and is a little more than 25% looking at the national average. Compared to this, in Japan's urban sector, in fiscal year 2005 it was 60%, and about 50% for the national average. From these results, we can see the height of Japan's energy efficiency.

Looking at the breakdown of Taiwan's un-ecological means of transportation, the share of motorcycles in the total was 30% even for Taipei City, and was over 50% for a lot of the other cities. This is causing a lot of traffic accidents, in addition to the environmental problem. Figure 8 shows the death rate for traffic accidents in Taiwan and Japan. While that in Japan has been continuously dropping since 1993, [the death rate from traffic accidents] in Taiwan has been maintained at more than twice that in Japan. Hence, it can be said that society has not shown any progress in this period

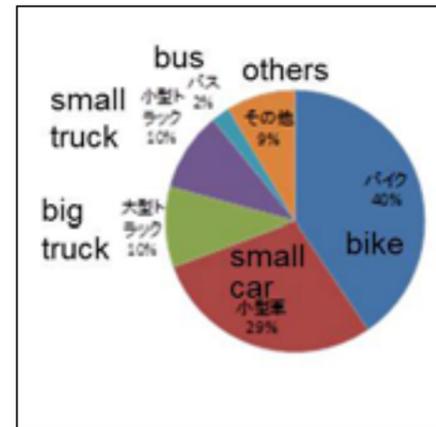


Figure 9 Breakdown of Taiwan's Accidents by Vehicle

with respect to transportation. Looking at the types of accidents in Figure 9, it can be seen that motorcycle accidents are highest, accounting for 40% of the total.

The present condition is such that personal vehicles such as motorcycles and cars have been increasing the CO2 emissions, but in recent years, electric cars and electric motorcycles, which have gotten a lot of fervor, hold the possibility of reversing the un-ecological position of personal vehicles. According to Mitsubishi Motors, the overall energy efficiency of electric automobiles is 29%, widely surpassing the 12% of gasoline cars, and surpassing somewhat the 25% of gasoline hybrid cars. More electricity will be used, so it is possible for CO2 emissions to be almost zero if nuclear-generated electricity is used. Electric trains and cars both will be using electricity, so which would be energy-saving: public transportation or personal vehicle? The former does not enable one to move at the shortest distance in order to arrive at the destination, since sometimes a roundabout route is needed. Moreover, in regions with low population density, the rate of ridership will have an effect on energy efficiency. On the other hand, the latter's energy efficiency is lowered by such problems as energy storage efficiency, wheel friction, and recovery brakes, but these seem to be technically solvable. In the extreme, the amount of weight needed to carry a person would I think affect energy efficiency. At the current stage, the vehicle per passenger weight ratio is 3.25 (calculated assuming that Yamanote line has a weight of 20 tons, a capacity of 150 persons, an average ridership rate of 0.63, with each person weighing 65 kg). On the other hand, for a motorcycle, this is a small 1.23. Consequently, it is undeniable that in the future the latter would be a more energy-saving way than the former. As a common transportation problem of developing countries, un-ecological means of transportation such as motorcycles and cars account for a large share of the total. Providing a subway network is very costly, and these are mostly imported goods, so there is not so much plus effect on domestic employment. In such a situation, the electric personal vehicle may be one energy-saving solution.

I have shown above the present condition of energy consumption, CO2 emission, and transportation of Taiwan, compared to the world. I have also shown that with regards to Taiwan's transportation, motorcycles occupy the highest share in means of transportation. Such style of transportation could be seen often in Southeast Asia, but I have shown the possibility that the spread of electric cars from hereon can solve the problem of energy efficiency and gas emissions.

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Session 5

Turning Alternative to Mandatory Energy of Thailand



Supreedee Rittironk

Faculty of Architecture and Planning, Thammasat University

Abstract

Most part of the world has now been facing the same crisis, energy. Natural resources will be running out if nobody does anything about it. Research and studies are now focused heavily in seeking alternatives and ways to reduce usage. Commercial Energy usage in Thailand has increased averagely 2.2% annually, and the demand continues to increase further. Thailand still relies on the fossil fuel as their main domestic energy production. They are 58.4% of natural gas, 21% of coal, 17% of crude oil, and the rest 3.6% from all New & renewable sources. Based on full report, the actual energy from renewable sources is only 0.1% of all Thailand's energy production. Moreover, Thailand still spends money in energy imports to supplement the increasing demand. Thailand is such a small country and is energy independent, but there are many ways to utilize the physical characters of Thailand to produce alternative sources of energy. Powerful sunlight and mostly clear sky days can aid the harvest of solar and heat energy. Solar thermal can turn the sun radiation to hot water, then we can use it as heat sources. The southern coast of Thailand can fairly well harvest energy from wind. The utilization of alternative energy of natural resource is now limited and has not been seriously studied. This study now initiates the idea of the alternative being mandatory for overall picture



Figure 1 (left) wind farm project at Koh Lanh, Chonburi, (middle) PV for rural Thailand project (photo courtesy: Solartron Co., Ltd.), (right) solar collector for hot water (photo courtesy: All Thai Homes, Co., Ltd.)

of fossil fuel's usage reduction. The idea is not new, but we need to be more creative on how we take advantages of what nature has given to Thailand, such as Solar radiation, Solar thermal, Wind power, and Geothermal power. This study investigates the opportunity for alternative renewable energy and their limitations on cases in Thailand to turn energy from being alternative to being required. The study concludes by providing suggestions on what can be done.

Introduction

The 21st century is the age of Technology, especially as a period of acquiring information. The world is connected easily via technology of internet, satellite, cellular phone, GPS, etc. People may overlook that these technology still rely on power or energy. While the world is facing challenges of global warming, the crisis of limited natural resources for energy has followed. These problems are interconnected. It comes down to one same solution that we have to find a better way to live our better life. To be more friendly to our earth, there are many researches and projects for renewable energy, the so-called "Alternative energy". While this crisis is shared worldwide, it is time to define if it is alternative or mandatory.

Energy Production and Usage in Thailand

One important issue about energy is about the demand being more than supply. During this age of technology where everything relies on power or electricity, the demand just keeps critically increasing every year. It is important to understand how energy is produced and allocated. Based on 2008 Report from Ministry of Industry, Thailand produced

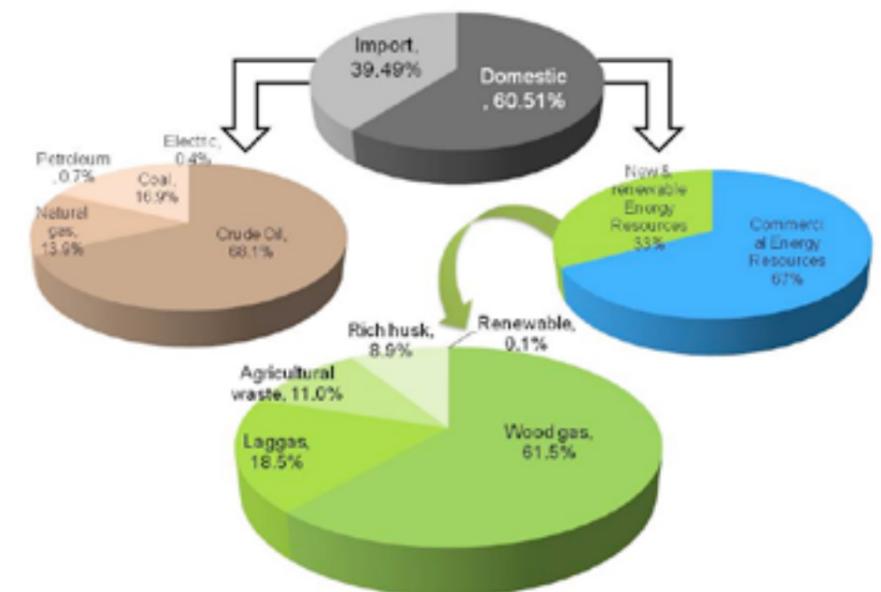


Figure 2 Thailand's Energy Production Map (Ministry of Industry, 2008)

energy 60.51% domestically and imported 39.49%.

Out of all Thailand's domestic energy production, energy comes from commercial energy source 67% and the rest from New & renewable energy resources. Non-commercial energy production is defined as New energy and renewable energy. New energy is the most dominant in the market because they are from agricultural products that are either raw materials or wastes. They are abundant in Thailand since it is the primary produce of the country. Those raw materials and wastes are turned into biomass, biodiesel, biogas, etc. These products have become great replacement for petroleum and natural gas. On the other hand, the energy production from renewable source is only 0.1% in production, which makes the number from the total of country even less. This evident has clearly demonstrated that renewable energy is still unacceptable. The question remains on how to improve this and what can be done.

Study Hypotheses

Awareness of global warming has been a part of almost every country's energy policy, while some can do better than another where resources are available. Looking into Thailand's production of renewable energy, renewable energy production is 0.1% from total new & renewable category, which is 33% of domestic energy and 66% from total energy production. This means the production of renewable energy is only 0.02% of total energy production in Thailand. While comparing to other countries, like 12.9% for US, 5.4% for China in 2009, Thai's production is extremely low.

The promotion for renewable energy then should be raised. In fact, there are researches and projects throughout Thailand in developing renewable sources from what is available in Thailand. However, the researchers are conducted within academic institutions, independent research centers, and local officials. Until 2004, Thai department of Alternative energy development and Efficiency, Ministry of Energy, has supported and focused more on alternative energy production than on preserving overall energy. That was the starting point in trying to catch up other countries. Even though, there is more involvement from government to alternative energy projects, there is still an urgent need for more supports having a policy of energy preservation at the same time.

While foreseeing alternative energy to be supported more, the government shall consider policy that can regulate major energy consumers, such as industrial factor and transportation sector, to use or purchase energy that comes from renewable sources. This will promote more alternative energy productions because it can generate income to private sector or local communities.

Overall, the idea of study is focused on promoting alternative energy

to be supported and required by government official in order to reduce unfriendly routine of using fossil fuel and carbon release to atmosphere. It is with the good intention of prolonging our earth from impacts of global warming.

Scope of Study

Researches in technology to define alternative energy are conducted throughout the world when we know that our earth is facing crisis. The "alternative energy" is defined as options or more choices for energy moving away from natural resources that are running low, especially fossil fuels. Humans have cleverly captured potential energy that are never running out from natural resources, or using them in rates less than at which they are generated. They are Solar radiation energy, Solar thermal energy, Wind energy, Geothermal energy, Hydropower energy, Biomass energy, energy from waste, etc. We can call them the renewable sources. However, considering Thailand is a small agricultural country, it may not have access to all these renewable sources, but there are some sources that is abundant. Therefore, this study will be limited to the scope that is from natural resources and available for Thailand, such as Solar radiation energy, Solar thermal energy, Wind energy, and Geothermal energy.

Solar Radiation Energy

Thailand, one of tourist destinations, is known for its tropical paradise. The climate of Thailand is mostly warm and humid all year round. Thailand has three seasons, hot, rainy, and dry. The warmest time in Thailand is from March to May, with temperature from 30 to 40C. During June to October, it is a rainy time in Thailand that can bring down the temperature to 10C. Sky will experience lots of cloud coverings. During the dry season, Thailand is affected by the Northeast monsoon so that temperature can drop further, especially in the North and Northeast of Thailand. However, with the tropical condition of Thailand, the sun exposure is quite abundant all year round except during rainy time, so there is an opportunity for Thailand to take advantage by utilizing solar energy.

Potential of using solar radiation is high in Thailand, and with recent support from Ministry of Energy to promote more use. The development of photovoltaic (PV) technology has existed for long time. Since Thailand is an agricultural-based country, it has to purchase technology from industrial countries. This factor has limited the use

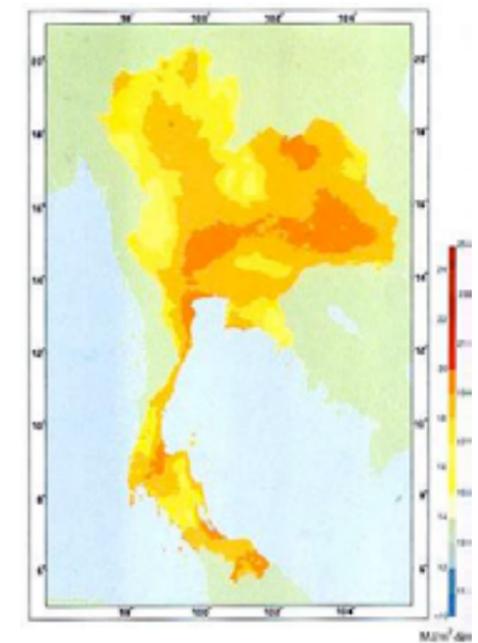


Figure 3 Annual Average Solar Radiation in Thailand (N. Rapapate and Ö. Göl, 2005)

of PV in Thailand. PV technology has gone far enough that it is getting less expensive and affordable, and projected to be even less expensive. However, the investment for PV is still high for many Thai investors when compared to other sources of energy. The upfront cost is high, while return is small and it takes long time. The Thai's energy perception also needs to be improved.

