

## REFERENCE: LIST OF RELEVANT IGES PUBLICATIONS

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### **1. The 3rd International Forum for Sustainable Asia and the Pacific (ISAP2011): The Asia-Pacific Multi-stakeholder Dialogue on Rio+20**

- a. Institute for Global Environmental Strategies (IGES). *International Forum for Sustainable Asia and the Pacific (ISAP2011) Chair's Summary*. October 2011.

### **2. Resilient and Sustainable Society**

- a. Bhattacharya, Anindya (2011) *Impact Assessment of No-Nuclear and More Renewable Energy Policies in Japan (Preliminary findings)*, Presentation Paper for 3<sup>rd</sup> International Forum for Sustainable Asia and the Pacific (ISAP) Yokohama, 26<sup>th</sup> July 2011.
- b. Hidefumi Imura (ed.) (2011) *Local Energy Solutions*, Presentation Paper for 3<sup>rd</sup> International Forum for Sustainable Asia and the Pacific (ISAP) Yokohama, 26<sup>th</sup> July 2011.
- c. Hidefumi Katayama (2011) *Getting for Local Energy Solutions after the 3.11 Triple Disaster*, Conference Paper at IGES-YCU Joint Seminar on Low-Carbon and Smart Cities held during 3<sup>rd</sup> International Forum for Sustainable Asia and the Pacific (ISAP) Yokohama, 26<sup>th</sup>-27<sup>th</sup> July 2011.
- d. Hidefumi Katayama (2011) *Low Energy Management* in "UNEP Bridging the Gap Report (Chapter 4) (Draft)."
- e. Scheyvens, Henry, Hideyuki Mori, Shinano Hayashi and Masanori Kobayashi (2011) *Discussion Paper: Building Resilient Societies*, Draft Presentation Paper for 3<sup>rd</sup> International Forum for Sustainable Asia and the Pacific (ISAP) Yokohama, 26<sup>th</sup> July 2011.

### **3. Green Economy**

- a. Kojima, Satoshi, Kei Kabaya, and Takashi Yano. "Green Economy for Sustainable Development: Japan Should lead the policy shift towards global poverty alleviation." *IGES Policy Brief*. Vol. 12. June 2011.
- b. Bhattacharya, Anindya. "Renewable Energy: A Strategic Policy for Sustainable Development." *IGES Policy Brief*. Vol.10. April 2010.

### **4. Institutional Framework for Sustainable Development (IFSD)**

- a. Olsen, Simon Hoiberg and Elder, Mark. "Strengthening international environmental governance by two-phased reform of UNEP: Analysis of benefits and drawbacks." *IGES Policy Report*. Vol. 42. October 2011.

# ISAP 2011 Chair's Summary

**Chair: Prof. Hironori Hamanaka, Chair of the Board of Directors, IGES**

**Day 1 26 July**

## **Morning Session on the Hayama Proposal and Implications of Japan's disasters**

People recognized the importance of thinking about the future energy mix of Japan with new and flexible perspectives after the Fukushima triple disaster. Energy policy and climate policy are different sides of the same coin and we should seek low carbon, high safety, and high energy security – keeping in mind there may be costs to bear for these positive goals. Research institutes such as IGES should play an important role to provide qualitative and quantitative analysis and concrete proposals to contribute to the ongoing discussion on Japan's future courses of action. In this regard, it was urgently called for continued dialogue among stakeholders such as the ones we had at ISAP 2011, learning from the German experience. The future direction of the international regime for climate change mitigation is very unclear. Parties including Japan should make compromises to make the discussion move ahead for our common future. The Hayama Proposal as proposed by the IGES climate change group may stir further discussion inside and outside of Japan.

## **Afternoon Session on Resilient Societies**

A decentralized system for risk reduction, relief, and recovery with differentiated roles under a comprehensive plan was proposed and discussed during this session in which:

- National governments have a facilitating and enabling role
- Local government has the responsibility for decision making and implementation, and for promoting horizontal cooperation and participation of different stakeholders.

It is essential to revitalize decentralized, localized, and self-reliant socio-economic systems which value and support inclusive and meaningful participatory processes as a way to facilitate effective risk

reduction, relief work, and reconstruction on the pathway to a transition towards a resilient and sustainable society. In this regard, the importance of community-based approach was emphasized.

## **Day 2 27 July**

### **Morning Session on Governance for Sustainable Development**

Despite the many challenges we need transformational change in addressing the weaknesses in current governance arrangements.

- Greater attention must be paid to horizontal and vertical integration – genuine and informed multi-stakeholder participation and multi-level integration: the involvement of women and civil society groups, business and local governments at all levels need to influence the outcome of Rio+20.
- Access to information and *meaningful* public participation in policy decision making process to enhance accountability and implementation, possibly through a global or regional convention.
- International and regional organizations need to play a proactive role in engaging with national and sub-national stakeholders, while sub-national stakeholders can take a more proactive role to engage with the national government to promote change.

If we agree that the status quo is not sufficient to address current and future sustainable development problems, then we cannot fear the challenges and consequences of making fundamental changes in the UN charter.

### **Afternoon Session on Green Economy**

The East Japan disasters, including the Fukushima nuclear accident, reveal that the existing social and economic system does not fully account for environmental and social costs. The concept of green economy is important in this context. The session discussed how the implication and definition of a green economy may vary depending on the developmental stage, but sharing the common goal of sustainable development. One of the key discussion points was how green economy can improve the

daily lives of poor people, not only in developing countries but also in developed countries. The importance of technology transfer and application, particularly exploring opportunities between south-south was emphasized, indicating a need for improving education to develop the capabilities necessary for technology transfer and to provide the skills that will sustain green job growth.

## **Conclusion**

In closing Prof. Hamanaka and Mr. Rae Kwon Chung, Director, Environment and Sustainable Development Division of UNESCAP shared their final thoughts for ISAP2011. Prof. Hamanaka recapped the main messages from each plenary session, which he said he hoped would be used towards developing a sustainable and resilient society and promoting green economy in the context of achieving sustainable development and alleviating poverty, bearing in mind the diversity of the Asia-Pacific region. Mr. Chung closed ISAP2011 by offering a reminder of two points – the first challenge is to reach out to convince the other two pillars, the other ministries, the other NGOs, as speaking to the converted is no way to achieve cross-cutting goals. The second challenge is to have more clarity within the environmental policy community as internal disagreements weaken the messages and do little to clarify the misperceptions and understanding about sustainable development. IGES and other institutes need to clarify and educate the national delegates going to Seoul and Rio de Janeiro. That is the challenge of our times, to overcome the knowledge gaps by working together and overcoming our collective challenges to human survival on planet Earth.

# Impact Assessment of No-Nuclear and More Renewable Energy Policies in Japan (Preliminary findings)

Anindya Bhattacharya, Senior Energy Economist, Economy and Environment Group, IGES

July 29, 2011

## Objectives

- ✦ To estimate the impact of reduction and substitution of nuclear energy and increasing use of renewable energy in the electricity supply mix in Japan using bottom-up technology driven energy systems model (TIMES-Japan).
- ✦ The impacts are to be estimated under three main parametric contexts prevailing in the market to evaluate the nuclear energy's acceptance or rejection compared to other technologies:
  - i) Technical feasibility,
  - ii) Cost of supply and
  - iii) Environmental impacts.

## Primary research questions

- ✦ What will be the total system cost?
- ✦ What will be the electricity supply cost in the country?
- ✦ What will be the energy and electricity supply portfolio of the country?
- ✦ What will be the impact on GHG emissions reduction target?

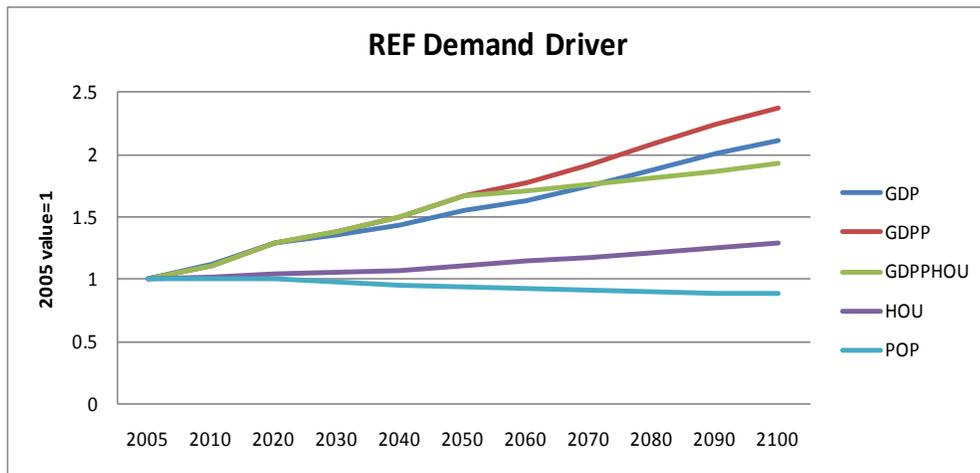
## Scenarios

1. **Reference Energy Scenario (REF):** This is the business as usual scenario with pre-disaster conditions of energy supply and demand.
2. **Fossil Fuel Scenario-Long Run (SFF-LR):** In this scenario a long term nuclear power supply reduction policy has been adopted. Nuclear power supply gradually goes off from the supply mix by 2050 with a three-step reduction target. In addition to that CCS (carbon capture and sequestration) technological intervention is also restricted until 2040 based on its current level of R&D status in Japan.
  - 2020: Nuclear power supply reduces to 13% from 30% at 2009
  - 2030: Nuclear power supply reduces to 5% from 30% at 2009
  - 2050: Nuclear power reduces to 0% from 30% at 2009
3. **Fossil Fuel Scenario-Short Run (SFF-SR):** In this scenario an immediate cut off of all nuclear power supply is considered by 2015.

4. **Renewable Energy Scenario (REN):** In this scenario a moderate renewable energy supply policy is introduced with 15% wind and 25% solar energy supply by 2050 in Japan. Due to various environmental and regulatory obstacles geothermal development is not very prospective in Japan as of now. Therefore, we deliberately restricted the penetration of geothermal in the supply mix only to 10% by 2050.

