第9回新炭素資源学国際シンポジウム
学生ディベートセッション報告

グローバルCOE「新炭素資源学」拠点
学生ディベートセッション担当学生一同

2012年11月21日から3日間に九州大学筑紫キャンパスで開催された最終回の新炭素資源学国際シンポジウムでは、「1.炭素資源の効率的利用と低炭素プロセス」、「2.エネルギーエマタ-システム」、「3.省エネルギー材料・デバイス」、「4.資源開発と環境保全」、「5.アジア環境経済」の5つに分類された内容に加え、国内外から基調講演、招待講演をお願いし、それぞれが持つ問題点やテーマを明示しながら、学生セッションが開催され、各グループにおいて活発な討論が行われていた。特に、エネルギー問題への理解を深め、国を超えて学び、知識の共有や意見交換を行っていた。国際シンポジウムの最終回の最終セッションでは、各グループのリーダーがその国独自の制度や考え方などを語る機会があり、その質疑応答の際、明確でない回答があると感じました。発表中、どのグループも様々な国の学生が集まっており、その国の制度や考え方などを語る機会がありました。発表後の質疑応答も活発に展開されておりました。発表後、発表者への質問が寄せられ、各グループのリーダーがそのグループで議論を行い、各グループのリーダーがそのグループで議論を行い、各グループのリーダーがそれぞれのグループで議論を行い、各グループのリーダーがそれぞれのグループで議論を行い、各グループのリーダーがそれぞれのグループで議論を行い、各グループのリーダーがそれぞれのグループで議論を行い、各グループのリーダーがそれぞれのグループで議論を行い、各グループのリーダーがそれぞれのグループで議論を行い、各グループのリーダーがそれぞれのグループで議論を行い、各グループのリーダーがそれぞれのグループで議論を行い、各グループのリーダーがそれぞれのグループで議論を行い、各グループのリーダーがそれぞれのグループで議論を行い、各グループのリーダーがそれぞれのグループで議論を行い、各グループのリーダーがそれぞれのグループで議論を行い、各グループのリーダーがそれぞれのグループで議論を行い、各グループのリーダーがそれぞれのグループで議論を行い、各グループのリーダーがそれぞれのグループで議論を行い、各グループのリーダーがそれぞれのグループで議論を行い、各グループのリーダーがそれぞれのグループで議論を行い、各グループのリーダーがそれぞれのグループで議論を行い、各グループのリーダーがそれぞれのグループで議論を行い、各グループのリーダーがそれぞれのグループで議論を行い、各グループのリーダーがそれぞれのグループで議論を行い、各グループのリーダーがそれぞれのグループで議論を行い、各グループのリーダーがそれぞれのグループで議論を行い、各グループのリーダーがそれぞれのグループで議論を行い、各グループのリーダーがそれぞれのグループで議論を行い、各グループのリーダーがそれぞれのグループで議論を行

Summary Report of Student Session

International Symposium on Novel Carbon Resource Sciences 2012
1. Energy Best Mix

- Tomoki UCHIYAMA (Kyushu University - Japan)
- Ryutaro AKIYOSHI (Kyushu University - Japan)
- Akhiro TOU (Kyushu University - Japan)
- Noriyuki FUJII (Kyushu University - Japan)
- TUSARA Loren Montefalcon (Kyushu University - Japan)
- DEWI Agustina Iryani (Kyushu University - Japan)
- Pilasinee LIMSUWAN (Kyushu University - Japan)
- Chamnin LEE (Toyo University - Korea)
- Suresh Kumar Megarajan (NEERI – India)

Group 1

Topic 1. Energy Best Mix

- Group Leader

Summary:

Energy is a basic need of life and plays critical role in determining quality of human life. Fossil fuels including coal, petroleum and natural gas have so far been the primary energy sources. As per Energy Information Administration (EIA), it was estimated that in 2007 the contribution of fossil fuel was approximately 87% in all over the globe, while rest came from solar, wind, geothermal, biomass, hydropower, nuclear etc. The major problem of present non-renewable primary fuel sources is that they are being vanished in a rapid rate due to continuously increasing demand of energy, as well as, their environmental impacts through green house gas (GHG) emissions, leading to “global warming.” The major issues related to the use of fossil fuels are:

- As of now, the fossil fuels left in the ground are dirty and expensive to extract
- After Fukushima incident, there are concerns raised about the safety of nuclear power
- International agencies should promote advancement in technologies more aggressively
- Economically less feasible for developing/undeveloped countries
- However, the cost can be reduced by large scale implementation

Therefore, for creating low carbon society as well as to fulfill the energy necessity, effective use of various alternative renewable energy sources along with judicious use of fossil fuels will be required in addition of energy efficiency improvements. “Best Energy Mix” in this context becomes even more relevant and essential for sustainable and cleaner energy supply. As per current scenario the energy consumption from renewable sources have some demerits/practical challenges including:

Economically less feasible for developing/undeveloped countries
However, the cost can be reduced by large scale implementation
given on non-nuclear options. It is therefore important to promote the “Best Energy Mix” which is often country specific. Most of the countries decide the use of energy options primarily based on availability of fuels and economic considerations. This obviously put more stress on easily available fossil fuels taking the cleaner options back seat. It is therefore important to promote “Best Energy Mix” practice in most of the parts of world. This would make possible more judicious use of fossil fuels and would help promoting alternate energy options.

Our debating group strongly believes that the renewable energy alone won’t solve the energy crisis as the use of fossil fuels will continue for next few decades. Therefore, options like “Best Energy Mix” and efficient energy utilization are important to practice more aggressively.

**Topic 1. Energy Best Mix**

**Group 2**

1. Choong Hwan KIM (Korea Institute of Energy Resources)
2. Jie ZHAO (Kyushu University - Japan)
3. Yasuhiro SAKURAI (Kyushu University - Japan)
4. Agus Didi HARYANTO (Kyushu University - Japan)
5. Yani long CHEN (Kyushu University - Japan)
6. Maulana ADI (Kyushu University - Japan)
7. Jiyoung KIM (Korea Institute of Energy Resources)
8. Liping WU (Curtin University - Australia)
9. Mulymono DWI ANTORO (ITB – Indonesia) – Group Leader

**Keyword 1.** What happens on primary energy composition or electric source composition in each country? How come such a structure? (Key on policies, geopolitics or economy)

**Key point:**
- **Japan:** nuclear energy was a national strategic priority in Japan. (One of the main reason is energy security.) Before 2011, electricity was around 30% from nuclear power plant and roughly 60% from thermal power plant. After Fukushima disaster, it seems that Japan decided to reduce using of nuclear power plant, and continued to search/develop alternative one.
- **Korea:** still uses nuclear power plants but are trying to reduce them, and also searching some alternative energy such as biomass, solar and hydro-energy.
- **Indonesia:** still relies on both oil and coal. Indonesia had a strategic plan to construct the nuclear power plant since 2005, but unrealized due to Fukushima disaster and lack of outstanding engineer (human resources). Since January 2011, Indonesia has been produced methane from coal. Methane that has the new energy resource for electricity at local / suburb society.

**Keyword 2.** In case of separating into industry, civil government, transportation, what happens on primary energy composition or electric source composition in each country?

- **Japan:** the energy, especially electricity, but on the other hands, advanced countries rely on nuclear energy, friendly to environment, and can produce bio-oil by pyrolysis (but still have some problems to use).
- **Korea:** nuclear power plant should be built at seaside or waterside. It means that risk for tsunami is also existed even in other country.
- **Indonesia:** electricity in Indonesia is not stable (sometimes shutdown unexpectedly).

**Keyword 3.** Small energy resource (Fossil resource, Atomic power generation, Water power), New energy resource (Biomass, Wind energy, Solar power, Geothermal power)

- **Japan:** electricity was almost 80% from thermal power plant (oil and coal), 10% from nuclear power plant, and other sources such as solar and hydro-energy. Biomass is the promising energy technology.