Currently, most energy usage in the economy comes from industrial and transportation sectors. Their usage combines to 72.1% of total energy used. In order to offset sources of energy, the cost will be quite high. If we try to integrate renewable energy in the other sectors, such as agricultural and residential sectors, implementation will be more simple. The research by Rapapate and Göl indicated that the demand for power in rural Thailand is not as high as we thought. It can be easily sustained by installing PV and be energy independent from the grid. Therefore, if all communities in Thailand can be energy independent and sustain itself without government power sources, a major reduction demand energy in Thailand becomes possible. Ministry of Energy is also offering support program for private sector. The future of solar utilization is quite promising.

Solar Thermal Energy

Solar thermal energy is also very easy to capture throughout Thailand, and perhaps is easier than solar radiation. Direct solar projection to PV is more effective than ambient projection, while solar collector for solar thermal is effective for both direct and ambient projection. However, the solar thermal tool is actually storing energy in a product of hot water, which creates conflicts to Thai people's life style. Unlike temperate countries where hot water is required for both commercial and residential consumption in everyday life, Thais do not normally consume lots of hot water, which is only for domestic



Figure 4 Solar thermal collector installed by BGET in Thai residences

showering. That leads to many reasons why solar thermal is not harvested because locals do not need them so they are not trying.

Unlike PVs where the outcome is electricity, there is always needs to use them, so solar thermal may be a luxurious item. It has become an unnecessary item. The experimental project by Border Green Energy team or BGET is to create a solar thermal collector for domestic use. BGET claims the cost of 1,800 baht or \$50 to build. Water is collected in the 30 - gallon insulated storage tank for domestic use at night. The water temperature reaches 45C when used. It is one fine example for locals to make technology when it is needed. Nevertheless, if hot water is not the goal for the final product, there are ways to convert hot water to electricity. It is another investment to go beyond the existing. If there is proper promotion and with government's assistance to reduce upfront investment, all household will be installing this technology, it will offset the demand from the grid significantly.

Wind Energy

Thailand has one seasonal wind axis, Northeast and Southwest directions. Upstream from Southwest occurs from May to October, bringing moisture from Andaman Sea. Downstream from Northeast occurs from November to January, bringing dry cool air from China. Besides these, there are seasonal depressions during June to December that spin the moisture clouds formed over the South China Sea, making the rainy season in Thailand. However, with regards to harvesting Wind energy, this abundant seasonal wind may have little or no effect because they control clouds and moisture in the higher atmosphere. Capturing winds for energy is dictated by near surface wind speed. According to the map, Thailand has effective winds for harvesting along the southern coast up to near central coast. Average wind along coast of Thailand is still under 4.5 m/s, which do not allow wind turbines higher than 100 kW. Wind can be captured more than 5 m/s at 15 to 30 meters above ground elevation.

Some factors in utilizing wind power in Thailand are

- Using Wind turbines more than 100 kW if installed more than 15 meters above ground
- Designing turbines to be resistant to high corrosion from warm, humid, and salty air
- Installed at best location of low southern coast of Thailand or high elevations in upper Thailand

There are two case studies of wind farming in Thailand. The first case is the wind

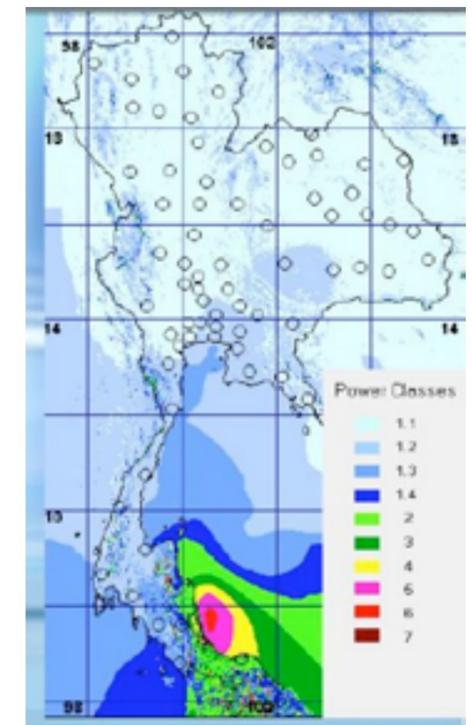


Figure 5 Wind speed map of Thailand

farm at Koh Lanh, Pattaya, Chonburi province. Forty - five 4.5kw wind turbines were installed to generate electricity and directly connected to the Pattaya grid. They are small turbines, but are claimed to produce 250 kw/h per day, and help reduce the use of diesel by 55,000 liters per year. That equals to the carbon reduction of 20,000 tons per year. The project is supported by the city of Pattaya. The second case uses bigger wind turbines to produce electricity developed by EGAT at Lamtakong dam, Nakhonrachasima. The project was started in 2008, and consisted of a 1.25 mW and a 2.5 mW turbine. The project claims that it can reduce the use of diesel 1.1million liters per year, which equals to carbon reduction of 23,000 tons per year. These two cases are fine examples of how wind can be harvested anywhere. Investors have to use the right size of equipment that is appropriate to the installed location. A bigger project like this could not also be done without collaborating with local officials or governmental sector. Even though the carbon reduction may not seem attractive, it still makes difference to the earth.

Geothermal Energy

Geothermal technology seems to be invisible and intangible assets that we have never thought of. It is so powerful, and yet can be sustained for many thousands of years as long as the inside earth is still warm. Geothermal energy is basically the heat inside the earth's crust. The deeper it goes, the

hotter it gets. Geothermal heat has varied intensity on where it is on earth. It seems to be intensified near tectonic plates, where the heat is released through the earth crust's gap. Thailand has shifts in tectonic plate along the north and northwest mountain range, which continues from Myanmar. This area is vulnerable to earthquake, but an appropriate source for geothermal energy. The Tectonic plate is part of the earth layer when it is initially formed by igneous rock. Thailand is located in the big plateau (Figure 6: Tectonic Plate location Map of Thailand) and lowland of Indochina peninsula, where land was formed by sedimentary layer. That is why geothermal energy is limited to the North and Northwest high range area. However, when comparing classifications of the subsurface, older plates such as areas in Japan, Rockies of the United States, Iceland, etc, or where the geysers and hot springs are, produce heat that is significantly higher than in Thailand.

There are three kinds of heat sources of geothermal, steam (high heat), hot water (medium heat), and dry

air (lowest heat). The research done by the Faculty of Science, Chiangmai University, was successfully using geothermal energy to air condition the room. The research indicated that the geothermal well is dry air and 58 meters deep and heat temperature was 94 ° C. Geothermal energy faces the same challenge as others, which requires big investment upfront. This study is suggesting that geothermal is extremely clean and available for capture in some part of Thailand, however it will not be possible without any assistance from government or big corporations. We know that in long term, at least in our life time, it will never run out.

Conclusion

Thailand has been battling for quite some time for the initiatives of renewable energy as alternative energy sources. It comes to our attention that the normal procedure for development may not be adequately aggressive. The action plans include

- Thailand is the recipient for technological products. The technology investment is still high for Thais. The development needs more government involvement to take major parts, instead of academic institution or private sectors.
- Thai government should offer or legalize the incentive program for energy purchase of renewable sources or high rate of buying back energy to grids.
- Among all sources of alternative energy, it may be wise to manage sectors that is easy to do, like residential and agricultural, rather than focus on energy hogs like the industrial and transportation sectors. However, in the long run, all sectors must be involved in alternative energy program.
- Thai's understanding of preserving energy is critical. The mentality should be imbued on Thais that to save a little is still better than not to do it at all. To save a little for many can add up to big saving as a whole. Basic information can be enforced radically and form the root of educational systems.

Thailand has a potential with a lot to offer from its location to harvest appropriate renewable energy. Forcing, legalizing, or creating mandatory energy may be a more appropriate action to promote the awareness and mentality for better living with our delicate planet.

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Figure 6 Tectonic plate location map of Thailand

Session 6



A Day of Living and its Changes in a Korean City from the Perspective of Energy and Environment

Youngjoo Kwak

Public Works Research Institute

Overview

Due to economic growth in Korea, the consumption of energy in urban residences, such as electricity (13.5% increase) and urban gas (15.2% increase) has been growing. Total energy is seen to be growing by 2.2%. On the other hand, the total energy consumption of the residential sector was characterized by a decrease (-8.7%) after the economic crisis of 1998. The energy consumption per person in the urban residential sector is the same as that of Japan at 0.39 (TOE per person). From this perspective, I will try to inquire into the concrete energy/resource conservation countermeasures of the South Korean government for the residential sector.

Background of the Research

The South Korean economy has been developing more and more. The energy situation and lifestyle are getting to be positively related. The total efficient energy consumption is characterized by a slight reduction after the economic crisis of 1998, but total energy has been increasing every year. Through the use of abundant energy, everyday living has become more convenient, but we now confront the problems of deficient electricity and water supplies. The United Nations (UN) has classified South Korea as a water-deficient country due to the overlapping of three big factors: urban concentration, imbalance in water supply per region, and the seasonal variation of water resources. Moreover, Korea's energy situation is such that most of its energy supply depends on importations, although it has energy

resources such as coal (anthracite), oil, natural gas, nuclear power, hydro power, and renewable energies (MKE and KEEI, 2009). According to the energy indicators of 2008, Korea faces a severe energy problem of a 96.4% dependence on imported energy, which has a total value of over 43.5 billion dollars (MKE, 2008). Just like Japan, South Korea has cited renewable energy as one part of alternative energy that

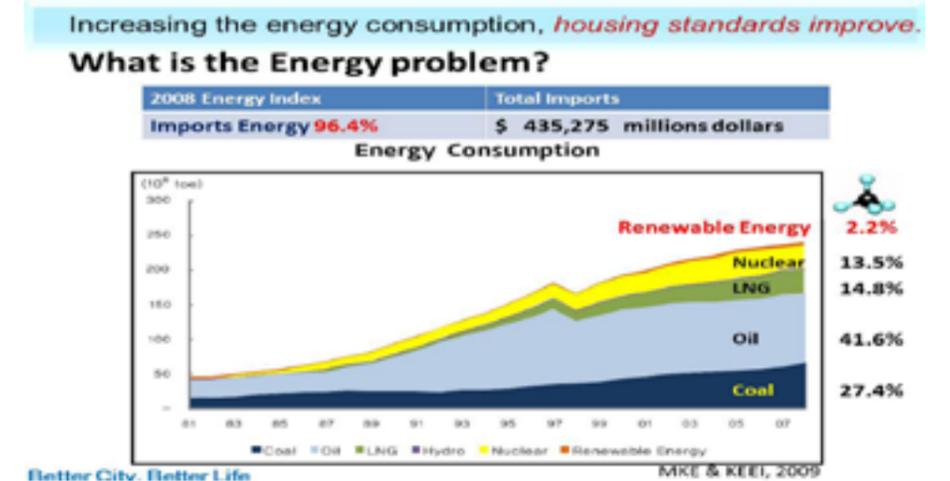


Figure 1 Changes in Korea's Primary Energy Consumption (MKE and KEEI, 2009)

falls under "new energy", and is seeing the rise in the opportunity for introducing these technologies. Solar electricity generation, wind electricity generation, biomass resource-based electricity generation have been cited as major forms of "new energy", but there are various barriers to their diffusion, such as institutional constraints to their introduction, and the problem of high costs. From hereon, the Korean government's energy counter measures faces the big issue of shifting to energy resources that do not depend on imports, and needs a shift towards a new green South Korea in the future. For this, I would like to inquire into the concrete energy/resources conservation counter measures being pushed by the South Korean government for the residential sector.