### Basic assumptions

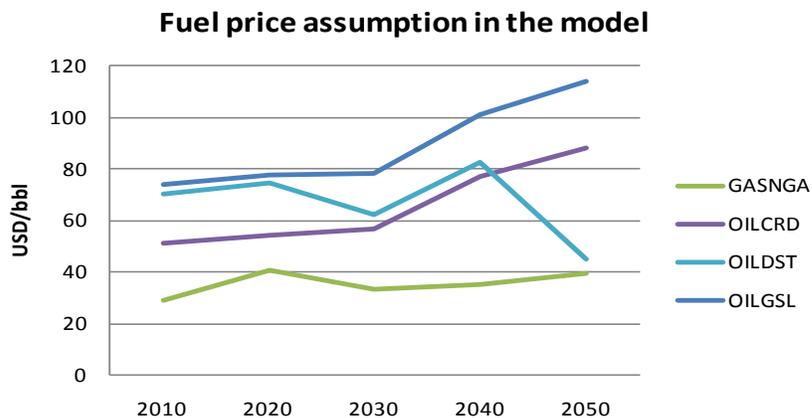
Following are the basic energy service demand drivers in the model to determine the final energy demand.



**Fig.1: Ref case energy service demand drivers**

Note: GDPP: GDP per capita, GDPPHOU: GDP per household, HOU: Number of households, POP: Population

Primary energy prices are also very important for the bottom-up models. The basic assumptions are shown in the figure below:



**Fig.2: Primary fuel prices**

In addition to above mentioned assumptions the model also assumed there is no changes in the final energy service demand in the market due to policy changes. Therefore, the scenarios simulate the steady state conditions of the demand function. As a matter of fact, only supply curve shifts over the constant demand curve to achieve the partial equilibrium conditions for the optimal solutions under different conditions mentioned under three policy scenarios. Work is in progress to also estimate the energy service demand changes due to various policy measures.

The costs of technologies are also very important for this study as they determine the final technological intervention in the system. The following table shows the reference case cost comparison between different nuclear technologies and renewable mainly solar and wind.

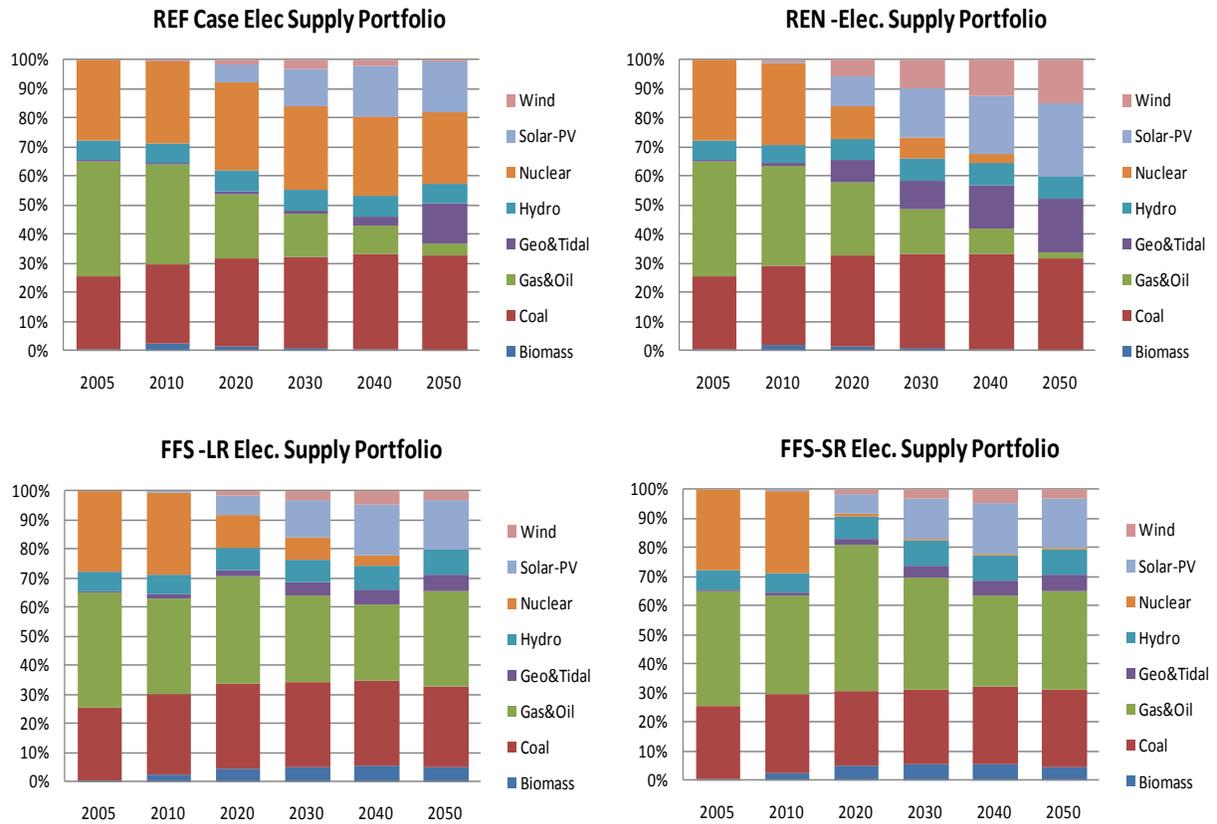
**Table 1: Reference case technology investment cost comparison (selected technologies only)**

Technologies ( USD@2000 /KW)	2003	2004	2005	2008	2010	2018	2023
Advanced Nuclear	2380.00			4200.00			
Nuclear Fusion				4200.00			
Nuclear LWR	2100.00			3705.88			
Solar PV Centralized	9399.18		8354.78	6300.00	4760.00	3133.06	
Solar PV Decentralized	10997.00		9775.08	7371.00	5569.20		3360.14
Wind centralized on-shore		2800.00	1775.40	1775.40			
Wind centralized off-shore			4177.60	3236.80			
Wind decentralized-onshore			1671.60	1662.66			

Source: Data has been drawn from the TIMES Integrated Assessment Model (Version 4.3.3) base data which are primarily collected from IEA and other external sources.

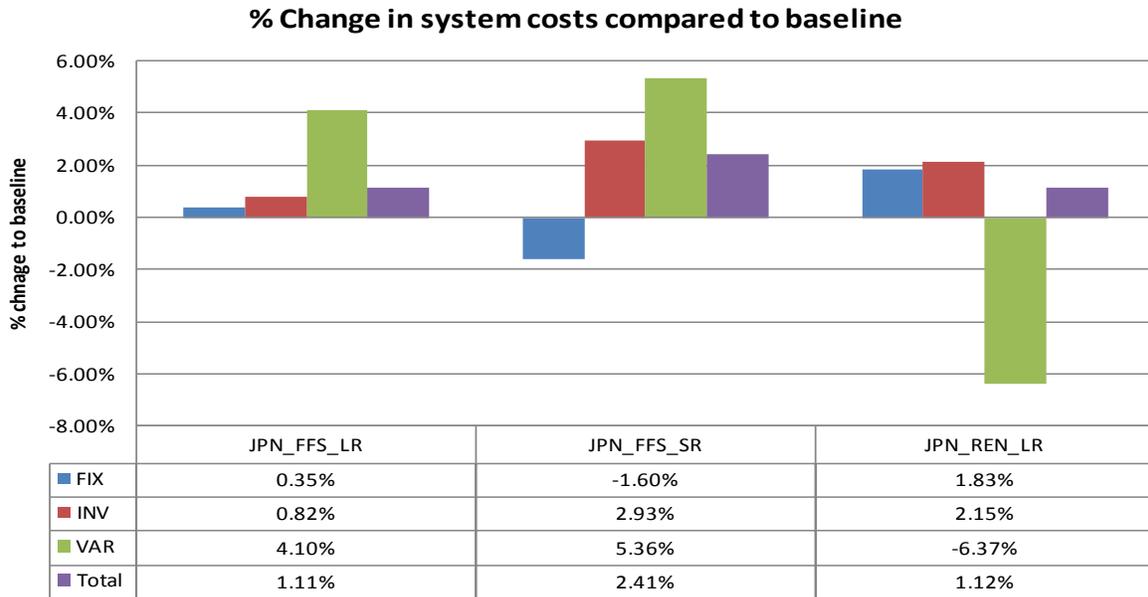
## Preliminary Results

- 1. Impact on overall electricity supply portfolio:** This result indicates that LNG and Natural Gas will be dominating the supply fuel market in Japan especially for electricity production. Coal will still remain as one of the major sources of power in the country under all the scenarios analyzed here unless it is deliberately replaced by other technologies. Geothermal is a potential alternative for nuclear base load supply in Japan. However, it requires plenty of regulatory and environmental policy changes to become viable. High cost due to high labor cost and high land cost in the country may hinder the introduction of the Biomass energy in Japan.