**Keyword 4.** Atomic power generation should be used?

- **Adi:** reducing the nuclear power plant step by step is required, but on the other hands, advanced countries rely on nuclear power. Developing countries are not using nuclear power right now because of the policies and human resources availability.
- **Kim and Sakurai:** for better or worse, nuclear power is still required because we need time to reduce it and to employ alternative one. Nuclear power plant needs plenty amounts of water for cooling. Therefore, nuclear power plant should be built at seaside or waterside. It means that risk for tsunami is also existed even in other country.

**Keyword 5.** Renewable energy can solve the problem?

- In an extremely case, we need the new energy and we hope/believe that it can solve the problem in each country.

**Topic 2. Resource Development and Environmental Risk**

**Group 3**

1. Yusuke HATAYAMA (Kyushu University - Japan)
2. WANG Yongjun (Kyushu University - Japan)
3. Tsedendorj Amarsaikhan (Kyushu University - Japan)
4. Thomas David TINDELL (Kyushu University - Japan)
5. ZHANG Donghua (Kyushu University - Japan)
6. Shuji HIRONAKA (Kyushu University - Japan)
7. Rongqiao QIN (Shanghai Jiao Tong University-China)
8. Tri Karian (ITB – Indonesia) – Group Leader
9. Istra Khoiri (ITB – Indonesia)

**Nowadays almost every country in the world are both importing and exporting resources. There is no country which can rely fully on its own resources to fulfill their needs. But in terms of certain commodities such as coal, minerals, oil and gas, there is country which is categorized as importing country and also categorized as exporting country. For example, for coal commodities, Japan, China, and the UK maybe categorized as importing countries, but Indonesia and Mongolia are categorized as exporting countries.**
Resource importing countries rely upon export countries to fulfilling the needs of industrial and social activities. In which case the international market effects the social aspects such as price, quantity and industrial output. There is various domestics reason why resource importing countries import rather than exploit resources in their own countries. Likely this is due to environmental aspects, limitation of resources and economical aspects. For some countries, exploiting resources means disturbing the environment which must be prevented, while in other resources importing countries the resources are limited so that they need to import in order to fulfill their needs. Economical aspects are also a key reason why some countries choose to import rather than exploit their resources. To a great extent the exploitation and transportation of resources will be more expensive than importing.

For most of developing countries, exporting resources is an option to increase the economic output. For example, the mining industry is regarded as a prime mover for the economy in remote areas. However the ultimate goal is to remove the burden allowing the economy to rely on export alone. So in order to reach this aim, besides exporting resources, resource exporting countries need to ensure the transfer of technology expertise from importing countries, in which is most of them are already in developed countries.

Therefore a dependable situation where resources importing countries should understand that in order to exploit resources, resource development damages the environment of the host country, so they should not only consider their own environment but also the resource importing countries environment. Furthermore the use of resources in resource importing countries for example in manufacturing, power generation, etc will produce environmental problems such as water and air pollution which will also affect the environment of resource exporting countries. Therefore it is an obligation for resource importing countries to be able to help resource exporting countries.

Resource exporting countries should understand that they cannot rely heavily on resource exportation based economy forever. Resources will be depleted and they will need another alternative to fulfill their needs. Therefore they need resource importing countries, that has an advance technology, to solve this problem. In order for symbiosis to happen, an agreement based on this philosophical understanding is needed. An agreement that leads to giving benefit to each country is needed.

Each country also should collaborate to solve environmental aspects in resource development. It is unquestionable that resources exploitation damages the environment. In most resource importing countries, environmental problems related to resource development is coming from the use of resource which will produce air and water pollution, waste, land subsidence, etc. In most of resource exporting countries, environmental problem mostly coming from resource exploitation. Mining operation for example, will produce significant environmental burdens such as deforestation, acid mine drainage, dust pollution, etc. Hence, it is necessary for both countries to have strong political or legal framework in place to ensure that any action taken on the environment must be responded to. For example mining companies, manufacturing companies, electric companies must be responsible to the reclamation, environment rehabilitation and also reduction of environment damage as much as possible. Additionally, industrial awareness to the use of environmental friendly technology or procedures is needed.