Objective of the Research

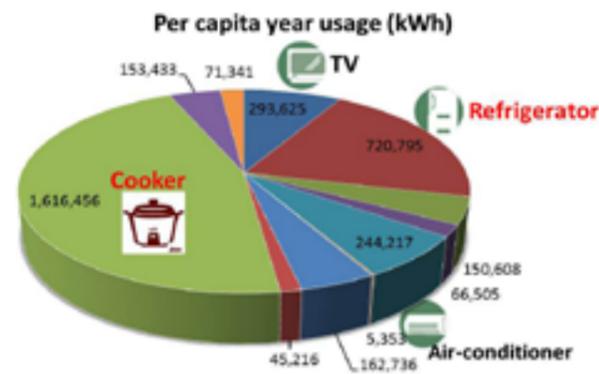
How have the awareness and the daily lives of Korean citizens changed due to economic development. Moreover, I would like to inquire as to whether or not the basic plan is going well with regards to the concrete energy/resource conservation counter measures of the residential sector being pushed by the central and local governments. This year, the government proposed a big project called "Carbon Zero City" for the whole country. In order to more quickly achieve this target, energy conservation awareness is indispensable, and above all, the shift to energy conservation and the development of new renewable energy resources is central.

Changes in the Urban Daily Living through Energy Consumption

Electricity Energy Consumption Situation

As of May 2010, due to the 7.4% increase in electricity supply over last year as new electricity generating

plants were completed, the electricity supply capacity is 73.72 million KW. Moreover, the supply reserve rate is over 6.9%. However, during the peak period of electricity usage in mid-winter and mid-summer, there are fears of an electricity crisis arising when capacities are



being reached. In particular, due to the up-sizing of electric appliances (such as TV and air-con) in the residential sector, energy consumption has risen. As shown in Figure 2, looking at the results of the survey of the urban residential sector's

Figure 2 Electricity Usage in City Residences (KPX, 2009.12)

energy situation, rice cookers are highest at 43%, followed by refrigerators at 19%, and air cons at 8%. Recently it has become a fashion to have kimuchi refrigerators and large-type refrigerators (KPX, 2009.12).

Water Consumption Situation

The results of the survey of urban residential water usage, as shown in Figure 3, has toilets the highest at 27%, followed by cooking at 20%, and laundry at 20%. Such trends in the categories of water usage in urban residences did not correlate with the number of persons per day. Consequently, it could be said that mainly through the increase in nuclear family

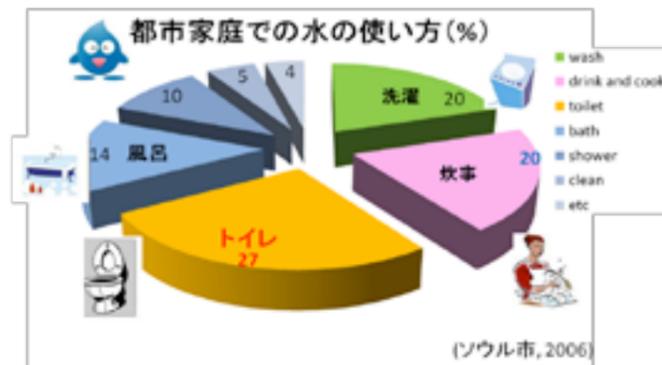


Figure 3 Water Usage in a Korean Urban Residence

units, the new household units have also become a major factor in the sustained increase of water usage in the urban residences.

Energy Conservation Countermeasures in Residences

Citizen awareness with regards to energy conservation is inadequate. This is because the

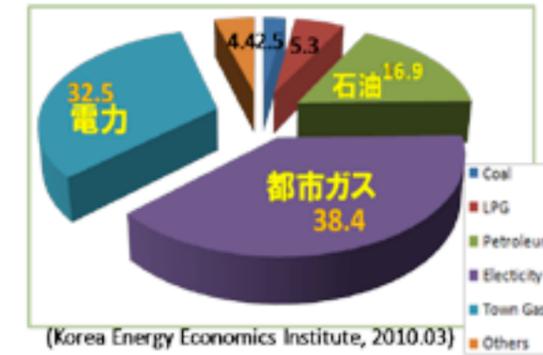


Figure 4 Energy Sources Urban Residences

higher the level of living the lesser the awareness regarding energy conservation. Moreover, owing to such things as the Ondol culture, which is a peculiar South Korean architectural style that consumes a lot of energy for heating, there is the problem of citizen awareness regarding energy conservation to be, in general, deficient.

In recent years, the ultimate sources of urban residences have been changing from petroleum to urban gas as an alternative energy due to regional government policy (KEEI, 2010). In such a way, energy sources are diversifying even in the residential sector. Huge issues about the difficulties in utilizing new energies should be overcome, by aiming for the shift from usable resources, which harness regional peculiarities,

Table 1 The Basic Energy Plan of the Central Government (KEEI and MKE, 2008)

	2007	2030
oil dependence	43.6%	33%
fossil fuels share	83%	61%
renewable energy share	2.4%	11%
energy technology level	60%	90%
nuclear electricity facility share	26%	41%
nuclear electricity share	14.9%	27.8%

to new energies. As shown in Table 1, in the basic energy plan of the central government, the objective is the upgrading of technology in order to raise the utilization rate of new recycled energy from 2.4% to 11%, and of nuclear power from 14.9% to 27.8%.

In short, in order to also achieve energy conservation in the regional government's policy for diffusion of new recycled energy, the objective is to develop advanced environmental technologies such as green home (solar houses), bio-energy, and LED lighting. For example, in the case of the new recycled energy plan, expansion is step by step being carried out: 0.6% from 2004, 2% by 2010, and 10% by 2020. Pusan City is also carrying out the development of new recycled energy such as solar homes, and ocean

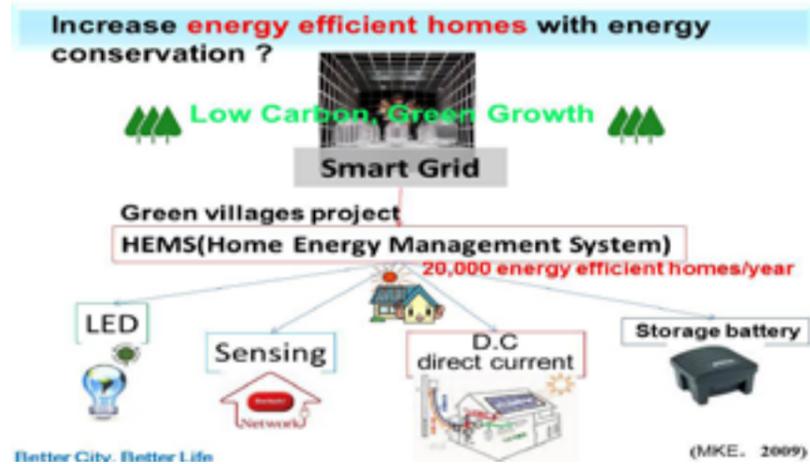


Figure 5 Government Policy for Energy Conservation in Households

energy by 2015, and a diffusion plan. Concretely, for the development of green homes, a plan was announced for the construction of one million residences that would adopt new technologies such as sensing system, LED lighting, and direct current electricity, as explained in Figure 5

Concluding Remarks

In South Korea, the final energy consumption is steadily increasing, but after the economic crisis of 1998, it is characterized by a slight reduction. From 1998 to 2006, the total energy consumption has increased by an average of 3.5% per year owing to the high growth of the services industry. With economic growth, it is predicted that per capita energy consumption and energy efficiency will increase, and that there will be changes in industry. A shift towards energy conservation is also necessary in the residential sector, due to the increase in energy consumption from the up-sizing of electricity appliances (such as TV and air con). Recently, natural energy sources in South Korea are also quickly shifting from petroleum to network energy such as electricity, urban gas, and thermal energy, rapidly changing the composition of energy consumption. From hereon, the South Korean government and citizens aim for the achievement of the low-carbon, green-growth slogan. For the diversification to new energy sources, citizen's active participation and the advancement of a consistent policy that could be directly invested on are necessary. Above all, if an accurate electricity demand and water demand administration is undertaken, an efficient energy administration is possible from short-term energy policies to long-term energy policies. South Korea is somewhat behind in the energy/environment sector, but I think that as a strong country in such areas as IT, automotive, and ships, more than any country, it has a strong possibility of development in the new recycled energy field.

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Session 7



Global Warming and Urban Infrastructure Construction from an Engineer's Perspective

Jianhong Wang

Nihon Koei Research Center

Global Warming

The average temperatures of atmosphere or oceans on the earth's surface, is called the "earth's average temperature, and is being used as an explicit indicator for climate changes of the whole world. At the start of the 19th century, J.B.J. Forier pointed out that there might be a greenhouse effect in the earth's atmosphere. In 1896, S.A. Arehenius reported that the changes of CO2 concentration will have a heavy effect on the world's temperature. As shown in Figure 1, the earth's temperature made by the statistics based on a scientific observation, undoubtedly clearly shows a rising tendency. During the period 1891 to 2009, it has been rising at a pace of about 0.68 degree per 100 years, and particularly, there has been more hot years since the mid- 1990s. By the second half of the 20th century, a tendency of the acceleration in the pace of temperature increase could be observed. As possible results, sea level rising and climate changes have been observed, which is causing worries about the

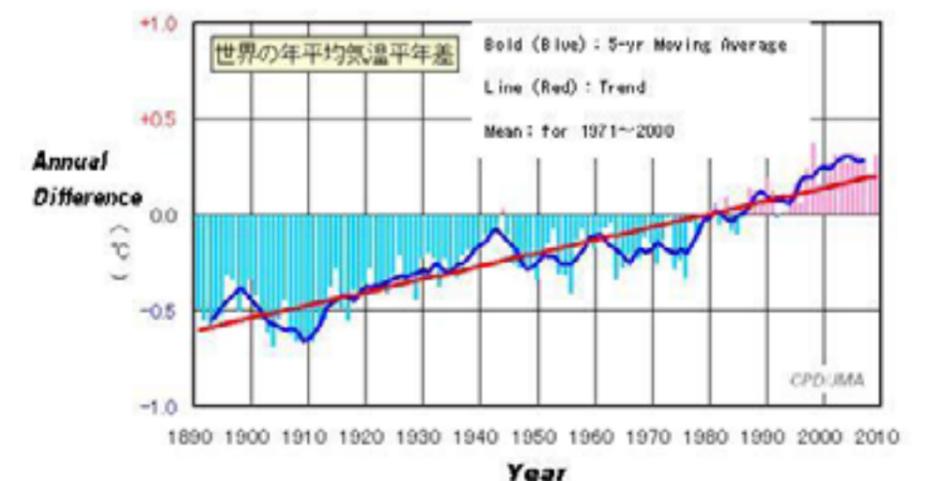


Figure 1 Global Average Annual Temperature, Source: Meteorological Agency

bad effects to the ecology and human activities.

The causes of this global warming are divided into natural and human. With regards to the global warming in the second half of the 20th century, although 4000 scientists, gathered since the Heidelberg Appeal of 1992 to the present, including 70 Nobel Prize awardees, emphasize that there is no relationship between CO2 and global warming, the hypothesis is strongly accepted that the main cause would be the artificial greenhouse gases emitted due to man's industrial activity. The United Nation's Inter-government Panel on Climate Change (IPCC) issued its 4th evaluation report in which a massive amount of scientific perspectives was collected, showing that "the probability that human-made greenhouse gases being the cause of global warming is over 90%." Such a report has become the foundation of today's movement on global warming changes.

It is conceivable that global warming changes are causing the air and water temperatures changes, and inducing the changes in sea water level and rainfall (or snowfall) patterns. Meanwhile, it is possible that turbulent weather abnormalities such as floods, drought, extreme hot weather, and hurricanes, are increasing or strengthening. The possibility of triggering a large scale extinction of biodiversity has also been raised. It is being predicted that global warming will have a large effect on the global climate and ecosystem. However, although it is extremely difficult to directly link individual phenomena with global warming at present, it is conceivable that such a change in the natural environment will also have a large effect on human society. There is apprehension on such matters as the aggravation of the food problem due to the shortage of water resources and the influences on agriculture and fishery. It is also predicted that an increase in average temperature of over 2 - 3 degrees Centigrade will most likely lead to a decrease in profits or increase in cost in all regions (AR4). In the case of global warming processing, it is predicted that there will be a warming up to 5-6 degrees Centigrade at the end of this century, and that "there is a great risk of the world incurring damage equivalent to 20% of its GDP."

As countermeasures against global warming, one is the preventive policy of restraint global warming by reducing emission of greenhouse gas, and another is the adaptation policy of taking measure to cope with the bad effects of warming. There is recognition that relief and adaptation policies, like the wheels of the warming countermeasure vehicle, would require an optimal mixing.