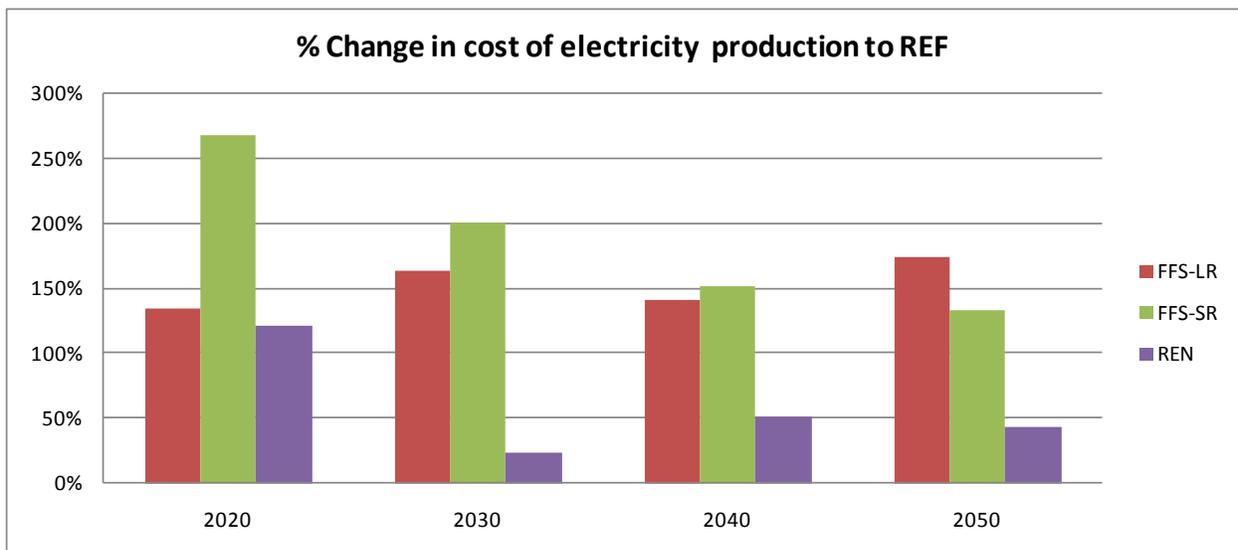
**Fig. 3: Electricity supply portfolio for Japan under different scenarios**

**2. Impact on total energy supply system cost:** This is the net present value of the total cost required to achieve the target set under the scenarios in the system. The discount factor is around 10% which is factored over the total life time of each individual technology in the system. This shows that if Japan goes for immediate replacement of nuclear power supply with other sources the country has to take the maximum burden of energy supply which will be 2.5% higher than the current cost or 225 Billion USD additional cost. Renewable energy scenario is expected to have much lesser financial impact on Japan which is around 105 Billion USD of additional cost compared to the reference condition.



**Fig.4: Changes in system cost under different scenarios**

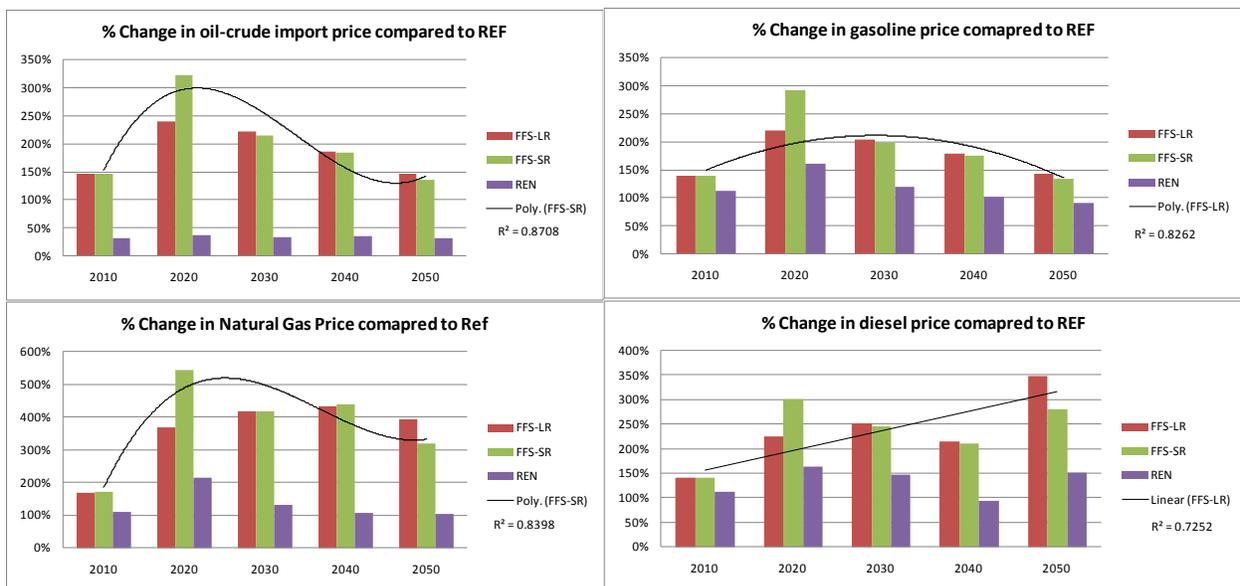
**3. Electricity production cost and retail price in the market:** In this analysis we estimated only the electricity production cost and not the other costs like transmission and distribution, commercial costs etc. However, it is assumed that the majority of the supply cost of power in Japan is the production cost. Given the condition that there is no change in other cost component then % change of the production cost of electricity can be attributed to the % change of the supply costs and retail price of electricity that the consumers are paying. Based on this assumptions we have estimated the following changes in the electricity prices in the market under different scenarios:



**Fig.5: Changes in electricity supply/production cost under different scenarios**

This result indicates that under the fossil fuel based scenario with immediate nuclear energy cut off plan may increase the electricity generation cost and thereafter the supply cost by 250% compared to the current level by 2020. However, it has been estimated that under all the potential alternative scenarios, price escalation is must. But renewable energy option with no nuclear supply beyond 2050 predicts the lowest price escalation until 2050.

The following figure (Fig.6) shows how the market price of different fuels changes compared to the REF scenario in Japan. Oil Crude is also predicted here which shows that 2020 is the most expensive year for Japan under all scenarios except renewable energy. All other fuels show some increasing trend in the mid to long term horizon for Japan as the fossil fuel demands still remain high for the country. Among all fuels, natural gas is expected to have very high price escalation in Japan (around 400%-500%) due to high demand by the power companies.



**Fig.6: Changes in different fuel prices in the market compared to REF scenario**

- 4. GHG emission:** To achieve better CO<sub>2</sub> emissions reduction, Japan needs to have aggressive renewable energy penetration policy in place. Model predicts that under both the fossil fuel scenarios, CO<sub>2</sub> emissions will increase rapidly over the reference scenario. Moreover, faster penetration of renewable energies than REN is necessary to satisfactorily reduce CO<sub>2</sub> emissions until 2040. After 2040 when the percentage of renewable energy supply goes above the fossil fuels, then only the emissions reduction impacts are observed. Therefore, renewable energy supply is one of the key controlling factors of GHG emissions in Japan.

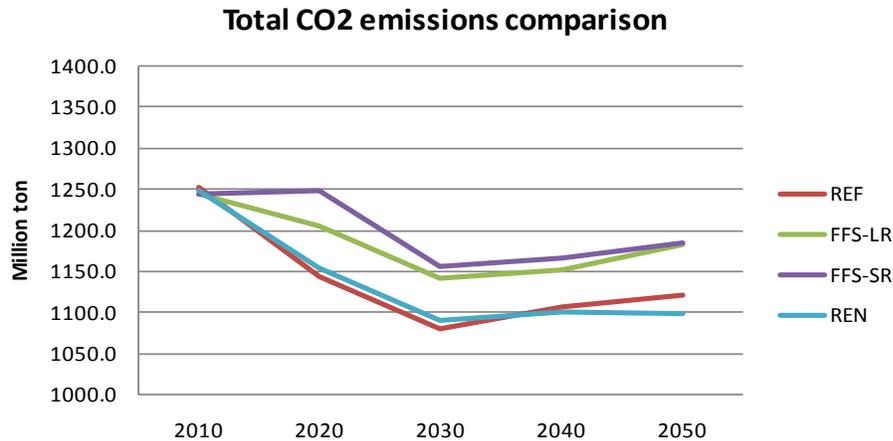


Fig.7: CO<sub>2</sub> emissions under different scenarios

### Preliminary conclusions <sup>1</sup>

- ✦ Japan may go forward with no-nuclear option but the financial burden of system development will be generated. It appears that use of existing facilities to full capacity can reduce the additional investment burden in the short run. Renewable energy scenario is expected to have much lesser financial impact.
- ✦ Japan needs to develop its base load alternatives like geothermal and tidal to substitute nuclear. Solar and Wind appears intermittent compared to nuclear power supply. More aggressive renewable energy policy is required.
- ✦ Retail power price is expected to increase under both the scenarios. Fossil fuel scenarios will increase the crude and gas import burden and subsequent cost of supply.
- ✦ Primary energy prices are expected to shoot-up in the short run due to sudden surge in demand and lack of supply. However, the prices are expected to fall gradually.
- ✦ Japan needs to commercialize its geothermal potential to reduce the environmental impact of non-nuclear supply portfolio. Geothermal and tidal seems to be viable as alternative to massive replacement of base load nuclear power.
- ✦ In the short-run LNG (liquefied natural gas) import increases with increase in NG (natural gas) based power generation. Coal is expected to be dominating the supply under no nuclear scenario at least until 2050.
- ✦ Japan needs to develop the CSP (concentrated solar power) technology for grid connected solar supply enhancement. So far roof-top standalone PV is predominant.

<sup>1</sup> This result and conclusions are preliminary in nature and should be used as indicative figures. Any part of the document should not be quoted without author's permission.

ISAP2011  
Lunch Session, 26 July 2011

## Local Energy Solutions (エネルギー管理における地域の智慧)

[ Moderator ] Prof. Hidefumi Imura 井村秀文

Senior Policy Advisor, IGES / Professor, Yokohama City University

[Speakers]

Mr. Kazuhiko Kobayashi 小林一彦(北九州市)

Executive Director, Office for Environmental Future City Promotion, Environment Bureau, City of Kitakyushu

Mr. Masato Nobutoki 信時正人(横浜市)

Director General, Climate Change Policy Headquarters, City of Yokohama

Mr. Kentaro Yamaguchi 山口健太郎(神奈川県)

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

Mr. Shigeru Inoue 井上 成((株)三菱地所)

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

Mr. Tsunehiko Nakagawa 中川恒彦((株)日産自動車)

General Manager, Planning and Advanced Engineering, Development Division, NISSAN MOTOR CO., LTD.