Presently, globalization has influence each country on the earth. Globalization has a number of advantages and disadvantages with regard to how countries compete, but mainly on how they co-cooperate. With globalization, communication network is established which makes the world smaller. But this also makes some disadvantages in which a country may go into recession if they cannot compete with another country. The question is whether cooperation can be establish rather than competition. Globalization makes ensure every place in this world is borderless, therefore environmental problems in one country can be a problem in every part of the world, economic problems in one country can be a problem in every part of the world. So in order to overcome these problems cooperation is needed so that every country can get benefit from the globalization.

Topic 2. Resource Development and Environmental Risk

Group 4

1. Tomoaki SATO (Kyushu University - Japan) – Group Leader
2. QIAN Deyu (Kyushu University - Japan)
3. Li Huai (Kyushu University - Japan)
4. Nay Zar LIN (Kyushu University - Japan)
5. Arti Widiantojo (Kyushu University - Japan)
6. Rapee Gosalawit Utke (Suranaree University of Technology – Thailand)
7. Yaqi SHEN (Shanghai Jiao Tong University – China)
8. Resmita Kusprasetianty (ITB – Indonesia)
9. Xiaochen YANG (Liaoning Technical University – China)

Summarizing:
Each country is in different situations for a resource development of coal, petroleum, rare-earth and so on. Exporting countries who give resources to other countries have a plenty of resources but they are often facing difficult situations on environmental risks such as environmental pollutions, ecological disorder and a conflict between diggers and residents. On contrary, importing countries who convert resources to products have high technical capabilities for resource development as well as environmental protection but they are often facing a lack of resources which sometimes cause difficulties.
to resource-related companies and general citizens due to the sudden increase in resource prices.

Considering these situations, we reached to one point that each country can capitalize on their strengths about resource development and environmental protections. For example, exporting countries supply their plentiful resources to importing countries which will be a help for their resource shortage. Reversely, importing countries supply their high technical capabilities to exporting countries which will be a help for their environmental protections. However, in the current globalized world, importing and exporting resources have been strongly affected by the international politics, military capability and economics as the globalization put out a competitive relationship between nations, which will be a huge issue for our idea of resource and technology exchanges through international trading.

This issue let us incubate one idea that all countries may collectively constitute a globalized trading organization which aims to take priority of earth benefit on an equal basis apart from politics, which enable us to freely exchange resources to technologies and vice versa. As a conclusion, we believe that cooperative globalization utilizing advantages of each country is the key for our topic of “Resource Development and Environmental Risk”.

### Topic 3. Trilemma Conquest

#### Group 5

1. Daichi TERAOKA (Kyushu University - Japan)
2. Yusuke KAGEYAMA (Kyushu University - Japan)
3. Masatoshi MAEKI (Kyushu University - Japan)
4. Yasuhiro HINOKUMA (Kyushu University - Japan)
5. Yusuke SHIMADA (Kyushu University - Japan)
6. KaruppuSamy Sulochana (Indian Institute of Technology Madras - India) - Group Leader
7. Basuki Rahmad (ITB - Indonesia)
8. Jeongjie HONG (Sejong University - Korea)
9. Very SUSANTO (ITB - Indonesia)

Based on the 45 minutes discussion carried out between the group members, the following points were finalized:

The team has elected Ms. K. Sulochana as their team leader.

The three choices for the Trilemma are identified as:

- Economic development – GDP Growth of the country
- Resource / Energy Security – Availability of Resources / Energy without disruption
- Environmental protection – To control CO₂ emission to reduce global warming

The solution to the topic was discussed based on the guide lines given by the Conference Committee in terms of 5 questions. They are summarized and presented below:

**Is there any economic development which satisfies other two elements?**

If the country is able to meet its energy demands at an affordable price, by using the renewable energy sources, such as hydroelectricity, wind energy, solar energy, wave power, geothermal, bio energy and tidal energy, then it will satisfy the other two elements.