Environmental Situation in China

CO2 Emissions in China

The world's CO2 emissions have been increasing, particularly the increase of CO2 emissions from developing countries has been remarkable. Figure 2a shows the world's CO2 emissions by country basis (Source: EDMC 2007). It can be seen that the emissions of developing countries are significant. In particular, the CO2 emission of China has become the largest in the world, surpassing America in 2007. This could be considered as the by-product of China's economic development. However, it could be seen that as a country is

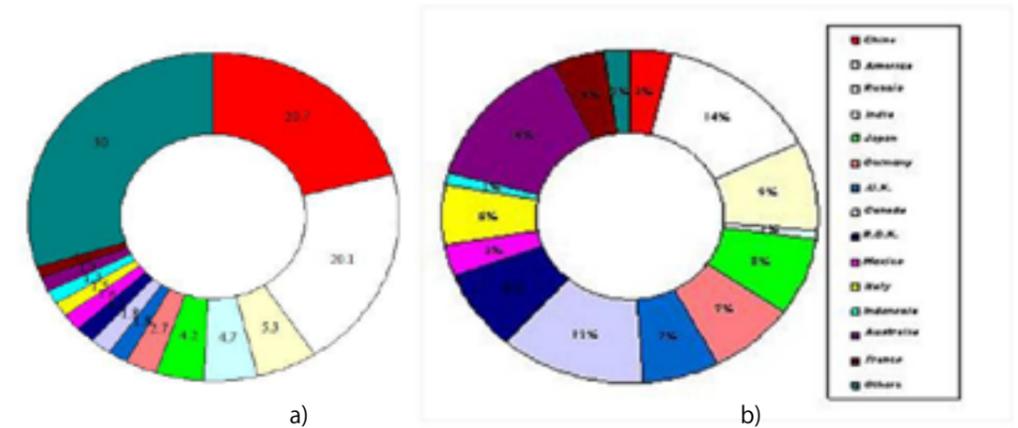


Figure 2 Global CO2 Emissions per Country (2007)
a) National b) Per Capita (Source: EDMC)

developed, the per capita CO2 emissions increase from Figure 2b. It could also be seen that China is not No.1 yet. On the other hand, since the global warming is becoming a global problem, it will bring great economic risk to China if CO2 emissions increase at its current pace.

Cause Analysis based on Statistical Data

Even from a global perspective, China is a major source of greenhouse gases, and has become the world's number one in terms of CO2 emissions. To reduce the annually increasing amount of greenhouse gas emissions, it is necessary to clarify the cause, in other word the source of CO2 emission.

As shown in Figure 3, CO2 is emitted mainly from the combustion of primary energy such as gas, petroleum, and coal. It could be seen that since the industrial revolution, the use of coal has been

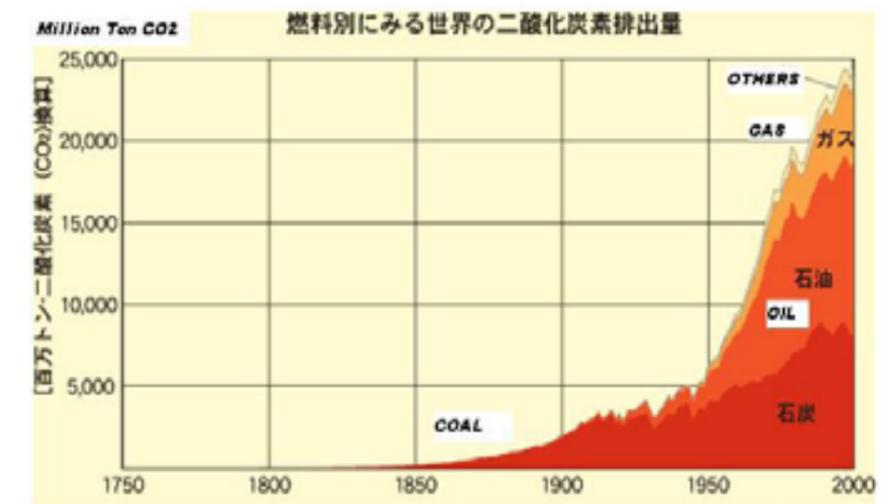


Figure 3 Global CO2 Emissions by Fuel Type (Source: Oakridge National Laboratory)

3 Reuse: Generation of electricity from waste products, and reuse of heat from waste products are being advanced. Asia's largest kitchen waste-fueled electricity generating plant was built in Shanghai and started operations in 2008. There are now 20 plants being operated all over China. The "Eleventh Five-Year" plan of China schedules the construction of about 60 units within the next five years.

4 Fixing Carbon: For increasing the carbon absorption, the following have been cited: tree planting, suppression of forest logging, aggressive use of arable land, shift to crops with a high CO2 absorption rate, protection of natural forests, greening of deserts, seaweed farming, and use of unicellular algae. In 2007, the average greened area has reached 37% in the urban areas.

5 Lifestyle: It has been conceded that citizen-level activities (such as saving electricity and water) have some effect. Together with the promotion of electricity and water conservation by the citizens, the government recently is further spreading electricity and water conservation by adjusting the charges for electricity and water.

6 Carbon Pricing: The following have been considered as effective: carbon tax (environment tax), Clean Development Mechanism (CDM, Kyoto Protocol Mechanism), domestic emissions trading, emission permit trading, and reduction obligation through direct regulation using laws or orders. These are being discussed in China now, but the introduction of these measures in the near future is expected to be difficult.

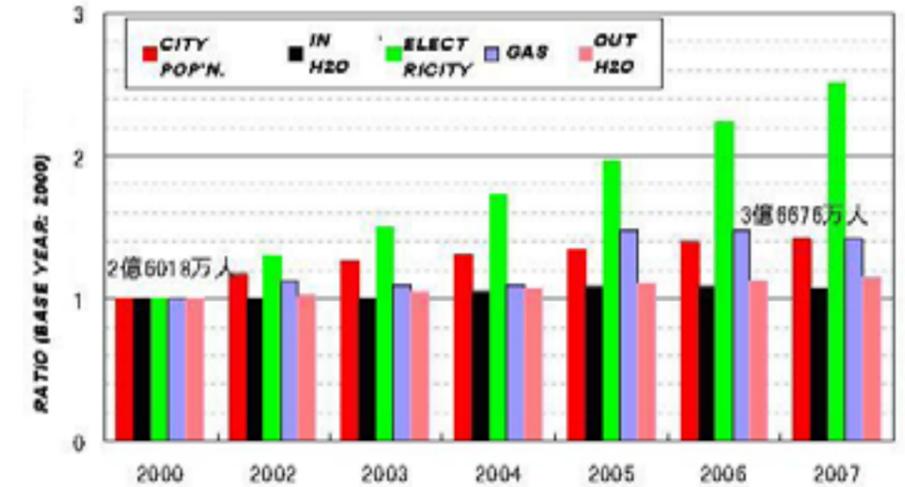
Environmental Countermeasures through Infrastructure

As a countermeasure for global warming, preventive policies through the suppression of CO2 have been criticized to be inadequate at the start, so it is necessary to discuss an optimal countermeasure for global warming that is thought more realistic. In particular, infrastructure construction in the cities that could cope with climate change has been given much emphasis.

Development of Urban Infrastructure

A city receives a large amount of resources and energy from outside, cycles these within the city, and finally expels these outside. The cycle in the city proceeds through (1) transportation and distribution system and waste management system, (2) water supply/sewerage systems, and (3) energy systems of electricity and gas. In order to improve the urban environment, infrastructure development is indispensable, such as transportation, water supply/ sewerage lines, waste collection, processing, and disposal. However, in China's cities, which have achieved rapid economic growth in recent years, there have been many cases wherein the provision of so-called urban environmental infrastructure has been delayed, although the construction of office buildings, roads, and electricity generating plants has been advanced. Moreover, climatic changes due to global warming have large effects on urban environment, and bring many new issues with respect to urban infrastructure construction. China's urban planning policy has been changing together with the period changes. Before the '80s, urban plans centering on construction of industrial

Figure 7 Status of Development of Urban Infrastructure



projects were made, but since then the city development emphasis on the construction of facilities related to daily living. It was decided that the construction of infrastructure of water supply/drainage, electricity, and transport/freight was to take precedence over factory construction. However, up to the '90s, the expansion of cities was restrained by the residence registration system, so cities were mostly small and medium-scale. Up-to-date urban planning was not long-term and lack rationality, therefore, it is becoming an obstacle to the urban expansion.



Photo 1 Beijing Traffic Jam

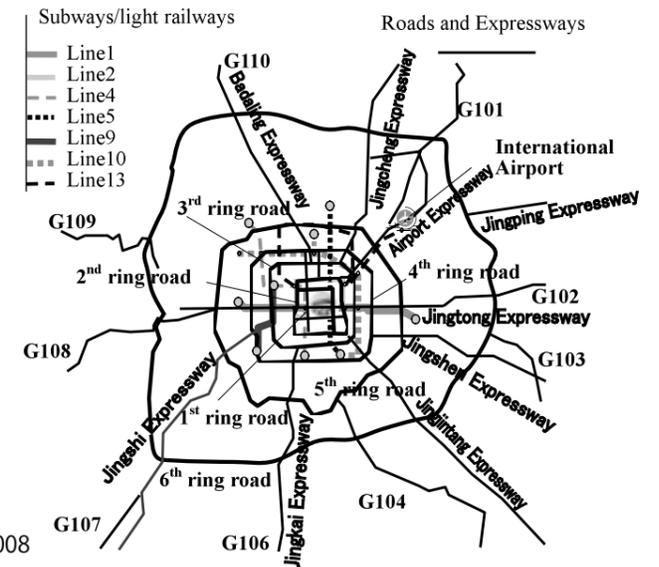


Figure 8 Beijing's Transport Facility, 2008

Problems of Urban Infrastructure Shortage and Countermeasures

In the case where urban infrastructure is short or cannot keep up with the demand for infrastructure, environmental problems arise. The situation of China's urban infrastructure is shown in Figure 7. Urban population has been growing annually, but it can be seen that urban infrastructure with the exception of electricity, can not meet the demand. However, gas was amply provided in 2005 due to the state project "West-East Gas Pipeline". Although sewerage facilities have been developed, it can be seen that the water supply infrastructure has hardly been developed for seven years. It is conceivable that this is mainly caused by the drying up of water

resources. In China's cities, the shortage of safe drinking water due to the lack of water facilities, such as water storage and supply lines, water pollution, and urban stench due to insufficiency of waste water disposal and sewerage facilities, together with air pollution caused by traffic jams have become severe problems. The combination of insufficient urban infrastructure and the problems caused by climate change has brought various environmental problems to the urban sector.

Transport Infrastructure

Traffic jams have the great effect on urban environment, but have remained unsolved and is becoming more and more serious. Figure 8 shows the transport infrastructure of Beijing in 2008. It could be seen that transport facilities have substantially been developed with 200 km of operating subway, and six ring roads. As shown in Photo 1, the traffic jam is still a severe problem, This is because the roads are not sufficient to meet demand due to the



Photo 2 Urban Flood (Jinan City)

automobile increase, and the shortage of parking facilities has also been cited. However, since the cars have great influence on the environment, there should be a shift from car to public transport such as trains and subways, which are friendly to the urban environment.

Water Supply/Sewerage Facilities

As a continental state, China usually draws its water from underground or rivers. As water resources decrease, the underground water level is lowering every year. This is thought to be caused by the practically no increase in the water supply/convey facilities since 2000. In order to have a stable water supply for the urban citizens, securing water resources and construction of water line facilities are of highest urgency. The current "South to North Water Transfer Project" is expected to relieve the water shortage problem of the northern Chinese region. From hereon, the construction of water convey/supply lines in cities will be demanded.

On the other hand, the rate of residential waste water disposal in China, was about 20% based on calculations for cities with populations of over 100,000 in 1996. The sewerage

facilities have been developed for all of the cities by 2007, however the waste water disposal rates vary greatly among cities. While waste water disposal rate has reached 93% in Beijing, there are still many cities where the rate is only about 10%. At present, the sewerage facilities cannot keep up with the population increase in the urban sector. Consequently, it is also necessary to develop sewerage facilities as an important infrastructure in future urban construction.

As a new urban problem, heavy rainfall has been frequently hitting cities in recent years, due to the climate change. In most cities in China, the drainage facilities cannot cope with such heavy rainfall so that urban flooding is becoming serious problem. Photo 2 shows an urban flooding scene. The construction of drainage systems for cities is becoming an urgent subject.