# Local Energy Solutions: Background and Objective

## 背景とねらい

### Energy, Environment and Economy (エネルギー、環境、経済のトリレンマ)

- How can we resolve the tri-lemma, after Fukushima? (原発事故を受けて)
- Energy: Less dependence upon nuclear energy, More renewable energy
- Environment: De-carbonization, low-carbon cities, low-carbon society
- Economy: Green economy/green innovation, recovery and reconstruction

### Local Energy Solutions: Challenges and Opportunities for Local Communities

#### Good practices and policies (地域発の活路)

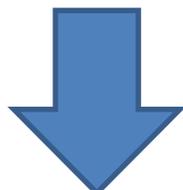
- Low-Carbon, Smart Cities --- Smart grids, smart meters, BEMS, HEMS, CEMS (低炭素都市、スマートシティ、スマートグリッド、・・・)
- Community-based approach: Collaboration among local stakeholders
- Concerted actions with enterprises (especially, SMEs) and households
- Deployment of local energy sources (エネルギーの地産地消)
- Reduction of peak energy consumption during summer (今夏の節電)

### Further Discussions

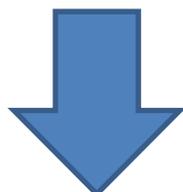
- Short, Medium and Long Term Actions (短期、中期、長期の目標と行動)
- International Transfer of Knowledge and Technology (国際的な視野)

# Local Energy Solutions: Discussion Issues (論点)

Information Sharing about New Ideas and Ongoing Projects and Practices  
情報の共有



Systematic Approach Based on Local Knowledge and Achievement  
地域の発想に基づく体系的取組み



Clearer Visions and Policies  
明快なビジョンと政策

## ■ Finance (資金)

- More Subsidies +
- Mobilization of Private Money

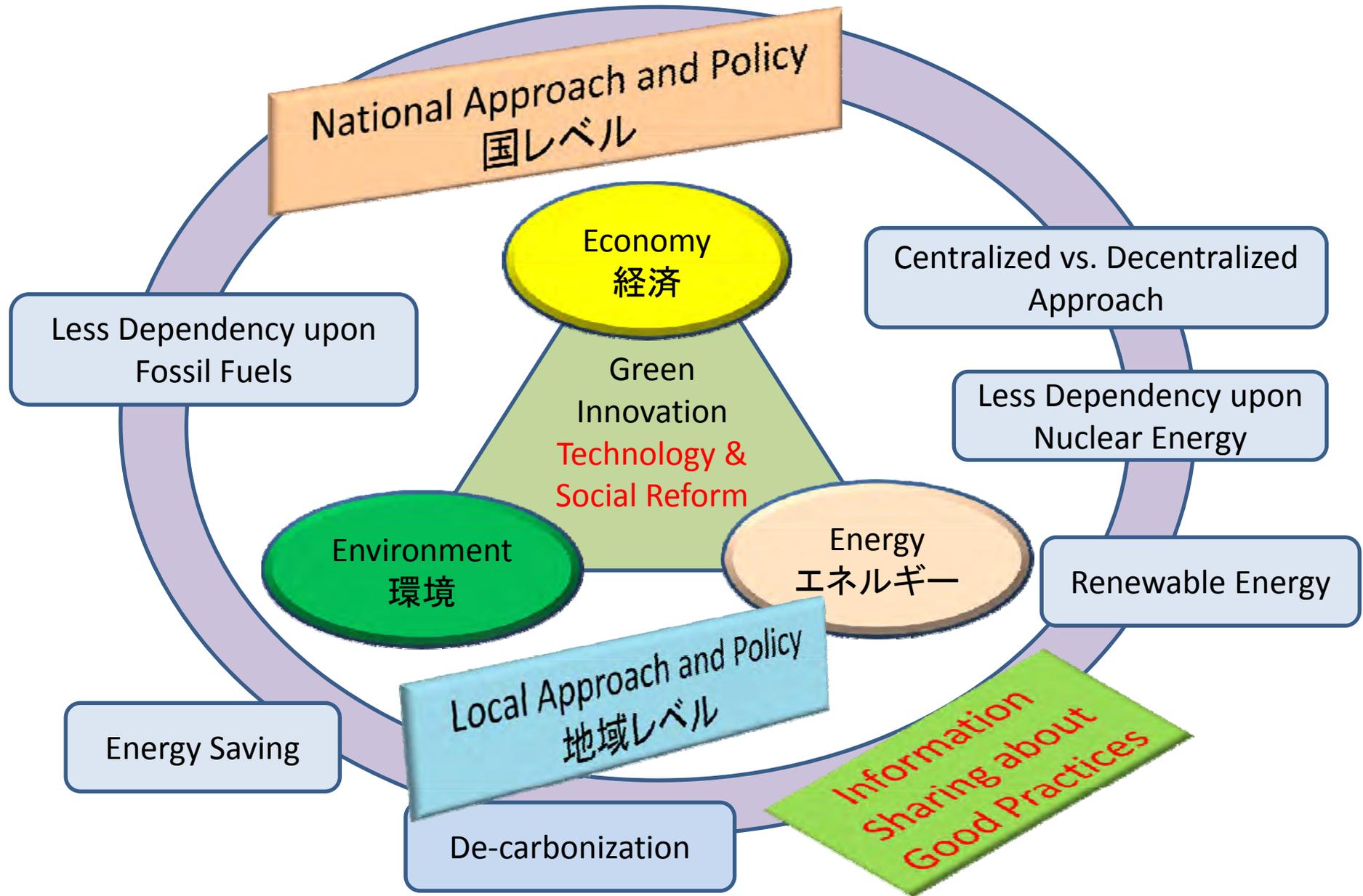
## ■ Institution (制度)

- Barriers and Reform  
障害除去のための改革
- RPS (Renewable Portfolio Standard)  
再生可能エネルギーの買い取り
- Energy Market Reform (Separation of Power Generation and Distribution)  
送発電分離
- TGC (Tradable Green Certificates),  
Renewable Energy Certificates  
グリーン認証制度

## ■ Technology (技術)

- Renewable Energy, New Energy
- Innovation for technical breakthroughs
- Smart grid, EVs, Battery, ---

# Local Energy Solutions



Further Debate Continues to  
IGES-Yokohama City Joint Seminar on Low Carbon and Smart Cities (Part 1)  
IGES-横浜市立大学共同セミナー：低炭素都市・スマートシティ 1

■ Dr. Shobhakar Dhakal:

– Role of Cities in Climate Policy

■ Ms Yoko Maki 牧 葉子(川崎市):

– Carbon Challenge by the City of Kawasaki

■ Dr. Kanako Tanaka 田中加奈子(JST):

– Information Network for Blackout Prevention

■ Dr. Hidefumi Katayama 片山秀史(IGES):

– Life Energy Management Strategies

■ Dr. Leena Srivastava:

– Indian Energy and Environmental Perspectives



## 4 Chapter 4. How to Bridge the Gap? Promising National Policy Options

### 4.1 Introduction [Amit Garg, Kirsten Halsnæs, Helene Ystanes Føyn, Maryna Karavai]

The objective of this chapter is to:

- Alert decision makers about national policies in the largest emitter countries that are already successfully reducing emissions, and build confidence among policy makers about that actions actually are taken in different countries
- To inform decision makers from major emitter countries about promising policies already being implemented in other major emitter countries that might be applicable to their country.

Accompanying this objective, the key question of this chapter is “What specific actions are countries currently taking that successfully are reducing emissions?” These actions may be taken with the specific aim to reduce emissions, or they may be taken because of other policy priorities (e.g. rural development, poverty alleviation, energy security, improved air quality) yet still reduce emissions.

Chapter 1 showed how large a gap there is between the emissions compatible with the 2°C target and the emissions resulting from the pledges made by individual countries. Chapter 2 then showed that theoretically the global gap can be closed based on energy-economic modeling studies. Following this, Chapter 3 showed that some specific sectoral mitigation options as for example related to international shipping and aviation could reduce GHG emissions significantly. Here in Chapter 4, we show that there are many successful policy actions already being taken *nationally* in important emitter countries reflecting various policy goals and climate change that will contribute to closing the Gap. Many of these national actions can inspire similar actions in other countries and could contribute to closing the Gap even faster than what is reflected in the pledges.

The countries covered in this chapter are all major emitters and thus have been given special attention in this report. They have been selected in order to provide a regional and stage-of-development balance; (alphabetic) they are Brazil, Canada, China, the EU as a group, India, Japan, Mexico, Nigeria, Russia, South Africa, South Korea, and the US. These countries/regions together contribute more than 75% of global GHG emissions for CO<sub>2</sub> and also for all GHGs.

The policy areas included in this chapter provide examples of policies that could contribute to significant GHG emission reductions. The policy areas are not comprehensive, but all together they represent significant emission reduction across sectors, where progress has already been made in the countries that are the subsequent focus of the chapter.

According to the IPCC AR4, Mitigation Policies, Summary for Policymakers (IPCC, 2007), implementation of mitigation options in the sectors listed in Box 1 could supply GHG emission reduction in 2030 of about 25 GtCO<sub>2</sub> eq. for a cost below USD 100 per tonnes of CO<sub>2</sub>.

Energy Supply	Fuel switching Improved supply and distribution efficiency Nuclear power CCS Combined heat and power District heating Hydropower Wind Geothermal Solar Bioenergy
Transport	More efficient vehicles Hybrid vehicles Electric vehicles Biofuels Modal shifts Land use and transport planning
Buildings	Efficient lighting Efficient appliances Improved insulation Solar heating
Industry	Efficient end-use electrical equipment Efficient and cleaner process energy Efficient motors Material recycling
Agriculture	Improved crop and land management Improved manure management Improved fertilizer management Bioenergy production
Waste Management	Landfill methane recovery Composting of organic waste Waste incineration Recycling and waste minimization
Forestry	

The policies and measures that are presented in this chapter based on country examples are intended to represent a balance between sectors and between regulatory options and economic instruments, such as renewable energy projects and support schemes, energy efficiency standards, fuel subsidy removal, fuel switching, enhanced R&D, energy taxes, carbon taxes etc.