**Is there any measure to sustain the non-renewable resources and energy for the future?**

There are many ways to increase the sustainability of the non-renewable resources and energies. Some of the important points are given below:

- Improving the efficiency of the existing loads – leads to use of less energy thereby increases the supply for more period
- Creating awareness among the people about the conservation of energy
- Reducing the energy utility for non-essential activities
- Increasing the tax based on the utility of energy i.e. if the family owns more than one vehicle or consumes more than the average energy needs
- Providing a low cost alternative energy solution

**To what extent pursuing environmental prevention such as to control CO₂ influence economic development?**

Currently, it depends on the economic development of that particular country.

**Developed country:** It is possible to invest more to reduce the pollution from existing resources to develop and build alternate energy sources

**Developing country:** Developing countries are not capable on their own, with their poverty, instability, limited resources, and know-how to develop, to reduce the pollution level on par with developed countries.

**Is it possible to share the way of thinking for trilemma conquest in developing country and developed country?**

Yes. It is possible to share the way of thinking for trilemma conquest in developing country and developed country, with the Program of clean energy development mechanism.

For developing country, Program of clean energy development mechanism constitute line of investment and technology transfer from developed country, whereas for developed country, Program of clean energy development mechanism constitute the process to decrease the emission of greenhouse gas with low price to get the required greenhouse gas emission.
**Topic 3. Trilemma Conquest**

**Group 6**

1. Mohamad Yunus Rozan (Kyushu University - Japan)
2. Satoshi SUEHIRO (Kyushu University - Japan)
3. Shigeto YAMASAKI (Kyushu University - Japan)
4. Kana KIMURA (Kyushu University - Japan)
5. Theeranun Siritanon (Suranaree University of Technology - Thailand)
6. Subramaniam Aravinth (Indian Institute of Technology Madras - India)
7. Sungrim JUNG (Sejong University - Korea)
8. DENG Wei (Kyushu University - Japan)
9. Ferian ANGGARA (Kyushu University - Japan) – Group Leader

Development of stable, affordable and environmentally friendly in term of natural resources is difficult. There are three conflicting goals known as

- Environmental protection. Protecting our environment while extracting natural resources means promoting energy efficiency, practicing good mining and developing alternative low-carbon energy supplies.

- Energy security. Effective management of energy resources for energy exporter as well as to having access to stable energy supplies at acceptable cost for energy importer point of view.

- Economy development. How to stimulate economy growth based on natural resources development.

All three goals are commendable (Figure 1), but setting the priorities is hard choices. Every country has different setting priorities. Gadonneix (2012) contrasting two different situation where existing hydrocarbon resources could support current rates of consumption for another two centuries to fuel economic growth, but they are unevenly distributed across the globe, are carbon-emitting and are becoming more expensive and difficult to access. In contrast, new low-carbon energy systems based on renewable sources can be exploited in many countries. But they may prove to be too expensive for widespread use in some countries or suffer from supply disruptions, thus limiting energy access as a result.

**Summary:**

Fortunately, our group consists of international students as it clear from the above member list. It can be categorized as USA, Middle East and Asia. Since the majority from Asia we agreed to discuss the most important issue in it.

Our members were divided into two sides; one agreed that the Air pollution is one of the big problems. Another group agreed about that the water pollution and water recourse problems. However, we end up by whatever the problems are, we end up by how effective the policy to solve the problem? And how responsible about the problems and finally, how can we solve those problems in different levels (i.e) as a Citizen, academic, industries, and finally as a governments who can lead us to make the solution possible.

In order to enforce the regulations and policies effectively, a consistent top-down and bottom-up standard should be implemented which means everyone should be on the same page without exception. Every individual are required to hold constructive meeting in various format to keep good communication on exchanging ideas. As part of the academic community, we are doing an excellent job in hosting this symposium to share brilliant ideas and technologies assisting those who needed help. However, we should take advantage and utilize our scientific intellectual and expand the circle of audience. In other words, we should have industrial representatives, politicians and people who are in charge to meetings like our symposium so that we can show evidences and reasons of our induction from scientific aspects to establish effective policies and regulations.