Waste Disposal

The disposal method of residential waste in China is mainly through landfill. In urban households, kitchen garbage, is mostly transported to landfill areas in addition to being reused as fertilizer or feed. Moreover, there is little care taken about the sanitary environment, so in a lot of cases, the practice is simply open dumping. In recent years, it has become difficult to acquire landfill areas around the big cities, so large-scale burning facilities have been constructed, and about 70% of the garbage was burned in 2007. However, in small and medium-scale cities, the common practice is simply landfill. It can be considered that waste disposal facilities will be the main point of infrastructure construction in the future for small- and medium-scale cities, because there will no longer be any landfill areas.

Urban Gas

The urban gas supply in the cities has reached a diffusion rate of 90%.

City Infrastructure Investment

While being a source of environmental burden (waste), infrastructure is also urban environmental infrastructure, which could become a countermeasure to reduce the environmental burden expelled to nature as a result of human activities. It is also known that there is a mutual dependence relation between infrastructure and economic growth.

In the cities of China, without an appropriate urban plan and policies for urban infrastructure development, the urban environmental problem will become more serious as demands for increasing infrastructure needs are not met. The situation of shortage of infrastructure will become a constraint on economic growth. Because government had run short of money to solve the problem of shortage infrastructure, a Build-Operate-Transfer scheme has been adopted since 1980, where foreign investment has been aggressively accepted. As the domestic economy continues to grow, the domestic private funds, called Private Finance Initiative, should be introduced.

Conclusion

Global warming is a crucial issue for mankind, and is amassing the concern of people from all countries of the world. As the most populous country in the world, China has been aggressively taking countermeasures against global warming. However, preventive policies alone are not inadequate, the necessary measures should be taken, in particular, the development of urban environmental infrastructure must be undertaken as soon as possible, as an urgent subject.

Panel Discussion

Moderator : Hiroatsu Fukuda (University of Kita Kyushu)

- Panelists :
- Weijun Gao (University of Kita Kyushu)
 - Kenichi Kimura (International Research Institute on Human Environment)
 - Mochamad Donny Koerniawan (Bandung University)
 - Max Maquito (University of Asia and the Pacific, Philippines)
 - Pham Van Quan (Hanoi Architectural University)
 - Wenchange Yeh (Shimane University)
 - Supreedee Rittironk (Thammasat University)
 - Youngjoo Kwak (Public Works Research Institute)
 - Jianhong Wang (Nippon Koei Research Center)



Fukuda Now, all over Asia, there is the problem of population concentration in the large cities. Today we talked about the increasing elevation of buildings and transport. From Kimura sensei and Gao sensei, using the expression “the advanced country’ s rut” , we were posed with the perspective: With regards to energy use, should we consider the advanced country case as a good one or a bad one? Would there be other ways? One more important point that was mentioned by each country’ s speaker is the necessity for a reform in each one’ s awareness when thinking about the environmental problem.

Some questions have come up, so I would like the panelists to respond. Firstly, from Jiang Susu, we have the question to all the presenters “There has been much research and promotion of smart grids, but concretely in which direction is it being particularly pushed?” Smart grids are often used in electricity, and there is much research in such places as California. It is a system wherein electricity is not provided to cities from large thermal generation plants, but rather electricity is supplied among districts

which generated the electricity through solar powered electricity, hydro power, wind power, and so forth. Since there could be a mutual exchange of electricity, and reliance on large equipment is not needed, [this system] has been cited in building low-environmental-load type of towns.

Kwak I have not done much study about the details of a smart grid, but I think the “grid” has a similar meaning as “network” , so I think it is using well an energy system, including electricity, through a wiser way of networking. At a micro level, it would include such systems as the automatic switching of electricity using sensors. Such small things come together and quickly grow to become a smart grid.

Fukuda Thank you. Let me ask Rittironk-san from Thailand.

Rittironk I assumed the question is about what is the policy on smart energy use and what is the definition of smart grid. Is that correct?

Jiang Everyone has almost the same understanding with regards to the definition of a smart grid, but even though the objective is the same, I think that each country may be taking steps from slightly different fields. I would like to know, as far as you would know, which field is each country applying the most effort.

Rittironk Ok. So, small question, but difficult to answer. Applying it to Thailand, the smart use of energy doesn’t seriously exist. We are still in an on-going process that’s why we are here today. I will go back to Thailand to provide more research and to create some advantages to government offices from practicing smart energy use, even though the government there has already established some of these initiatives but they are not quite being implemented yet. Going back to the idea of smart grid, in the United States, where I am also from, for example, it’s already being used and enforced. There’s a lot of renewable energy that’s already been used the government will say if you want to have your business you need to buy your energy source that is renewable at least 15 percent that’s the policy and at the same time the idea of household your house there’s a technology of sensing basically its already existing in Japan too. You walk into the room the light turns on, you walk out the light turns off, you walk into the room the air is coming in, and you walk out the air turns off. The sensing issue is very inspiring to be used for energy efficiency

Fukuda Perhaps this topic (smart grid) has not yet been adopted by today’s participating countries, so I would like to ask Gao-san, who has been dabbling in it as a specialist.

Gao A smart grid makes full use of IT so as to find out how to combine solar-generated electricity and wind-generated electricity, and so forth to supply electricity in a small

range, but I am very much against it. About six years ago, the word “micro grid” came out, and later the word “smart grid” came into use. In Japan, this is being done in Hokkaido University and others. However, this is a concept from America, and I think it would not make sense in Asia. Rather than using machinery smartly, I think that it would be better if we take out the technology, consider the peculiarities of a region, and use our human knowledge.

Kimura I don't know much about it, but it is an idea that came out from those working on solar-generated electricity, and is still at the conceptual stage. For example, as a simple story, a household uses its own solar-generated electricity, but instead of the surplus going to the electric company, it goes to those in deficit. At a much larger scale, if we connect to the areas on the other side where the sun is not shining, we can have solar-generated electricity on a global scale. There is still a long way to go, and there are many ways, but perhaps we will get there someday.

However, for example, even if we are to put together solar batteries and wind-generated electricity, there are various differing parts such as the electricity wavelength. There are problems of appropriate adjustments if [these technologies] are put together, so I think it would not be that easy.

Fukuda Thank you very much. One more point, Jian-san has a question for Maquito-san. “Why is it that there are so many buses in the Philippines when the fares are high and ridership is low. From an ecological point of view, it seems that pushing electric trains or trams would be better. Are there no alternatives to buses?”

Maquito The traffic in EDSA is terrible. There is an alternative transportation, which is the electric train running through the middle. This is managed by the government, so the fare is set at a very low level. As much as possible, [the government] would like to help out the citizens, so it sets the fare at low levels to allow the low-income people to go to work. But it is always full. From my experience, it is jam packed from morning to the evening. So people are forced to take the buses. Why is the ridership low but buses continue to exist? Everyone improvises a lot in order to get customers, so it is a situation where a lot of buses could be maintained.

Fukuda Thank you. I would like to move on to the next issue. There are some questions regarding awareness. One question is from Meleki-san from Tsukuba to all of the presenters. “In Japan, new products come out one after the other so that everyday living can become more convenient. I think that China would also be following the same trend. However, if convenience = product

= production, then how could we be ecological from hereon? Today, those of us participating in this forum have laptops, cameras, cell phones, iPod, and iPhone. Through calls for ecology made by the government and private groups, to what extent does each country put emphasis on making individuals be concerned about using objects and resources, as an issue of the future.

Wang I am not an ecology specialist, but if we do not do anything quickly, our energy and resources as well will quickly be gone. The Chinese society has thought of what should be done, and tried various steps. For example, Chinese are very much in love with American cars. But American cars consume too much gas, so a law was passing asking for the making of more ecological cars. Similarly, I hear that regulations on electric products are quickly becoming more stringent.

Yeh I think that if new devices are thought to be interesting, then these should be left to the evolution of technology. I think that with regards to ecology, waste should be reduced within what is possible without suffering. I think that it becomes natural that benefits quickly increase as a country's economy grows. Even if the world is destroyed because of that, there's really nothing we can do about it since it is self-inflicted.

Fukuda Quite philosophical (laughter)

Maquito How to balance efficiency, equity, and environment is a big issue. In pursuit of efficiency, iPad, internet, and computers become necessary. However, it is the environment which receives the most damage due to the use of these [devices]. It is better for everyone to share knowledge as to how to balance.

In this forum, various cases have been given. For example, Thai people do not take hot baths but they can make hot water at a low cost even without the use of high-level technology. In Indonesia, waste water is recycled and processed for use on plants. For as long as we humans live, we cannot avoid the use of resources, but this forum's big theme, I think, is to consider the environment, community, or society while efficiently using resources.

Gao Mass production, mass consumption, and mass disposal are symbols of this age. I also reserved an iPad at Shinjuku yesterday (laughter). I like new things, so it is not easy to avoid the temptation from the advancement of technology. However, for example, in the past the chargers for cell phones were all different depending on the type of phone, but now the connecting portion of chargers are the same, so even if you change your cell phone you can still use the old charger. iPad and iPhone have the same connections so there is a way for

batteries to be very much conserved.

But, even if we had such things, we are not necessarily happy. We should think about how to suppress our desire to buy again. I would like to avoid the spread to Asia and Africa of the thinking that mass production and mass consumption are good cultures.

Kimura It is the same with medicines. If there is something good, there inevitably is a side effect. Hence, making such a convenient thing is good if it will really be used for the good, but it could also be used for the bad if that is the intention. It would be good if products are developed so that these could not be used for bad things. That is something left to the freedom of the person using the product. Is this going well? Computer softwares have locks within them so that people cannot do bad things. In these days, there is also the thing called environment business. It is good, I think, if we could make a business out of ecology, but it rarely works that way.

Donny I think we always use technology. Without technology life is not life I think it's like that and we have to choose which technology that can be safe and clean. In my country we use the technology too from America we have our iPhone, we use Japanese mobile phones, Japanese cars, we import all of our technology from all parts

Fukuda The assertion of Indonesia's Donny maybe a bit similar to that of Kimura-sensei, but in order to live a better life, technology is necessary. America for example collects and buys various products of Japan. The important point here is to save energy by using technology. The key is to use technology in the direction of saving energy.

Quan I think everybody already said something. But I think the more technology the less energy we use and the less material we use to produce a new product. For example, a new computer, new laptop we use longer-life battery, at the same time, we reduce material needed to build one product. That's one way to save the energy. That's my idea.

Rittironk Thailand might be an exceptional case because Thailand is a king country. Our beloved king, everybody loves the king, and the king is doing good to the people so whatever the king said we believe and we follow. One thing that he said, he encouraged everybody to live sufficiently, that enough is enough. So is that a policy? No. Is that some kind of encouragement? Sub conscious encouragement? Yes. Does everybody follow it? That's up to everybody. Does it work? It works to some certain extent so there is actually no law that said

you have to do this but people will do it at their own will. We love Japanese car, we love Toyota, we love Honda, but the subconscious of people is that they like to show off. There's no Prius in Thailand but there is hybrid Camry because I want to show off it's big and I'm rich. So do we go by it? It's very, very popular so there's no way of stopping people to buy technology but the king has enforced how we should live, how we should live our life, and it works.

Kwak Since there are convenient electrical devices and new products in South Korea, I think now problems have appeared. In the case when there is nothing wrong with the product, we do not have to think about this problem. So, I think it is necessary to pass this stage. In the case that environmental problems appear as the economy develops, a new stage is reached if laws and counter measures to prevent the environmental problem are made. Like in Japan, the government created the eco point system to promote industry. If a problem appears, the problem will be solved by making something new.

Building a road or dam destroys the environment. Shall we preserve the environment or develop? It's an either or problem. Shall we make a new product with a new technology, or shall we maintain the status quo? That is the problem. In my opinion, the superb products that remain through the severe competition in the world market will, I think, become more ecological. In the past, refrigerators that use 1000 KW, now use only 100 KW. I think it is alright if a product was created with new technology. If a problem then arises, it can be again solved, so I think the present condition is very good. Moving forward one step at a time is, I think, absolutely necessary.

Fukuda Thank you. Thinking optimistically, technology will solve our problems.

Regarding Gao-sensei's statements earlier, there may be some opinions, since there are some questions. Let me just read them.

One is from La-san. "In economics, it is said that the amount of goods, that is the amount of consumption is correlated to happiness, but I think Gao-san asserts that this is not so. I completely agree with this assertion. Economic growth and the environment, I think, have an inverse relationship, maintaining the environment without sacrificing growth is I think difficult. However, in order to make this assertion valid, it is necessary, I think, to objectively show that even though the number of goods decreases, people are made happier. Is there a way of objectively measuring happiness?"