For each country, a broad description of policies and measures being implemented is provided first, followed by a focused discussion on one or two successful policies. National circumstances, including institutional arrangements, affect success level of these policies and measures. It is not possible for all these policies and countries to provide estimates for the concrete potential mitigation from the policies, but where estimates have been made, these are presented. The focus

of this chapter is to demonstrate that specific policies exist across the world that are contributing to GHG mitigation and that these could inspire actions in other countries. For instance, the recent Perform, Achieve and Trade initiatives in India for industrial sector energy efficiency enhancement derive from similar systems in Canada and the EU. Similarly, renewable energy programmes around the world supported by soft loans, feed-in tariffs, and green certificates have been around the world, and experiences in applying these instruments are assessed. Finally, economic instruments like subsidy removal on fossil fuels and energy (and/or carbon) taxation are practiced in several countries, and the chapter presents some initial results.

In the following, each of the 12 countries are presented separately, with an overview of the national situation followed by a specific discussion of one or two successful policies. The chapter is wrapped up by drawing conclusions on cross-cutting issues, based on the individual country sections, which may provide examples for other countries mitigation efforts.

## **4.2 Brazil [Emilio La Rovere]**

In 2005 Brazil's total GHG emissions were 2,203 Mt CO<sub>2</sub>eq, up 62% from 1990 (Brazil MCT, 2004, 2010). The main source of GHG emissions is deforestation caused by the expansion of agricultural frontiers. Agriculture and husbandry are key sectors of Brazilian economy, and they rank second as main GHG emission sources. The energy sector only comes in third as GHG emitter, thanks to the role played by hydropower and renewable biomass allowing for a 45 % share of renewables in the country's total energy supply.

Brazil has already been making a lot of efforts to limit its GHG emissions, including the curbing of Amazon deforestation and an important investment on renewables. The National Climate Change Policy Law (Federal Law n° 12187) approved by the Congress and sanctioned by the President on 29 December 2009 (Government of Brazil, 2009) included the voluntary goals to limit the country's GHG emissions presented at COP15 in Copenhagen. On 9 December 2010, during COP16 in Cancún, Brazilian government published Federal Decree n° 7390 (Government of Brazil, 2010), regulating the articles of Law n° 12187 regarding the final figures of the voluntary goals for the amount of avoided GHG emissions in 2020

### **4.2.1 Successful mitigation policies and measures under implementation**

In the last five years, the Brazilian government has achieved substantial success with policies to curbing deforestation, and was able to sharply decrease the deforested area per year and the corresponding CO<sub>2</sub> emissions. A strong political will is required to keep all the governmental institutions mobilized in operation to constantly verify the respect of the law. The recent record has shown the viability of a successful performance in this field, as deforestation in the Amazon was limited to 1.2 M ha in 2007 and 0.7 Mha in 2008, down from an average of 1.95 M ha / year in the period 1996-2005. Assuming the average biomass density used to project the BAU emissions in 2020 this decrease in the Amazon deforestation rate has allowed for avoided emissions of 363 Mt CO<sub>2</sub> in 2007 and 605 Mt CO<sub>2</sub> in 2008. The Brazilian voluntary goal for

2020 is a reduction in 80% of the annual deforestation surface in the Amazon, meaning an estimated reduction of 758 Mt CO<sub>2</sub> /y compared to a baseline of constant emissions at the level of the 1996-2005 average.

Furthermore, the government is making a huge effort to build hydropower plants, through the involvement of governmental utilities and substantial public funding to reduce the risks associated with these projects. The government is also supporting the expansion of ethanol production (providing funding to new production capacity) and use (mandated 20/25% blend of ethanol in gasoline, and fiscal exemptions for flex fuel cars using E20 to E100 blends), though its main driving force is a private sector encouraged by high international oil prices and good prospects for exporting ethanol (and sugar). It is estimated that the Ethanol Plan alone has avoided around 740 M t CO<sub>2</sub> since its launch in 1975 up to 2010. Other mitigation actions included were the production and use of biodiesel in a 5% blend with diesel oil for 2020 (B5) and the increase in power generation from other renewable sources: small hydropower plants, biomass (especially sugarcane bagasse) and wind energy. The avoided emissions in 2020 are estimated at 234 M t CO<sub>2</sub> /y.

The goal set for the agriculture sector is very ambitious, considering the recent growth of the country's grains and meat exports. However, economically feasible mitigation alternatives already exist and have a great potential: recovery of degraded pasture land; agroforestry schemes; more intensive cattle raising activities (given the current low average ratio of less than 1 head per hectare); biologic nitrogen fixation and low tillage techniques, which already cover more than 20 million hectares in the country and are rapidly spreading.

#### 4.3 Canada [Matthew Bramley]

Canada's greenhouse gas (GHG) emissions in 2009 were 690 megatonnes of carbon dioxide equivalent (Mt CO<sub>2</sub>e), 17 percent above the 1990 level (Canada. Environment Canada, 2011b, 19).<sup>1</sup> In 2008 oil and gas production accounted for 22 percent of emissions, electricity generation 16 percent, other industrial facilities 15 percent, cars and light trucks 12 percent, buildings 11 percent, agriculture 10 percent, and heavy trucks (on-road) 6 percent (Canada. Environment Canada, 2010, 89). Canada's level of GHG emissions per capita is one of the highest among developed countries (*Climate Analysis Indicators Tool (CAIT) Version 8.0, 2011*).

Federal measures to limit GHG emissions have been limited to date, relative to Canada's total emissions. The federal government expects its current measures to reduce annual emissions by 9 Mt CO<sub>2</sub>e relative to a business-as-usual (BAU) level in 2012 (Canada. Environment Canada, 2011a, 37), and by 32 Mt relative to BAU in 2020 (National Round Table on the Environment and the Economy (Canada), 2011, 39). To meet the target to which it has committed internationally, Canada must reduce its annual emissions to 243 Mt below BAU in 2020 (Ibid.).

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<sup>1</sup> These numbers exclude emissions from land-use, land-use change and forestry.

Of the federal measures implemented to date, the most significant include regulated energy efficiency standards for equipment, GHG tailpipe standards for cars and light trucks, and a commitment to invest in four industrial-scale projects to capture and store CO<sub>2</sub> (Bramley, 2010). There are indications that the latter two measures will have a smaller impact on emissions than has been reported.<sup>2</sup>

Canada's provincial governments also play a major role in climate and energy policy. We describe below two provincial government measures that are arguably the most significant examples of government efforts to limit GHGs taken to date in Canada.

#### 4.3.1 Phase out of coal-fired electricity in Ontario

The Government of Ontario is phasing out all coal-fired electricity generation in the province, which is home to nearly 40 percent of Canada's population. Coal-fired generation reached a peak in the year 2000, when it accounted for 27 percent of the output of Ontario's electricity generation sector, and 36 Mt out of the sector's total emissions of 41 Mt CO<sub>2</sub>e (Canada. Environment Canada, 2008b, 513). In 2001, the government adopted a regulation to close the Lakeview generating station, which entered into service in the 1960s, by April 30, 2005 (Government of Ontario, Canada, 2001). In 2007, the government adopted a regulation to close the other four coal-fired stations, which entered into service between 1970 and 1985, by December 31, 2014 (Government of Ontario, Canada, 2007).

Coal-fired power is being replaced by a mix of gas-fired, wind, other renewable and nuclear power, as well as by reduced demand (Ontario Power Authority, 2011, 3-5). The government has undertaken a series of electricity procurement and conservation programs to shape the future electricity mix and demand (Ibid.). Notable among these are feed-in tariffs for renewable power (see Ontario Power Authority, no date) enabled by the province's *Green Energy and Green Economy Act*, which entered into force in 2009 (Ontario Ministry of Energy, no date).

In 2015, once Ontario's coal phase out is complete, annual GHG emissions from electricity generation in the province will be about 15 Mt CO<sub>2</sub>e (Canada. Environment Canada, 2008a, 19). The phase out can therefore be estimated to have reduced annual GHG emissions by about 25 Mt. Reduction in smog-forming pollutants was an important motivation for the phase out (see, e.g., (Canada. Office of the Premier, 2005)).

#### 4.3.2 Carbon tax in British Columbia

The Government of British Columbia (B.C.) levies a tax on the carbon content of virtually all fossil fuels burned in the province (Government of British Columbia, Canada, 2008a, parts 3 and 4). The tax puts a price on about 73 percent of the province's CO<sub>2</sub>e emissions (Horne, 2010, 3). It began in July 2008 at \$10/tonne CO<sub>2</sub>e, and will reach \$30/tonne in July 2012; the government

<sup>2</sup> For the tailpipe standards, see (Bramley & Partington, 2010). Most of the emission reductions from the investments in carbon capture and storage are expected to be rewarded by offset credits that will allow higher emissions from other industrial operations under Alberta's *Specified Gas Emitters Regulation*.

has not yet determined the tax rate for July 2013 onwards (Government of British Columbia, Canada, 2008a, Schedule 1). The government is legally required to return all tax revenues into the economy in the form of reductions in other taxes or fees (Government of British Columbia, Canada, 2008a, Part 2). Currently a little less than one-half of carbon tax revenues is being returned to individuals (with special provision for those on low incomes) while the remainder is being returned to corporations (British Columbia Ministry of Finance, 2011, 45).

Based on modelling, the B.C. carbon tax is expected to reduce annual emissions in 2020 by up to 3 Mt CO<sub>2</sub>e relative to a scenario without the tax (Government of British Columbia, 2008b, 20). However, since the tax is relatively new, real-world evidence for its success in redirecting investments to lower-emitting activities remains anecdotal. The tax initially faced considerable political and public opposition, but 74 percent of residents now feel it has had positive or neutral consequences for B.C. (Horne, 2011, 3)

No other jurisdictions in North America are currently expected to implement a carbon tax comparable to that of B.C. However, in the jurisdictions that are considering implementing cap-and-trade systems for GHGs, B.C.'s tax could be influential in demonstrating that a significant price on emissions is economically feasible.