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**Topic 4. Environmental Policy and International Cooperation**

**Group 7**

1. Al-Riyami SAUSAN (Kyushu University - Japan) – Group Leader
2. HU Hao (Kyushu University - Japan)
3. ZHANG Lixin (Kyushu University - Japan)
4. YANG Jason Hsiao Chun (Kyushu University - Japan)
5. CHEN Xiuzhi (Kyushu University - Japan)
6. ZHANG Mingwei (Kyushu University - Japan)
7. MARYATI Sri (Kyushu University - Japan)
8. Gurminder Kaur Sardool Singh (MJIIT - Malaysia) – Group Leader
9. Daisuke OKA (Kyushu University - Japan)
10. Saran Kalasin (Mahidol University – Thailand)

Environmental protection. Protecting our environment while extracting natural resources means promoting energy efficiency, practicing good mining and developing alternative low-carbon energy supplies. Energy policy. Setting regulations and policies to enforce the use of renewable energy resources. Combating climate change. Reducing greenhouse gas emissions through technology and strategies. Energy security. Ensuring consistent and ongoing access to energy resources.

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**Topic 4. Environmental Policy and International Cooperation**

**Group 8**

1. HU Hao (Kyushu University - Japan)
2. HUANG Yong (Kyushu University - Japan)
3. YANG Huaxing (Kyushu University - Japan)
4. CHEN Xiaozhi (Kyushu University - Japan)
5. ZHANG Mingwei (Kyushu University - Japan)
6. MARYATI Sri (Kyushu University - Japan)
7. Gurminder Kaur Sardool Singh (MJIIT - Malaysia) – Group Leader
8. ZHANG Kuirin (Kyushu University - Japan)
9. Daisuke OKA (Kyushu University - Japan)
Summarizing:
There are four countries addressed in this group: Malaysia, Thailand, Indonesia, and China. We listed the following environmental issues for each country, however one environmental issue is selected from each country for discussion:

**Malaysia**
- Environmental issue: Water pollution especially occurring in rivers such as Klang River in Selangor and Linggi River in Negeri Sembilan. These rivers are affected by waste dump, sand mining activities, industrial wastewaters and agricultural runoff. This effects the water quality that is extracted into the water treatment plants for drinking water use. Treatment of water becomes difficult, advance technologies are required however this is not always possible due to the increasing cost to treat water. As a long-term cost-effective measure, prevention of water pollution is always better.
- There are two leading policies implemented to monitor and control the pollution in the rivers: 1) Environmental Quality Act 1974 enforced by the Department of Environment to protect the pollution in the catchment areas, 2) National Drinking Quality Surveillance Program by Ministry of Health to monitor the quality of the drinking water supply from the water intake, water treatment plant facilities and distribution system.

**Thailand**
- Environmental issue: Flooding (mainly central & north area for example the Chao Praya River). This effects agriculture mainly farming and food production, industrial activities, housing and economy. People are displaced from their homes and unable to move on with their livelihood for income. Indirectly tourism is also affected.
- The two policies to manage this problem by the Ministry of Agriculture are: 1) Protection and addition of forest area by Department of Forestry under the Ministry of Agriculture are: 1) Protection and addition of forest area, 2) Focus of water management. During the wet season, excess water is effectively stored in reservoirs and subsequently used during dry season when there is no water. This will enable the irrigation of farmlands, usage by industries dependent on water and as drinking water source.

**Indonesia**
- Environmental issue: Deforestation. The act of clearing of forests for mining purpose is done to support the economy of the country. However this causes environmental problems such as erosion, landslides and degradation of nutrients in soil. Thus the dilemma is how to 'mine' with respect to environment. The tropical forest in a valuable asset not only to the tropical regions but also for the developed countries or temperate countries do not own these.
- Currently there are two policies in place which look into this: 1) the reclamation of illegal mining and illegal logging, which is under the jurisdiction of the Ministry of Energy and Mineral Resources, 2) policy to control forest clearance by Ministry of Forestry. There is a need to find a balance between the two policies so that the mining industries are not affected while the forest is protected.