Hanson-san also has similar question. "The Happy Planet Index (HPI) is very interesting, but how is that applied to all regions? How is it calculated? How is it defined?" Gao-sensei, mentioned in your statement of the problem that it

would be nice for developing countries to have this [index], but on the other hand, you said that you wanted an iPad (laughter). I would like to hear more about this matter.

Gao I think that humans have to always contemplate the contradiction between the heart and action. It all boils down to the discussion about the King. In the teachings of Confucius, which is widely diffused in East Asia, it is said that if there is material sufficiency, then one should be satisfied. I also implement this. I buy an iPad because there is a research grant. If there was none, I will not buy it. The same with clothes, my wife does not buy brand goods. If I ask why, she answers that it is because these become useless right away. I am also materially sufficient right now. Therefore, I have a sense of being satisfied with the environment I am in. I consume within the bounds of my efforts. Therefore, I was not contradicting myself earlier.

Each Asian country has its own living environment. Bridges and desulfurization devices have been built with Japan's ODA, but ultimately the local people cannot pay for the maintenance cost so these are not used. It is quite an old story, but in Sichuan desulfurization devices were built, but after two years of empirical experimentation, when Japan's specialist went back home, the facility was not used. Hence, for developing countries to become more affluent, I think that they should use the resources that they themselves have, and receive little by little technology appropriate to their regions as well as financial support from advanced countries.

In reply to La-san's question, being in a good environment although the amount of goods is decreasing is being happy. The idea of happiness would naturally vary from person to person, so we cannot generalize, but we should try hard to look for a way to be happy while maximizing the use of the environment one has. This, I think, applies to Asian countries.

Regarding the question of Hanson-san, I will email you later. There is an international standard for the HPI. I have not look at the method of calculation in detail, but it is an indicator that is different from conventional advanced country index. It evaluates the happiness of humans and the earth. As it is said in the words "one earth", we should also think about the happiness of the earth.

Fukuda Such pending issues come out because if Asia or the countries of the world live like advanced countries, the earth's breakdown is imminent. For as long as some scheme is not arrived at, we cannot have the same way of living as we have right now. While touching on this matter, I would like to ask each country's panelist to respond from the standpoint of their respective country.

Kwak The variation in the happiness index is quite large. It simplifies a difficult subject and may be a spur-of-the-moment indicator. I have some doubt as to how much it could be trusted, but it is better than not having one. However, there are individual differences, so which is better is difficult to answer, I think.

Rittironk Interesting question, I really have no answer, I really have no information, but I have suggestion. It's very hard to make assessment of something that is so abstract. But at the same time when you measure a country you say this country has this much GDP. GDP stands for Gross Domestic Product, and tells us how well the economy of a country is doing. But I think there is one country that doesn't use GDP. I don't really know what their abbreviation is but I think might be like GDH; it's like Gross Domestic Happiness. That country is called Bhutan. Bhutan is our neighboring country. The Prince who used to come to Thailand mentioned about his love to have his people happy, he loves to have happiness in people life. Is that the right way to do it? So Bhutan is really against capitalism. "We don't want technology. We don't want change. We want tradition back." So that's not the best way to live our life either because Bhutan will now have . makes you happy right? So maybe just follow the Law of Buddha said, why don't just use the middle rode? Why don't just use the mediation? You can do both at the same time in middle degree. You can reach your happiness in some extent. You can pursue your technology, and your lifestyle to some certain extent and that will be the mediation of your happiness.

Quan I don't know how the happy planet index is low in the European countries while high in Africa, and other part of Southeast Asia. But I think in Vietnam, it is very high because we are happy with everything. We try to put up with the challenges. If some problems come to us, they will come. We are not waiting, but once they come, we are satisfied with that we try to mitigate and live with it. Related to the topic of energy and better city, better life, in Vietnam, some persons will love to stay, to live in the city, but the majority of persons want to stay in the country side. Over there, they don't have good facility, but people there have some good friendship with others that make them happy and they want to stay there.

Donny Actually I don't know what the prosperity is but you can imagine that in Indonesia there are low income people with seven children but they are happy. They don't have iPhone, they don't have a car, but they are happy with their children. They can pay for their children to go to schools. I don't know how they manage to pay their seven children to go to schools. I think maybe because they can take care of the children. Why we push the meaning

of prosperity to the people to get some things like iPhones? We have to know what the local's prosperity in that area and what they are happy for. I think some people are happy because they have children. That's it. I don't want to be rich, I don't have iPhone, I don't have a car but I have a child and it makes me happy. That's why I don't know the prosperity issue. Thank you.

Maquito The happiness index is extremely interesting. When I look at it, I am reminded of the research of Tokyo University Professor Toru Nakanishi, who used to be my tutor. He does research on Manila's slums. He came upon such a happiness index, and compared it with his slum area. Surprisingly, he found that the happiness index of the slum's community was nearly 100%. He made a survey to explain the cause of such a result. One hypothesis is that if there are peers who help each other, or a community, no matter how difficult daily living is people could be happy as a result. Pursuing the matter further, it is not so much a social capital type of network, where "we help each other because we could get into a difficult situation in the future", but more of simply being with one another that people become happy. Just saying "How are you today?" could make people happy.

Now is a time when even economics is being questioned about whether or not the happiness of people can be calculated by using money alone. If everyone pursues the currently understood definition of happiness, the earth will break down. That is clear, so a change in awareness is necessary. Should everyone come to think that just living a reasonably healthy life, then, I think, this earth will not collapse.

Yeh I don't quite understand the happiness index. I have returned to Japan after working in Taiwan for nine years, but I find Japan more interesting. So, I think that I am happier now.

For example, the vehicle death rate in Taiwan is high. Even among my students, one was riding a motorcycle when a car suddenly made a U-turn and hit the student. However, later the insurance computes to just about 800,000 in Japanese yen. Life insurance is inadequate. If so, daily living becomes a worrisome affair. An assistant of the laboratory next door, who ignored the traffic light while commuting to work, got hit by a car which resulted in facial fractures. The settlement was a mere 120,000 yen. In this respect, Japan has a firmer insurance system that helps one have a peace of mind. If we consider that, I have my doubts about the high happiness of developing countries.

Wang What is happiness? If there are no gaps with the people around, one, I think, could have the highest level of happiness. China's rate of growth is high right

now, but I feel that the level of happiness is going down. Comparing the rural and urban sectors, the rural sector should absolutely have a higher level of happiness. Looking from a world level, the countries that are least developing, may have the highest level of happiness. In short, my personal opinion is that the introduction of high-level technology amidst globalization is destroying happiness.

Fukuda Thank you. There seems to be some opinions from the floor.

Lee G. Listening to everyone's talk, I really would like to say something from my experience. I was born and raised in a poor countryside. I am somebody who could not have enough food to eat, and could not get treatment when I became ill. From your standpoint, you may be happy, but in a lot of countries, including Southeast Asia and Africa, the situation is not being able to eat or get cured. Furthermore, one important view is that these people did not choose such a situation, since they really had no option. In the world, there are nearly one billion such people.

When we think about this, is it good to make a survey which pretends to show that the suffering people of developing countries are happy? While the people of advanced countries ride around in cars enjoying a good life, from a humanistic point of view is it alright to say that the developing countries and their slums as well are happy? I would appreciate it if I could get comments from Kimura-sensei and senior people about how we should think about this matter from their experience after the war.

Kimura The issue of well-being is an eternal one, and would not end that simply. However, there is significance in Gao-san having an interest in this and adding it to his presentation. As to why such an index was made, most likely it's because we are now in a digital age which made possible to start a survey that would quantify things that were not measured.

For example, in the 18th century a person called Bentham stated "the greatest good for the greatest number". Happy people and unhappy people are mixed together, but is it ideal for everyone to really have the same level of happiness? This is also related to the environmental problem. Would it be alright if people now are happy? There are people who think of using as much energy as they could use and not worry about later, since that is something for people in the future to think about. However, that would not be good. I think that we should not feel happy if the people around or the people of the future are not happy.

I do not know in detail how this happiness index was computed, but most likely the level of happiness is different from person to person, and there are

many types of happiness. Most likely, there was a questionnaire interview of the level of happiness of each person, from which the average was taken. What meanings would it then have, is a difficult question. It is a difficult problem because it is not easy to trust averages. It might be more interesting to think more philosophically about this matter.

Gao During my childhood days, when my mother says, "It's meal time. I bought meat today", I would run at full speed. If I am not quick about it, I will not be able to eat meat. But, I had a feeling of being happiest when I ate meat then. What I want to say is that awareness is something that is tuned in with the times. It would be a different level really to compare [ourselves] with them who do not have regular meals or eat meat although they are lean. We should not, I think, force our values, but rather respect them as human beings for being happy and satisfied even though they are poor.

Lee G. That is because you still had the chance to eat meat. However, for people who are in the verge of dying from hunger or who cannot get cured when they become sick, can we still say that they are happy, even though they have the support of their families?

Gao What I want to say is that would be a different level.

Maquito Indeed, I also have confronted Nakanishi-sensei with the doubts that Lee-sensei raised. How can we unabashedly conclude that they are happy? There are times when they could not get a meal, cannot buy medicine when they become sick, and cannot go to school even if they wanted to because they did not have money. But it never came to my mind that Nakanishi-sensei was involved in any plot or gave a false pretense of happiness among the poor. This is because if you look at how Nakanishi-sensei works, it is really pure devotion, living for 20 years in a place where I would not have thought of. He carries out his research by engaging the people in daily conversation, trying to arrive at the essence of the problem. So, I would really like to emphasize that there is no element of a plot here whatsoever.

There are many ways of solving the problem. Nakanishi-sensei's solution method is to provide scholarships. My solution method may be to go to the countryside and live there. So, each one has their own solution method. There is no correct answer.

Lee G. This is a problem that is right now being raised by the United Nations. It is said that the problem of poverty of the developing countries remains unresolved, and even China will need two to three more years. In seriously considering how

to cope with the poverty issue as the United Nations or advanced country, there should be consideration of happiness, but this is not there.

Gao The poverty problem has been addressed for several decades or centuries. However, today's theme is about how we should use energy. Naturally, advanced countries must support the development of developing countries, but even more, people should exert self-help efforts with the resources they have, and must think about ways as to how to have a meal. It is not a matter of simply giving rice. Let us think about how poor countries could make life better for themselves through the use of resources and energies that they have. It is not a problem that could be solved if we bring the money from here to there. Something should come about from here.

Lee G. Please take a look at the data that Wang-san earlier presented. In terms of energy consumption, China is number one. However, looking at the per capita energy consumption, China is a fraction of America. Since China is the world's number one from an overall standpoint, it is being told to undergo more severe energy conservation, but now the technology and level of economic development have not reached that far. Satisfied with themselves, advanced countries are blocking the chances for developing countries to develop. This is the global structural problem of advanced and developing countries. When looking at the balance between the environment and development, among advanced countries, there are countries that do not have sufficient firepower with regards to the environment, although they are sufficiently economically developed. On the other hand, China is now being told that it has to earnestly conserve energy since its CO2 emission is the biggest in the world, although it has not yet sufficiently developed economically. This is a big philosophical problem.

La I was the one who asked the question earlier about how happiness could be quantified. Thinking carefully about the basic point of where the environmental problem comes from, I think that it is from the sense of happiness of capitalism. No matter which system, I think the common point is that the ultimate objective is to increase the amount of happiness of human beings.

In capitalism, the amount of happiness positively correlates with the amount of consumption. Since the amount of consumption completely depends on the amount of income, if the amount of income increases, then the amount of happiness increases. Moreover, owing to the ability to quantify growth rates, there is an objective persuasiveness. Consequently, in capitalism, there is the strong belief that the amount of happiness of people would increase as the

growth rate is increased. There is then a rush towards prioritizing growth, and this leads to the destruction of the global environment.

However, there are a lot of cases where one could be happy with a bit of inconvenience, even without growth. There are too many cases such as communities where there is a good natural environment and people could have peace in mind and trust each other. However, the happiness that could thereby be obtained is hard to visualize subjectively and is weakly persuasive.

When I asked the question, I was thinking if it would be possible for methods for quantifying the happiness that could be felt from things other than growth to stop the belief of prioritizing growth and hence putting a stop to environmental destruction.

Thank you very much for elaborating as well as having a heated discussion of this issue.

Fukuda I would like to end the discussion of this matter here. There are some questions to individual presenters, so I would like to ask the questioner to explain.