#### **4.3.3 Lessons learned**

Ontario's coal phase-out and B.C.'s carbon tax span the full spectrum of GHG policy approaches — from government direction of the energy system, to pure emissions pricing. The two examples demonstrate that both ends of the spectrum can be politically feasible in North America. Support for the coal phase-out was enhanced by the reduction in smog-forming pollutants. And although taxes are generally unpopular, the carbon tax became broadly accepted with the passage of time.

#### **4.4 China [Jiahua Pan and Zhu Xianli]**

China's three decades of rapid economic development were accompanied by fast increases in the country's energy consumption. Around 70% of China's primary energy was from coal, leading to serious air and water pollution and making China the biggest GHG emitter in the world. The Chinese government has taken a lot of measures to improve energy efficiency and promote the development of energy from renewable sources, mainly because of environmental and energy security concerns. Since 2006, reducing the energy intensity has been included as a binding target in the country's five-year and annual development plans. From 2006 to 2010, China successfully lowered its energy intensity by 19.1% (China. NDRC and CNSB, 2011).

##### **4.4.1 Energy efficiency improvement in energy intensive industrial sectors**

Industry contributes to around half of China's GDP and two thirds of China's primary energy consumption (China CNSB, 2010). Energy intensive industries alone account for around half of the country's total energy consumption. Especially since 2002, the rapid growth of such energy intensive sectors has led to robust energy consumption growth. In the 5 years till 2010, China has

reversed this trend. From 2006 to 2010, the overall energy intensity of industry sector fell 25%, with even faster improvement in some energy intensive industries.

These reductions have been achieved through specific and clear target setting by the government in its Five-year development plan. Based on these targets, annual energy efficiency benchmarks are set that are tightened gradually. Various financial and fiscal incentives are provided to encourage and ensure energy efficiency improvement. For example, during 2006-2010, China charged higher electricity prices for enterprises from energy intensive sectors using technologies listed in the elimination or restriction catalogue based on energy efficiency performances. Higher tax rates and interest rates for bank loans were also used as instruments to discourage the operation of enterprises using such technologies. The government also offers subsidies and grants to encourage energy efficiency improvement.

China has established energy efficiency benchmarks for key products/processes of its iron and steel, non-ferrous metal, building material, and chemical industries. Enterprises are requested to meet these benchmarks and their performance is subject to strict monitoring and supervision. Local governments can force enterprises failing to meet the benchmarks for immediate production suspension and energy efficiency renovation. Enterprises that are beyond renovation or cannot meet the benchmark even after such renovations will be included in the list of forced closure. Deadlines are set for enterprises to replace their machinery and electrical equipment that are in the banning list for low-energy efficiency. One powerful measure is mandatory closure of production capacity that are of out-of-date technologies before the end of their operation life.

Supplementary measures, including helping the workers losing their jobs in the forced closure find new jobs and offering them employment benefits pave the way for such closures. The extreme measures taken by the government authorities at different levels to achieve the targets, in some cases shutting down power supply, make enterprises believe that the government is serious about the achieving the targets and increase the compliance rate. China is continuing these effective policies and measures in its current five year period (2011-2015).

#### 4.4.2 Wind Energy

China also has very effective policies and measures for promoting renewable energy, especially related to wind energy and technology development. China has the biggest installed capacity of wind energy in the world (REN 21, 2011). Total wind power capacity in 2010, 44.7 GW, is much higher than the 30 GW by 2020 target set in 2006. Moreover, China has also become a main producer of wind power equipment. About 90% of the newly added wind generating capacity in China is from Chinese made wind turbines made (China Wind Energy Association, 2011).

The government policies and measures that have lead to this success include: (1) Favorable legislation: The *China Renewable Energy Law* from 2006 laid the foundation of renewable energy development, stipulating that renewable energy projects can get preferential tariff and taxation treatment, grid companies have to buy all the electricity generated from renewable

sources, and the extra costs of renewable energy compared to electricity from coal shall be covered by the electricity price. (2) Long-term policy signal: the government sets clear capacity targets for wind and other renewables by 2020, and these long-term targets are further specified in the country's five-year development plans. (3) Subsidies and grants to local enterprises for technology progress, pilot wind projects, as well as electricity from wind. (4) Encourage foreign wind turbine makers to set up joint ventures in China, set up local production facilities, and buy from local suppliers.

2006-2010 marks the beginning of a new period of more emphasis on energy efficiency improvement and renewable energy development in China. The Chinese National Development and Reform Commission estimated that the various measures led to a total energy saving of 441 MtOe and avoided 1.46 billion tones of CO<sub>2</sub> emissions (China NDRC, 2011). The government is continuing these policies and in preparation to introducing new ones, like carbon trading, to achieve its pledge of 40-45% reduction in emission intensity by 2020 compared to 2005.

#### 4.5 The European Union [Catherine Mitchell]

The European Union (EU) is made up of 27 countries, known as the EU-27. Total GHG emissions fell by 17.4% in the EU-27 between 1990 and 2009 from 5,588.8 mt CO<sub>2</sub>e to 4,614.5 mt CO<sub>2</sub>e (EEA, 2011), well within the Kyoto requirements for the EU to reduce GHG by 8% below 1990 levels by 2008-12. The overall EU GHG trend is dominated by the two largest emitters, Germany and the United Kingdom. Of the EU-27 emissions, the most important sector is energy accounting for 79.3% in 2009 [2<sup>nd</sup> largest is agriculture with 10.3% and 3<sup>rd</sup> is industrial processes with 7%].

The overarching EU climate and energy package is the so-called 20-20-20 targets, agreed in June 2009. This is a reduction of EU GHG emissions of at least 20% by 2020 from 1990 levels; 20% of energy consumption to come from renewable resources by 2020; and a 20% reduction in primary energy use compared to projected levels to be achieved by improving energy efficiency by 2020. At its core are four pieces of complementary legislation: a revision and strengthening of the EU-Emission Trading Scheme (see below); an 'Effort Sharing Decision' governing emissions not covered by EU-ETS; binding RE energy targets [effectively doubling the 2006 9.6% to 20% by 2020; a legal framework to promote safe Carbon Capture and Storage (REF)].

While it increases pressure on energy efficiency (via the EU's Energy Efficiency Action Plan which includes all EE policies, such as market transformation, product and building regulations etc), it does not promote it by binding legislation. A research, development and demonstration (R,D and D) Framework Programme (FP), started in 1992 and now on its 7<sup>th</sup>FP, of X billion euro's (REF) to complement the wider greenhouse gas and energy goals. Furthermore, the EU has implemented a European Economic Recovery Programme which allocates around 1bn€ to CCS demonstration and €565 to offshore wind demonstration (European Commission Energy, no date; UN General Assembly, 2011). Although the EU is able to implement these legally binding mechanisms, and is one entity within the Kyoto agreement, it is the responsibility, and

choice, of the individual Member States as to how they implement the RE and energy efficiency (EE) policies to meet those requirements.

#### 4.5.1 Climate Policies

The EU Emission Trading Scheme (EU-ETS) is the cornerstone of the EU’s policies to combat CC and its key tool for reducing industrial green house gas emissions. It is the largest cap and trading scheme for greenhouse gas emission allowances, covering 11,000 power stations, industrial plants such as cement, glass, lime, bricks, pulp etc, oil refineries, iron and steel works in 30 countries (the 27 EU MS plus Iceland, Lichtenstein and Norway). This accounts for almost half the EU’s CO2 emissions and 40% of total GHG emissions. The EUETS can be characterized by the increasing tightening of its caps; reach (for example, airlines will join the scheme in 2012, and it will be expanded to include petrochemicals, ammonia, aluminium in 2013 when the 3<sup>rd</sup> trading phase begins) and data requirements.

#### 4.5.2 Renewable Energy Policies

Given the 27 countries, it is no surprise that the EU has many different RE policies, for electricity, heat and transport. These divide between deployment policies which can be fiscal incentives, public finance and regulations. The majority of those are for renewable electricity and are set out in Table 1. These divide between quantity driven or price driven payments. Of the former, the most usual is a Quota Obligation (where a party is obliged to procure a certain amount of energy by a certain time) or a Tender (where, usually, public authorities organize a tender for a certain amount of energy). Of the latter, the key mechanisms are the Feed in Tariffs (FIT, which guarantees RE supplies with priority access to the grid and dispatch, and sets a fixed payment per unit of energy delivered for a fixed amount of years, varying by technology); and Feed in Premiums (FIP, which guarantees an additional payment on top of market price).

Table 2: Major RES support strategies currently applied in the EU

		Number of Member States currently applying the scheme		
		RES-E	RES-H	RES-T
1.	Feed-in tariffs	21	-	-
2.	Feed-in premiums	6	-	-
3.	Quota obligations	6	3	20
4.	Tenders	4	-	-
5.	Investment grants	10	23	-
6.	Tax incentives and exemptions	10	10	24
7.	Financing support (loans, etc.)	7	5	-

Source: own illustration, with information from de Jager et al. 2011, p.27-34 and Ragwitz et al. 2011

The way that countries support RE has changed overtime in the EU. For example, France began with a Tender but now also has a FIT for small generators. The reasons for choice, and effectiveness, of a Quota versus a Price driven mechanism has been widely examined (Held et al,

2010; Haas et al, 2011; de Jager et al, 2010; Kitzing, L, 2011; Ragwitz et al, 2010; Ragwitz et al, 2011). These studies have concluded that some FITS have been more effective and efficient at promoting RE electricity than Quotas, mainly due to the combination of long-term fixed price or premium payments, network connections, and guaranteed purchase of all RE electricity generated. Quota policies can be effective and efficient if designed to reduce risk; for example, with long-term contracts (Edenhofer *et al.*, 2011).

#### 4.6 India [Joyashree Roy and Amit Garg]

Latest estimates (India. INCCA, 2010) show in 2007 India's GHG emissions with LULUCF were 1727.71 million tons of CO<sub>2</sub>eq of which Energy, Industry, Agriculture, and Waste sectors constitute 58%, 22%, 17% and 3% of the net CO<sub>2</sub>eq emissions respectively, with 1.5 tons/capita.