**China**
- Environmental issue: Food security. Land exhaustion caused by modernization (building more cities) is one of the main reasons, where rice and wheat production is affected. This was also highlighted by a keynote speaker Prof Toyoaki Washida that the South-East Asia countries are seriously affected by the rising temperatures as a result from global warming and reduce the agriculture and food production. Another issue in food security for example addition of harmful products such as melamine added into milk as additive. This is very harmful to health. There is a high usage of disposable lunch boxes makes the food unsafe.
- There are two environmental policies with regards to this: 1) increase food production by Ministry of Agriculture through greater amount of research and safe technologies. 2) food safety and quality which involves regular inspection and quarantine by the Ministry of Health. Suggestion is to increase punishment for the companies that manufacture the unsafe food and food products. Government should increase public awareness on selecting safe food for consumption, for example select meat carefully. As we know the SARS began from eating civet cat's meat.

As an outcome of the discussions, the group strongly believes that international collaboration and policies would be helpful to resolve or abate environmental issues through the following measures:

- **research collaboration** – by exchange of expertise such as having more internship / attachment programmes where students conduct data collection on problems from their own country and research on these under supervision from experts in collaborating countries eg students from China, Malaysia and Indonesia attach in Japan to address the environmental issues from their own country.
- **financial regulation and assistance** from developed nations for example investing in the forest protection issue in Indonesia with providing incentives to miners to support them economically. This way, miners can reduce mining without affecting them economically and the forest can be protected.
- **having sustainable international protocols** such as the Kyoto Protocol or the Durban Framework mentioned in the keynote lectures during this symposium and other new protocols to help reduce environmental pollution.
- **boost of eco-industry** for the example in production of organic or safe foods. Support from the government required to endorse and support these industries. The abatement of tax or government subsidy for eco-products was presented in this symposium.

Lastly, as conclusion, we hope that environmental pollution will obtain more attention at individual, institutional, governmental and non-governmental level without borders.

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**Topic 5. Energy Saving Technology**

**Group 9**

1. Kouhei MACHIDA (Kyushu University - Japan)
2. LU Ying Ching (Kyushu University - Japan)
3. KIM Byung-Jun (Kyushu University - Japan) – Group Leader
4. Kyoung Kyu Won (Kyushu University - Japan)
5. Sunao KAMIMURA (Kyushu University - Japan)
6. Konoka MIYAMOTO (Kyushu University - Japan)
7. JIA Yue (Kyushu University - Japan)
8. Takaaki ARAHIRA (Kyushu University - Japan)
9. Aung Zaw Myint (Kyushu University - Japan)
10. LIU Yongfa (Kyushu University - Japan)
11. Muhammad Wakil Shahzad (National University of Singapore - Singapore)
12. Pallavi Balchanadra MUNGSE (NEERI – India)
13. Yunita Bayu Ningsih (ITB - Indonesia)
First, we discussed about energy saving. Energy is essential to the comfort of our homes to provide heat and electricity. We also use energy to run our cars and for personal transport. However, there are lots of ways we can use energy more efficiently while still meeting our energy needs.

1. Is the interest level high for energy saving in each country? Yes
   We had a lot of opinions on this question. For example, in case of China, they have tried to develop the catalyst for simple chemical reaction like synthesis of ammonia. And in Japan, they develop and improve how to use the waste heat and natural power plant like the geothermal power generation and new energy source with mixing the waste and coal. And in Korea, they have focused on consumer product like air condition, refrigerator, and other electric appliance. Also in India, Singapore, they have tried to develop energy saving approach like solar energy and good efficiency eco-like plant.

2. Is there any special measurement or approach for energy saving?
   Especially, in case of transport, electric vehicle, hybrid vehicle and eco car have been under developing and progress. Also development of new catalyst for reducing NOx and SOx is very helpful for energy saving. Due to deplete of fossil fuel, alternative new energy source has to develop. For example, there are biomass, fuel cell, and battery. And improvement of convertor for upgrading efficiency of electric power generation will be needed.

3. What is sought-after energy saving technology in each country?
   Interest of energy saving technology, it seems to be same around the world. The key of energy saving is how to approach, develop, and upgrade. For example, the researcher who developed the fuel cell, they have developed the material for fuel cell (catalyst, electrode), system, approaching and upgrade. And in steel mill, using waste heat, it is possible to generate the electricity, in present, still working. The upgrading Building and construction technology, it will give a helpful saving energy. For example, design for advantage of heating and cooling in winter and summer, develop the good efficiency of consumer product.