Lwin Hi I'm from Myanmar doing research in Tokyo Medical University. Vietnam and Myanmar have very similar lifestyles and features. I found that Vietnam is having a lot of discussion about electricity, just like in our country. Because of global warming there was a heat wave last month and hundreds of people died. So I think global warming is very important and also electricity is very important so, I would like to look at how to cope with these issues. In my case, I observed that most of the researchers found energy saving is very important. I have worked in Malaysia; I have lived in Thailand, and Bangladesh. I have observed that even in Japan, most of the offices and hospitals and the government sector use electricity without caring too much, because the government gives the money, it is a government cost. So I think maybe, that the energy saving is the best way for the individual. So what do you think, this is one of my questions.

Another thing we have been discussing about is the happiness index. I am from the medical field. I think in the happiness index there are several factors, not only the environmental factors but also the socio economic factors and individual lifestyle factors. So it is very complicated. Dr. Rittironk mentioned GDH. I am not a psychologist but I think the GDH is now a well standardized method. I might be wrong. I think we need a good standardized method so as to analyze several factor combinations.

Another question is to Dr. Rittironk is about the US dollar 55 (5000 yen) for the solar energy, and I am happy to know that our technology in Myanmar may be able to use that technology. But 5000 yen is too expensive for low

Quan income people in the underdeveloped countries. How much energy can be produced for such kind of cost?

Regarding to the question of saving energy, especially electricity, last month the Vietnamese government has issued a law about using electricity and saving energy in every aspect from the residential, industrial to the office buildings. We also have some kind of punishment and encouragement for their activities and we also have set up some Eco label for each product. I think that the main purpose of this is to raise the awareness of the people about how to use energy and electricity in their work or at the offices. Is that answer good enough for you?

Lwin I agree so much about it because individual education is very important. I think that in such an individual method to save the energy some kind of punishment might be needed. When I was working last time in my previous university in Tokyo, if you don't turn off the lights in the evening after work, they will charge you 5000 yen for your carelessness. So again it is possible to apply this to a developing Asian country.

Fukuda Thank you. It is a reply which says that there is also the approach of setting up penalties in order to raise environmental consciousness.

Rittironk Conserving energy has always been a policy for Thailand. When I was 10 years old everybody go home and had a routine life, which was not a big capitalism. People go home and watch TV but one day the government said that we are going to shut down the television between 6 and 8 o'clock at night. I think that young people might not have seen that but I was about 5 years old. Did it work? It actually really worked but no more. Eco is always embedded in Thai culture and even in all the government buildings in Thailand right now. We don't need censoring technology for lighting. Each fixture will be installed a switch individually like a little string so you seat here and turn it on. I don't need master switch. That is almost every governmental unit has done today. Preserving energy is no question for Thailand.

Your question about 5000 yen; is 55 USD affordable? It doesn't matter how much that is. What matters is how many people use it. 5000 yen for 30 gallons of hot water. How many gallons are needed to take a shower per person? So just do the calculation. I think it will be worth it to do some sharing. In the community, educate people, you know to share your resources together. You use it more efficiently and preserving it. Do people have the money to buy it? Not really but they can share, right?

I got Bachelor of Science, how much money they get paid? About 5000-6000 baht. I don't have my calculator right now but anyway its expensive, but you learn how to live together, and you learn how to share.

As for the issue of happiness, there are two words to answer this question: the word NEED and the word WANT. They both mean I want something but the only difference is NEED is something you really need you can't live without; I need food, I need water, I need girlfriends sometimes. WANT is something you can live without it. Like I want to eat zaru soba today. If I don't have zaru soba today, will I die? No. But if I don't have water today, I will die. So if people fulfill their basic NEED, they will be happy. If they try to fulfill their want it creates problems and wars. There are wars about religion because I want you to be my religion, or because I want gas from your country, or I want you to have my gas. The word WANT always create problems. However, as long as you have satisfied your need, I think that will make everybody, not happy but quite satisfied.

Lwin My final question is to all sensei. I am in the medical field so CO₂ reduction is very important because it can cause chronic asthma and lung diseases. It is not only just about happiness or global warming. So, which is more important in developing country, industrialization or CO₂ reduction? If CO₂ reduction is more important even in the developing countries, then how can we manage this?

Fukuda There is one more question from Hanson-san to Kimura-sensei. With regards to Vietnam's experimental residence, you said that traditional technology, not modern technology, should be important. Should a condition, where the temperature has been lowered more than in an existing tradition town house, be considered as "better" ?

Kimura Earlier I talked about this a little, but I have also a report about the result on what happened to the temperature after the actual construction. If you need detailed information, there are some papers that have been submitted to the architectural conferences, so please take a look. However, there is air conditioning in this residence. Hence, the inside portion is comfortable. There is no data measured for cases without air conditioning, so a direct comparison cannot be made.

The objective of this project is to first raise the level of living of the extremely poor, or, as was mentioned earlier, people who have a very low level of happiness, rather than conserving energy or upgrading the quality of life. Even if air conditioning is provided for, [I] would like to have proven the matter that

the amount of consumption of air-conditioning becomes smaller compared to the ordinary household. I think it would be nice if we could build comfortable houses just by architectural design, without using such machineries, but it is not that easy, isn't it. The objective of this experiment is to make the situation a bit happier by raising the comfort level including such aspects as sanitation and psychological sense of oppression. The quality is different so I think we can directly compare this with the conventional residence.

Fukuda It would be good to refer again to the papers for the details.

There are questions from two persons, which I think is also a very important problem. One is that "in the Southeast Asian countries, urbanization will advance further as rural people look for jobs in the cities. I think that more than ever money will be spent on slum, residential problems, sanitary problems, water problems, transport problems, energy problems and health problems. With regards to this, I would like to ask your comments. Do you predict the end of urbanization in such countries as Thailand, Vietnam, Indonesia, and the Philippines?"

Another one has a similar issue. "The concentration of population in Asian cities is severe. Is there a way to achieve better city, better life without the removal of single polar concentration?" This I think is also depends on each country's situation, so I would like each one to make a response.

Wang I am doing some work related to urban development, but with the steady progress of urbanization, for better life to be achieved, more time, I think, development must be allowed to take time. Ultimately, everyone gathers in the cities in order to make money in the cities. However, in Japan, which has developed this far, there is not much difference between those living in the villages and those living in the cities. In this way, quickly shrinking the gap between the villages and cities is, I think, the best way to stop the advance of urbanization.

Yeh Concentration in a single pole raises the efficiency with regards to transportation. It also preserves the nature of other regions, so I feel that in itself it is good. With regards to poverty, when I went back to Taiwan, I immediately felt that in order to become affluent one must do something by oneself. For example, a country, I feel, would never become a full-fledge country if it keeps on thinking that advanced countries would help out economically. Hence, I think that one needs to exert effort with one's own strength. If that can't be done, then it couldn't be helped, I think, if that country will be broken up as it complies with the principle of competition.

Maquito Single polar concentration is a quest for efficiency. People also flow from the countryside in search for recreation, medical care, and other conveniences. When I attended a conference related to architecture, the topic came to megacity, and a slide listed up the megacities. A European who saw the list pointed out that there are not so many megacities in Europe. The reason appears to be that Europeans feel that living in the countryside itself is good, and they don't have the bias for living in the cities by all means. In short for as long as we do not change the awareness that life in the village and the countryside is bad and that in the city is good, this trend of urbanization, I think, cannot be stopped. It will just move forward. I think that it would be nice if even one person should have a change in awareness, and people start thinking that the country side is better life, better quality.

Gao In economics, there is the thinking that things become better if there are goods and options, but in psychology it is the opposite. Having many options makes a person crazy. With too many options, one develops melancholia. In the environmental problem, having too many wants is a problem. Creating a new lifestyle in Asia, where one could be self-reliant and happy, by introducing solar-generated electricity and wind-generated electricity in the villages, without that much roads, then urbanization may just stop. When will this come about? Maybe a hundred years or a thousand years later, I don't really know.

Kimura Single polar concentration in the cities is now being talked about. Even in Japan, various government-led regional promotion efforts have been done way back, but without much success, with the resulting single polar concentration in Tokyo. The Niigata shinkansen was built with the expectations of being able to link Niigata and Tokyo by shinkansen would lead to more prosperity in the regions with Niigata as the center. The result was the opposite as everyone came from Niigata to Tokyo. Personally, I am wondering that whether or not such a result could have been predicted, or that whether or not by building, it would end up badly. Hence, we should also think about this, if we now worry about the cities in Southeast Asia. To activate the regions, it doesn't necessarily mean that simply building a shinkansen would be good. When the Niigata shinkansen was built, I was thinking about the huge amount of money that was used, and whether there could have been other ways.

Donny I think that it is difficult in Indonesia to make a solution of the urbanization because the city is more gratifying than the rural areas. I just think that we have to make the rural area more attractive than the city so we can end urbanization. But it is too difficult. For example, before if we wanted to go to Bandung from Jakarta, it took five hours. But after we built our highway,

it is just two hours so all of the people from Jakarta go to Bandung in the weekends and Bandung has more traffic than Jakarta in the weekends. So Jakarta and Bandung become connected. Jakarta and Bandung have become one mega city. That's why it is difficult in developing country to find a solution about the urbanization. Rural areas are not more attractive than the cities right now, especially in Indonesia. The second solution is the policy. We have to force the government that people from the rural area will be punished if you go to the city. But in Indonesia become a democratic country. If you want to go somewhere, there is no punishment. I think Thailand can use such punishment, but in Indonesia, it is very difficult.

Quan Now that the ratio of urbanization in Vietnam is 29%. I think now in Japan it is 75%. But we already have no space for urbanization. In Vietnam, we already have some new policy to control the immigration from the country area to the urban area. In our law, we already said that the people have the right to choose the place they want to live, so we actually don't have the right to control immigration. But we have another policy, first of all they can promote the local structure in the country side area and the promotion of handicraft industries so that people can still be there with a little bit lesser income compared with the people in the city. But they don't have to work with traffic jam or air pollution, and some case studies in Vietnam already show that this policy has been successful. And I think, this can be more popular if the government supports more.

Rittironk I was born and raised in Bangkok. I am not saying that it is a mega city but it is a very big city. I have lived in a big city for my whole life: New York, Chicago, St. Louis, Bangkok and now maybe Tokyo. That's why I love Tokyo so much. But anyhow, a big city has the same urban issue. Population has been always a problem in Bangkok, but now there has been a policy from the urban planner in the government to create satellite towns. The satellite town is not a city but it is a node, an urban node. People go to the city to do things. For example, I need to do my passport; I don't need to go to downtown but I go to the node city. Maybe we should answer one question, why do people go to town? You go to town to make money. People go to town to work. So in order to create satellite towns, we need to create jobs there. And that would be part of the governmental policy to create the node of the cities, which we are at an ongoing process.

Kwak In Korea, there is the serious problem of 10 million people out of the total population of 40 million are concentrated in Seoul. Moreover, looking at

who is living in the best place in Seoul, expectedly it is the powerful and rich. However, it is not only the rich. There are parents, who value education, so although they do not have money, they live in first class areas but work very hard for the sake of their children. The problem here is that the population is concentrated because of education or other things that could only be found in Seoul. There is now talk of dispersal. Even if it would not be exactly the same, the rural sector is on the average made to have the functions of the cities without any distinction, then I think the problem could be somewhat solved.

Fukuda Thank you. Today the panelists have kindly answered many questions. Finally, allow me to mention some of my impressions.

Firstly, there were three big topics. One Kimura-sensei and Kwak-sensei may have the same awareness about “not stepping on the rut of advanced economies” . Developing countries have something good going for them. For example, in warm countries, although they have the technology to make buildings that match the climatic conditions, building houses and buildings that advanced countries have may just result in hot and high-energy structures. Then for the sake of energy conservation some countermeasures may be adopted. This should not be the case. I would like them to think about architecture that matches their climate.

Perhaps the discussion about happiness is, I think, the same. There are a lot of people who commit suicide in Japan. The other day I saw the news of an artist who committed suicide, and I thought that even in Korea there are a lot of suicides. We say that development is related to happiness, but it is not always so, and we very much feel this. In this sense, we feel that some kind of value of another happiness that is different from economic development should be out there somewhere. I do not know whether or not that could solve our problems, but I think this was one of the directions of today’ s discussions.

Another one did not come up as a question today, but it was often in the responses that each individual should be firmly aware. It is important that the government and others think about big policies for energy conservation and the CO2 problem, but ultimately if each person is not aware, then these things could hardly be solved. There were discussions that we should think about this.