India's "clean energy levy" in operation from July 2010 - taxing both coal produced in and imported into India- at a level of 50 Rupees per ton is expected to raise some \$677 million (Norton Rose, 2011) in its first year, all of which will be used for reducing emissions and establish a National Clean Energy Fund. India publishes GHG inventory every two year to help measure, model, implement and monitor many targeted policies. Promotion of non conventional energy sources and technologies have delivered (Garg A need reference pl)total savings of 89.47 MT within a decade (1990-2000).

##### 4.6.1 Industry

Industry sector energy intensity declined by almost 40% (Roy, 2007) in 1990-2000. Many industries install specific pollution abatement, energy saving and renewable energy devices as they qualify for 35-100% depreciation allowances. Customs duty rebates exist such as reduction from 15% to 5% on components of membrane cell technology used in caustic soda industry, exemption on imports of equipment, machinery and capital goods for making products using fly-ash and phospho-gypsum etc. Fly-ash usage also attracts excise duty exemption. Fuel switch has been encouraged through several national soft loan schemes on installing solar water heating and lighting and wind energy systems. There are provincial incentives as well e.g., Rs. 0.25 rebate per unit of its electricity consumption in Karnataka state on installation of solar systems.

Since 2006, the Bureau of Energy Efficiency (BEE) has required and provided incentives to industries for undertaking Specific Energy Consumption audit and report the results. The information is used to determine specified efficiency enhancement target for proposed Perform, Achieve and Trade (PAT) scheme. It is a type of sectoral approach and like EUETS (Roy, 2010) but Energy Saving certificates (ESCerts) will be traded against a market price. PAT is predicted to accelerate improvements in energy efficiency and reduce CO<sub>2</sub> emissions by 25 million tonnes per year by 2014-15 relative to business-as-usual (India. INCCA, 2010). This is approximately 1.4% of India's projected total annual CO<sub>2</sub> emissions in 2015.

#### 4.6.2 Forest

Forestry legislations and policies in India aimed at conservation and sustainable management of forests have transformed India's forests into a significant net sink of CO<sub>2</sub>. From 1995 to 2005 carbon stocks stored in forests and trees have increased from 6,245 mt to 6,662 mt, registering an annual increment of 38 mt of carbon or 138 mt of CO<sub>2</sub>eq (India MOEF, 2009). The National Mission on Green India has the objectives of doubling the area under afforestation/eco-restoration in the next 10 years, and increase GHG removals by forests to 6.35% of India's annual GHG emissions by 2020 (increase of 1.5% over baseline).

#### 4.6.3 Buildings

Construction sector growth rate expected to be more than 20% annually by 2014 is implementing material, water and energy efficiency through mandatory building bye laws and standards (ECBC norm 2009). The Indian Green Building Council (IGBC), part of Confederation of Indian Industry (CII) has created in last ten years 844.39 million sqft green building footprint which can be said to have been successful in avoiding 5391.725 thousand tons of CO<sub>2</sub> emissions. CDM based CFL programme implementation in residential sector of various states under BLY project that lower the price at consumer end to Rs 15 (US\$ 0.33) instead of the current market price of Rs 100 (US \$ 2.10) avoids emission of 40 million tonnes of CO<sub>2</sub>.

#### 4.7 Japan [Kanakano Tanaka and Hidefumi Katayama]

Japanese GHG emissions excluding LULUCF in FY2009 were 1209 million tons-CO<sub>2</sub>, representing a decrease by 4% from base year<sup>3</sup> under the Kyoto Protocol. CO<sub>2</sub> emissions from fuel combustion accounted for 94% of the total CO<sub>2</sub> emissions. (GIO *et al.*, 2011)

Major emitters, industry and energy conversion sectors have set up their plans to reduce CO<sub>2</sub> emissions, e.g. Voluntary Action Plan formulated by Japan Business Federation (Keidanren) on their own initiatives. These plans now cover 83% of the emissions from the industrial and energy conversion sectors, and around 44% of those from all sectors. (Government of Japan, 2010) The policy challenge of energy management is also noteworthy. Japan has been implementing the Energy Conservation Act since 1970s. It has originally started after oil-shock, mainly for reduction of energy use at industry process to improve energy efficiency. The law includes energy management regulation, which requires industry to monitor their energy use and report it to the government their energy use, and to meet the energy use reduction target, e.g. annual 1% improvement of energy consumption per unit of production. For the private sector, the cost, i.e. energy price in case of Japan, is the main priority. The regulation has helped the industry to self-check their internal energy use to reduce the energy cost. Through those measures, CO<sub>2</sub> emissions of industry participating the Action Plan in FY2009 decreased by 16.8% compared to FY1990. Reductions in CO<sub>2</sub> emissions per unit of production and per energy respectively contributed to decreases of 13.2% and 1.4% in CO<sub>2</sub> emissions. (Keidanren, 2010)

<sup>3</sup> 1990 for CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O; and 1995 for HFCs, PFCs, SF<sub>6</sub>.

The regulation was occasionally modified in order to strengthen the regulatory scope. The last amendment in 2008 was to shift its legal system from a factory/workplace basis to a comprehensive energy management on an enterprise basis--- includes not only factory for manufacturing but also office, logistic system in an industrial entity. (Government of Japan, 2010)

Another big policy challenge in Japan, which addresses the mitigation at residential sector, is a Top-runner standard for the electricity appliances since FY1998 under the Energy Conservation Act. The concept of the Top-runner system is to make the level of energy efficiency standards of each appliance and automobile better than that of the most energy efficient product among those commercialized products. 23 appliances are verified with this top-runner program at present. The weighted harmonic average of energy efficiency of subjected appliances have been improved and expected by: 68% from FY1997 to FY2004 for air conditioners; 55% for electric refrigerators from FY1998 to FY2004; 30% for televisions from FY2004 to FY2008; and 23% for passenger vehicles from FY1995 to FY2005. (Japan. METI, 2011) By providing necessary information such as Energy-Saving Labels, consumers are encouraged to select energy efficient products. High energy efficiency appliances are competitive in market and disclosure of energy efficiency ranking works well as incentives for manufacturers to develop higher efficient products. In order to motivate the retailers to promote distribution and appropriately control sales of energy efficient products, the retailer-awards program has been implemented. In addition, there was a financial incentive for consumers, Eco-Points scheme, which is one of the subsidy programs to boost purchasing highly energy efficient products. (Japan. METI, 2010)

Accordingly, the Japanese mitigation effort has been focused at CO<sub>2</sub> reductions associated with electricity and fuel use, at industrial, residential, and commercial sectors. The main points are: industry's low cost and small but continual efforts on energy efficiency improvement; mandatory scheme for monitoring and reporting and extension of policy scope of energy management regulations for industry; and energy efficiency standards for appliances which contributed technology push-up, increasing market values of energy efficient products and accelerating investment recovery.

#### **4.8 Mexico [Carlos Mena and Adriana Lobo]**

Mexico is not a great contributor to global GHG emissions (4% of world emissions) but its emissions are growing, and it is a very vulnerable country to the effects of climate change. The government considers this is a threat but also as an opportunity to promote the sustainable development of the country. In order to confront this challenge the Special Climate Change Program (Mexico. Inter-Ministerial Climate Change Commission, 2009) was developed. Most of the mitigation strategies of this plan entail multiple co-benefits such as cleaner and more efficient production, improved air quality, increased energy security, and preservation of natural resources. Two examples of successful GHG mitigation actions are:

**4.8.1 Wind power generation**

One important strategy to reduce GHG emissions in Mexico is to increase the use of wind energy taking advantage of the outstanding resources in the Tehuantepec. The Mexican Government has given an unprecedented impulse to this resource. The Energy Ministry and the Energy Regulatory Commission have designed an innovative framework to systematically address a number of financial and regulatory barriers that inhibited its development. To address the initial perception that wind energy was not economically viable, a small feed-in tariff determined through a competitive bidding process was introduced. The lack of fiscal incentives was addressed by modifying the Tax Law to allow wind power investments to be deducted in a single year. The lack of transmission capacity from the Isthmus of Tehuantepec was solved by implementing a bidding process to get firm commitments from private generators to pay for new transmission lines (Barnés, 2011).

This program has been very successful; wind power installed capacity in Mexico that in 2007 was just 2MW, in 2011 is already 880 MW and there are 350 MW more under construction. There is now a thriving wind energy industry largely driven by private companies in Mexico, they have projects to install 5,500 MW additional wind power capacity.

**4.8.2 Bus rapid transit systems (BRT's)**

In the last decade, four Bus Rapid Transit Systems have been successfully developed and implemented in Mexico, contributing significantly to improve public transportation and bringing significant co-benefits for people and the environment.

System	Location	Size (km)	Passengers/day
METROBUS	Distrito Federal	67	620,000
OPTIBUS	León , Guanajuato	31	700,000
MACROBUS	Guadalajara, Jalisco	16	125,000
MEXIBUS	Estado de México	15	130,000

These systems aimed mainly to reduce congestion and improve public transportation, have brought significant co-benefits. There are many advantages of this systems compared to regular on-street bus services, they reduce travel time and accidents, are more reliable and reduce fuel consumption and air pollution. They also reduce GHG emissions; the system operating now in Mexico City (METROBUS) eliminates 100,000 Tons of CO<sub>2</sub>e emissions per year compared with what would have been emitted in the absence of the system. These systems have replaced both old polluting buses and transportation by private cars.

Sustainable public transport in Mexico is thriving, every day more middle size cities know about its advantages and decide to adopt them. The Mexican government has created the Public Transportation Federal Support Program that offers grants to local governments to cover up to 100% of studies and 50% of infrastructure costs for public transportation projects that meet

certain criteria. There are already 16 BRT projects for other cities in Mexico (CTS-Mexico, 2011).