4. What is motivation for making energy saving society?
   The developing and developed country has the thinking and understanding of energy saving. So, our group was investigated a survey of each person’s opinion. (Future, health, environment, and money) Most of member has interest of future and money. Saving energy will be helpful saving money, and comfortable our future. In addition, they proposed necessary of more educating through the program of energy saving. Also, energy saving can start in closet, for example, when finishing the job and going outside, turn off light and electric devices, and walking and bicycle in short distance, and driving habit for energy saving will cause the effect the energy efficiency.

Topic 5. Energy Saving Technology

Group 10

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Keyword 1. What happens on primary energy composition or electric source composition in each country? How come such a structure? (Key on policies, geopolitics or economy).

a. Japan: nuclear energy was a national strategic priority in Japan. (One of the main reason is energy security.) Before 2011, electricity was around 30% from nuclear power plant and roughly 60% from thermal power plant. After Fukushima disaster, it seems that Japan decided to reduce using of nuclear power plant, and continued to search/develop alternative one.

b. Korea: still uses nuclear power plants but are trying to reduce them, and also searching some alternative energy such as biomass, solar and hydro-energy.

c. Indonesia: still relies on both oil and coal. Indonesia had a strategic plan to construct the nuclear power plant since 2005, but unrealized due to Fukushima disaster and lack of outstanding engineer (human resources). Since January 2011, Indonesia has been produced methane from coal. Methane that has the new energy resource for electricity at local / suburb society.

d. China: electricity was almost 80% from thermal power plant (oil and coal). 10% from nuclear power plant, and other energy such as solar and hydro-energy. Biomass is the promising energy/technology.

Keyword 2. In case of separating into industry, civil government, transportation, what happens on primary energy composition or electric source composition in each country?

For transportation, the main energy resource is oil, and each country has to make an effort to use oil efficiently. Each country has own policy to distribute the primary energy for each sector, transportation, what happens on primary energy composition or electric source composition in each country? How come such a structure? (Key on policies, geopolitics or economy)

Keyword 3. Existential energy resource (Fossil resource, Atomic power generation, Water power), New energy resource (Biomass, Wind energy, Solar power, Geothermal power) What is merit? Debatable point?

a. Sakurai: existence energy can achieve stable electricity supply, in other words, can control output power much easier than the new energy. Expanding the new energy such as solar and wind energy takes much cost and has a lot of problems. Biomass could be cheaper than the others but still need time to develop the technology. In addition to this, it cannot be expected that biomass become the main alternative energy due to its amount and difficulty of collection.

b. Chen: new energy have to clean and save the carbon resources (renewable energy). Debating point is how to blend the new technology with the present technology.

c. Liping: wind power generator makes the noise (low-frequency sound). Biomass is the promising renewable energy, friendly to environment, and can produce bio-oil by pyrolysis (but still have some problems to use).

d. Kim: fossil fuel makes some pollutants. Biomass is the new friendly energy.

e. Adi Dwiantoro: we still rely on fossil fuels for energy demands. We are living in industry type, all aspects need the energy, especially electricity, but on the other hands, reducing CO2 emission and developing technology are required. Electricity in Indonesia is not stable (sometimes shutdown unexpectedly).

Keyword 4. Atomic power generation should be used?

a. Adi: reducing the nuclear power plant step by step is required, but on the other hands, advanced countries rely on nuclear power. Developing countries are not using nuclear power right now because of the policies and human resources availability.

b. Kim and Sakurai: for better or worse, nuclear power is still required because we need to time to reduce it and to employ alternative one. Nuclear power plant needs plenty amounts of water for cooling. Therefore, nuclear power plant should be built at seaside or watershed. It means that risk for tsunami is also existed even in other country.

Keyword 5. Renewable energy can solve the problem?

In an extremely case, we need the new energy and we hope/ believe that it can solve the problem in each country.