Then there was the problem of gigantic cities. There were two key issues here. One is the increasing population in the gigantic cities, the deteriorating environment, the increasing difficulty of urban living, and the increasing energy burden. Another one is the transport problem. However, in my various surveys under the guidance of urban environment experts, within Japan, Tokyo has the lowest energy consumption or CO2 emission per capita. This is because 90% of the people use the public transportation, bringing down the energy consumption per capita, although the trains could be very crowded during

commuting time, forcing an unpleasant experience on people.

Not only within Japan, but world data gives the result that the higher the population density, the lower the per capita energy and resource consumption. Today, Europe is building compact cities, but I feel that mega cities or big cities are not necessarily bad. However, since it could be extremely unpleasant situation for the persons living there, I think we should make a good environment for people. It is the same with the transport problem. Today, we only talked about roads so this means cars. If population is concentrated then buses or electric trains pay off. If population density is low then buses as well as electric trains are in the red. Today, there were a lot of minus points raised, so I would just like to say that to some extent concentration also has a positive side.

I would like to end the session with the above thoughts. Thank you everyone for today.

Profiles

■ Mochamad Donny Koerniawan

Lecturer / Researcher at Department of Architecture, Institute Technology of Bandung, Indonesia.

QUALIFICATION:

Undergraduate of Department of Architecture Gadjah Mada University

Master in Building Science of Department of Architecture Institute Technology of Bandung

PhD candidate at Department of Architecture, Institute Technology of Bandung, Indonesia. Research Main Area: Building Science, Thermal Comfort, Building Simulation.

IMPORTANT PUBLICATION:

1. (2010) Recreation Park And Thermal Comfort: Site Measurement And Predictive Simulations. Assessment Of Open Spaces In Taman Impian Jaya Ancol, Jakarta, Indonesia, YSRIM, Shanghai China (M D Koerniawan)
2. (2009) Home-making and house building in the poor settlements: Towards a framework to study self-help housing, International Seminar "Making Space for a Better Quality of Living" 18 August 2009 Dept. of Architecture and Planning, Faculty of Engineering, Gadjah Mada University (Wiwik D Pratiwi, M Donny Kurniawan, Anita Vitriana, Kiki Z Solihah, & Medria Shekar Rani)

■ Max Maquito

Researcher-in-Charge of SGRA's Japan-Philippines Shared Growth Seminars, Lecturer at Temple University Japan.

QUALIFICATION:

B.S. Mechanical Engineering, University of the Philippines, M.S. Industrial Economics, Center for Research and Communication (now under the University of Asia and the Pacific), Ph.D. in Economics, University of Tokyo. Currently a Research Consultant at the University of Asia and the Pacific (Philippines).

PUBLICATION:

1. "Rediscovering Japan's Leadership in 'Shared Growth' Management: Some Findings from a Study of Philippine Ecozones and Automotive Industry" by Ferdinand C. Maquito (SGRA Researcher) and Henrietta Carbonel (Adjunct Faculty), International Christian University) forthcoming in "Rikkyo Business Review"
2. "Changing so as not to Change: A Review of Japan's Firm-Bank Relationships, paper presented at the 3rd International Business Symposium of the College of Business, Rikkyo University, May 22, 2010

■ Pham Van Quan

Lecturer/ Department of Ecology and Environmental planning, Faculty of Urban and Rural Planning, Hanoi Architectural University, Vietnam.

Vice director, Center of research and development for environment technology of Civil, Vietnam Association of Civil Engineering Environment (VACEE)

QUALIFICATION:

Undergraduate in Faculty of Environmental Science, Hanoi University of Science, 2001

Master of Environmental Science in Institute for Environmental Science and Technology, Hanoi University of Technology, 2004

Doctor of Engineering in Urban Engineering Department, School of Engineering, The University of Tokyo, 2009.

PUBLICATION:

1. Characterization of urban flood mapping with pathogenic pollution in downtown of Hanoi by inundation simulation and water quality monitoring. 8th international conference on Urban Drainage Modelling (8UDM), Sep 2009, Tokyo.
2. Non-point pollution sources under wet weather condition in the downtown of Hanoi. IWA 13th International Conference on diffuse pollution and integrated watershed management (DIPCON 2009), Oct 2009, Seoul.

■ 葉文昌 Wen-chang Yeh

Researcher, SGRA "Environment and Energy" Research Team. Returned to Taiwan after graduating from Tokyo Institute of Technology in 2001. Assistant Professor, National Yunlin University of Science and Technology, 2001. Assistant/ Associate Professor, National Taiwan University of Science and Technology, 2002. Has been working for the past 8 years to set up an environment for the creation of thin film transistors and silicon solar batteries from self-constructed device on an independently acquired budget. Associate Professor in Shimane University of the Department of Electronic and Control Systems Engineering, from April 2010.

PUBLICATION:

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■ Supreedee Rittironk

EDUCATION

Doctor of Philosophy (Ph.D.) in Architecture, College of Architecture, Illinois Institute of technology, Chicago, Illinois, USA

Master of Architecture (M.Arch), School of Architecture, Washington University in St. Louis, Missouri, USA

Master of Construction Management (M.CM), School of Engineering, Washington University in St. Louis, Missouri, USA

Bachelor of Industrial Design (B.ID), Faculty of Architecture, Chulalongkorn University, Bangkok, Thailand

ACADEMIC EXPERIENCE

2003-present Lecturer in Architecture, Faculty of Architecture and Planning, Thammasat University, Thailand

2008-2009 Adjunct Lecturer in Design and Construction management, Westwood College, Chicago Loop campus, Chicago, Illinois, USA

2007-2009 Teaching Assistant, Illinois Institute of technology, Chicago, Illinois, USA

2006-2007 Adjunct Lecture in Architectural studies

RESEARCH AND STUDY

1. Revisiting and Outlooking Thai Bamboo Architecture, ISACS2009 symposium: Integrating Diversity: Reflection, Reinterpretation and Re-Position, Chiangmai University, 2-4 December 2009.
2. Bamboo architecture from old to new, and to renewal. VIII World Bamboo Congress Thailand 2009 in Bangkok, 16-19 September 2009.
3. Laminated bamboo beam design guidelines for architects and builders. The second international conference on modern bamboo structure (ICBS 2009) 2-3 July 2009 in Bogota, Colombia at the Universidad de Los Andes.

■ 郭荣珠 Youngjoo KWAK

Researcher, SGRA Environment and Energy Research Team
Researcher specializing in water-related disaster risk management, Public Works Research Institute
Research Collaborator, Center for Environmental Remote Sensing, Chiba University

Joint Researcher, National History Museum, Chiba
Ph.D. from Department of Earth Sciences, Graduate School of Science, Chiba University, 2010

Technical Consulting Engineer, Measurement and Geographical Data, 2006

Pusan University, National Korea Maritime University, Adjunct Lecturer, 2004

B.S. in Civil Engineering, Pusan University, 2002

PUBLICATION:

1. KWAK, Y.J., KONDOH, Akihiko, "A Study on the Assessment of Multi-Parameter Affecting Urban Floods Using Satellite Image; A Case Study in Nackdong Basin, S.Korea", Asia Oceania Geoscience Society, 2008
2. Youngjoo KWAK and Akihiko KONDOH (2010) "A Study on the Assessment of Multi-Parameter Affecting Urban Floods Using Satellite Image : A Case Study in Nackdong Basin, S.Korea", Advances in Geosciences • Vol17 • pp.265-278.

■ 王劍宏 Jianhong Wang

Member, SGRA Management Committee

Hails from Shandong Province, China

B.S. in Construction Engineering from Wuhan University, 1998
Work for two years in China Petroleum in construction design and implementation

Assigned to Japan's Shiraishi Group Company in 2000, assigned to design work for three years

Decided to do further studies in Japan after encountering Japan's advance technology when visiting Kajima

Technical Research Institute in 2003, and in April of same year took the entrance exam of Graduate Studies

of Waseda University, and was accepted in September into the Koizumi laboratory, specializing in Shield

Tunnel technology. In seven years, obtained his Masters and Doctorate degrees. After being a research

assistant at Waseda University, he is now doing research on infrastructure construction at the Nihon Koei Research Center.

The 38th SGRA Forum in Tateshina

Better City, Better Life

~ Energy Situation of Cities/Buildings and Lifestyle in East Asia ~

Report

On July 3, 2010, the 38th SGRA Forum on the theme "Better City, Better Life: The Energy Situation and Lifestyle in East Asian Cities/Buildings" was held in grand fashion at the Tokyo Chamber of Commerce and Industry Tateshina Forum. This time, the main sponsor was the University of Kita Kyushu, with the Atsumi International Scholarship Foundation/Sekiguchi Global Research Association as co-sponsor. The forum was held as part of the activities of the Japan Society for the Promotion of Science, Exchange Program for Young Researchers, and was made possible also with the cooperation the Tokyo Chamber of Commerce and Industry.

At 10 A.M., the forum was opened with the greetings from Chief Representative Junko Imanishi and Professor Soichiro Kuroki of the University of Kita Kyushu. After which, Professor Weijun Gao of the University of Kita Kyushu, and Professor Kenichi Kimura of the International Research Institute on Human Environment, made statements of the problem for the forum.

With the forming of gigantic economic zones in East Asia, the daily lives of people have been improved, and the energy use has been increasing. The gap among the peoples of this region is still large, but there is a common awareness of a crisis about energy/environment. Before us lie a mountain of extremely important global issues that must be resolved, such as the population problem, water/energy problem, climate change problem, and urbanization problem. In order to solve these, we could move in a new direction by using, the handed down folk wisdom in Asia, and not only depend on the new technologies of Europe and the United States.

After [the opening remarks], researchers from seven East Asian countries/regions made their respective presentations of their research on the environment and energy situation as well as development.

[Indonesia] Mochamad Donny Koerniawan (Bandung University) "The Influence of the Development of High-Rise Buildings for Low-Income People in Sustainability and Energy Saving"

[Philippines] Max Maquito [Philippine, University of Asia and the Pacific] "The Challenge of Environmentally Sustainable Transport (EST) in Mega Manila City"

[Vietnam] Pham Van Quan (Hanoi Architectural University) "Energy Conservation Counter Measures in Vietnam Cities"

[Taiwan] Wenchang Yeh (Shimane University) "Taiwan's Energy Conservation Consciousness and Transport Situation"

[Thailand] Supreedee Rittironk (Thammasat University) "Turning Alternative to Mandatory Energy in Thailand"

[Korea] Youngjoo Kawack (Public Works Research Institute) "A Day of Living (and its changes) in a Korean City from the Perspective of Energy and Environment"

[China] Jianhong Wang (Nippon Koei Research Center) "An Engineers Perspective on Global Warming and Urban Infrastructure Construction"

After the presentation from each country/region, under the skillful moderation of Professor Hiroatsu Fukuda of the University of Kita Kyushu a panel discussion was held, where there was a lively discussion participated on by foreign students from all over the world.

Could such problems as environmental pollution/traffic jam caused by economic development and urbanization in East Asian countries be solved? As economic development advances, more energy is used as a more convenient life is sought for, but is this really necessary? What is the indicator that would measure happiness, which first of all is vastly different from person to person? These are actually issues about the world and mankind's future, for which a simple conclusion would be hard to find.

However, the forum itself was held on the basis of a call for an international cooperative system through the interchange among young researchers in the said field to address the global environmental problem that goes beyond the framework of national borders. With regards to the awareness of a crisis in energy/environment, it was impressive that the eight representative researchers had practically the same response. Regarding energy conservation counter measures, the earth's environment could be saved if not only the government but each citizen would take responsibility to move forward steadily one step at a time, especially with the leadership of excellent young researchers from East Asian countries, just like in this forum.

At 6 PM, the forum was ended with Steering Committee Chief Tadahiro Shimazu giving the closing remarks. A cocktail party, hosted by the Atsumi International Scholarship Foundation, was held thereafter. Chief Directress Itsuko Atsumi gave her thanks to the participants to the forum from each country in her toast. The discussions about the forum continued as if forgetting the long and tiring day.

(Written by: Jianhong Wang, and Youngjoo Kwack)

SGRA Report Backnumber

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SGRA レポート32	第21回フォーラム講演録 「日本人は外国人をどう受け入れるべきか—留学生—」 横田雅弘、白石勝己、鄭仁豪、カンピラパーブ・スネート、王雪萍、黒田一雄、大塚晶、徐向東、角田英一 2006.4.10発行
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n レポートご希望の方は、SGRA事務局（Tel：03-3943-7612 Email：sgra.office@aisf.or.jp）へご連絡ください。

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E-mail: sgra-office@aisf.or.jp

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