#### **4.9 Nigeria [Imoh Obioh and co-author]**

[Draft has not yet been received]

#### **4.10 Russia [Igor Bashmakov]**

[Zero order draft has been received in time, but we are still waiting for the updated, short first order draft]

#### **4.11 South Africa [Stanford Mwakasonda]**

[Draft has not yet been received, however, due to special circumstances related to author recruitment the author was not recruited until 25. August]

#### **4.12 South Korea [Myong-Kyoon Lee and Marlene Vinluan]**

Most of Korea's GHG emissions are concentrated in the energy sector. Energy-related emissions from these sectors amount to 585.9 Mt CO<sub>2</sub>e in 2008, of which 13.9% (MOE, 2010) was accounted for by the transport sector alone. Out of the total transportation sector, road transportation contributed to 90% (Korea Transportation Safety Authority, 2008) of the total emission from transportation. From 1990-2008, the annual average increase of road transportation emission was 3.6%.

In response to the intensifying challenge of increasing GHG emissions and environmental risk from climate change brought about by the country's strong economic growth, the Korean government in August 2008 set an ambitious National Strategy for Green Growth, where sectoral strategies have been pursued in order to develop green industries as an engine for growth in the future.

Specifically, in support of the said strategy, the government announced in November 2009, the Strategy for Promoting Low Carbon Green Transportation (GGGI, 2011) which aims at shifting the paradigm from the current road-centered system to green transportation system, while maximizing the efficiency of existing transportation facilities.

This strategy aims to reduce GHG emissions by 33~37% from transportation sources from the BAU emission ratio in 2020. The government forecasts that it will be able to cut 46.5 million tons of GHG through green transportation promotion (Shim, 2011).

##### **4.12.1 Successful Domestic Policies and Measures**

One of the policy measures that the government implemented to realize its GHG emission reduction target in the transportation sector is the implementation of the Bus Rapid Transit (BRT) system by the Seoul Metropolitan Government started in 2004, which is now expanding to several major cities in Korea. The main motivation for the implementation of this system is to

relieve traffic congestion, increase mobility options for the commuters, and ultimately to reduce carbon emissions.

The experience with BRT in Seoul so far has been a resounding success. BRT is now being viewed as a much cheaper and quicker way to provide express public transport services than metro expansion, which can take many years to construct and requires much more capital. Among the notable results of the BRT, is the greatest improvement in speed for buses, which on the average ranging from 16.6 to 21.6 km/hour, hence, improvement in bus punctuality and reliability. Total bus accidents and injuries on all routes combined have fallen by about a third. Rising bus passenger levels outnumbered that of the subway system by more than 100,000 daily passengers. Moreover, private car usage dramatically decreases on the average from 2,942 to 2,402 vehicles per hour. Additionally, some of the co-benefits resulting from this policy are the less pollution (CO<sub>2</sub>, PM, NO<sub>x</sub> reductions), congestion and social costs, such as accident savings and fuel savings, among others.

Other factors contributed to the feat of this policy was mainly due to the development of an exclusive dedicated median-lanes, real-time information for passengers and system operators, integration of transit fare system through the use of smart card, which allows a person to transfer from one bus line to another, or from a subway to a bus (or vice versa) at no extra charge, as long as it is within the prescribed transfer time. BRT also uses new state-of-the-art buses, which are mostly running on compressed natural gas (CNG). CNG buses emit very low emission, release 65% less gases such as NO<sub>x</sub>, and have a noise level that is 2~3dB(A) lower. The government is intensively providing CNG buses in metropolitan cities and replaces diesel buses that have reached their end-of-life with CNG buses.

More importantly the government indicated that the BRT reduces GHG emission of an estimate of 42 CO<sub>2</sub> ton of GHG emission per day on the average. Hence, by year of 2020 (WU, 2010) a reduction of 20,000 CO<sub>2</sub> ton of GHG emission in the transportation sector has been estimated as a result of this policy.

#### **4.12.2 Technical and Economic Feasibility of the Policies (as well as Scale-up Barriers and Conditions)**

However, this success has been coupled by some funding and costs crisis. Seoul metropolitan government is spending excessively high portions of its budgets as subsidies for public transportation. In 2009, it spends a total of US\$480 million subsidy for the buses (Mo, 2010). In addition, there are also costs associated with the use and adoption of CNG buses. Report (MOE, 2011) shows that the city government will fund the program to the tune of US\$101 million with bus operators receiving subsidies of up to US\$23,700 for each bus purchased.

So far, these are the main challenges faced by the implementation of BRT in metropolitan Seoul. However with the strong will of the government coupled with sufficient and persistent investment in the sector, these challenges could be translated into opportunities to overcome

whatever difficulties and realize the vision of green growth and live up to its commitment of reducing GHG emission at a substantial level.

Moreover, with adaptation to climate change being one of the priority areas of the government, it set regulatory standards on fuel efficiency and GHG emissions from the transport sector that requires redesigning of cars to either drive 17 kilometers per liter or cut GHG below 140 grams per kilometer between 2012 and 2015 (UNEP, 2010). These policy targets are among the measures in response to the government's overall aggressive GHG emission reduction target of 30% from BAU (4% reduction from 2005 level) by 2020 (Presidential Committee on Green Growth of the Republic of Korea, 2011).

#### **4.13 The United States of America [Joe Huang and Jayant Sathaye]**

For many years, the United States has been the largest GHG emitting country in the world, although in the last two years, this position has been taken over by China. However, since China's population is more than four times as large, on a per capita basis the U.S. continues to be a disproportionately large GHG emitting country. When the emissions from electricity generation are distributed to their end use sectors, e.g., commercial and residential, industry then accounts for the largest share of U.S. GHG emissions at 29%, followed by transportation at 27%, residential and commercial at 18% each, and agriculture at 8% (U.S. EPA, 2011b). Since more than a third of US GHG emissions (36%) can be attributed to energy used to keep residential and commercial buildings comfortable and well-lit, or to operate equipment and appliances within the buildings, there have been various efforts aimed to reduce the energy use intensity of buildings and appliances through energy standards, labels, ratings, and voluntary Demand-Side Management (DSM) programs.

In most states, there are mandatory residential and commercial building energy standards for new construction that are periodically revised and made more stringent. For example, California probably has the most comprehensive set of building energy standards, Title-24, of anywhere in the nation. Title-24 was first adopted in the late 1970's, and has since been revised every three years. The current residential and commercial Title-24 are performance standards that establish a maximum allowable energy budget per floor area (itself a custom budget that varies with the building size, design, and climate), but allows builders and architects flexibility in their designs, as long as they are shown through computer simulations to meet the required budget. This compliance procedure is now well established and accepted by the building industry, and has been effective in raising the energy efficiency of buildings in California, without constraining the creativity of the building designers.

While the building energy standards set the floor for minimum energy performance, they also function as benchmarks for voluntary programs, mostly sponsored by the utility companies, to encourage and help builders to go beyond the standards. All the major utility companies in California support a state-wide Savings by Design program that provides technical assistance to new commercial building owners to make their buildings exceed Title-24 by 10% or 20%, and

followed by cash rebates should the buildings actually show lowered energy bills after they have been built. For residential buildings, the focus has been more in promoting energy-efficiency retrofits of existing houses, such as providing zero-interest loans for adding more insulation, or replacing an old furnace or air-conditioner with more efficient ones.

The net impact of these regulatory and voluntary efforts in California has been a dramatic improvement in the thermal efficiency of buildings compared to those built prior to Title-24's adoption in the late 1970's. For example, pre-Title-24 buildings all had single-pane clear windows, no wall insulation, and minimal amounts of ceiling insulation, while buildings built now have at least double-pane windows, 9-14 cm of wall insulation, 22-28 cm of ceiling insulation and cool roofs. However, although the thermal characteristics of buildings have noticeably improved, the amount of reduction in energy use and GHG emissions remains questionable for the following factors: (1) many older buildings have poor indoor conditions, i.e., newer buildings may be more comfortable but not have lower energy use, (2) newer residential buildings have been getting larger and larger, so while energy use per floor area may have gone down somewhat, energy use per capita may still be rising, (3) newer buildings tend to be built in more inland climates, making aggregate comparisons of energy use to older buildings difficult to assess.

#### **4.14 Cross-cutting issues and Conclusion [John Christensen, Laura Segafredo]**

Smart energy policies reduce greenhouse gas emissions and save money. Indeed, a small number of very powerful energy and climate policies have been proven to offer vast economic benefits while slashing conventional pollution and global warming. Rapid adoption of these policies can advance national development priorities and put the world on a reasonable climate path; failing to do so will result in climate disruption and be far more costly. Among them, at least three have a rock-solid track record and have been widely implemented around the world.

##### **4.14.1 Vehicle performance standards**

Over the past 50 years, a quiet transformation has taken place in motor vehicle design, environmental performance, and fuels. These changes, driven by government standards, have reaped extensive economic, health, and climate benefits.

Regulations in the European Union, the United States, and Japan have reduced vehicle emissions of conventional pollutants by about 99 percent, at cost to the consumer of roughly \$500—or 3 percent of the average cost of a new gasoline-fueled car. According to the U.S. Environmental Protection Agency, the social benefits—such as reducing premature deaths, respiratory ailments, and crop damage—outweigh the manufacturing costs on the order of two to five times (U.S. EPA, 1999).

This is a remarkable example of how government standards transformed the environmental performance of passenger vehicles by setting performance-based goals to drive new technologies.

Incremental progress allowed for new technologies to build on previous technologies; no one could have foreseen the full suite of emission controls that now exist.

Such government policies are now being harnessed to reduce greenhouse gas emissions—primarily CO<sub>2</sub>, but also N<sub>2</sub>O and air conditioner refrigerants. South Korea, China, the United States, the European Union, Japan, Australia, and Canada have adopted some form of vehicle performance standards, thus bringing about 70 percent of global transportation greenhouse gas emissions under regulation. Mexico and India are considering adopting efficiency standards, while other major markets such as Russia, Brazil, and Indonesia have not yet approached this step.

These vehicle efficiency standards have proven very effective in reducing fuel use and CO<sub>2</sub> emissions. Germany's standards yielded a drop in CO<sub>2</sub> emissions of up to 10 percent *per year* compared with business-as-usual trends between 1978 and 2005. Since China adopted a weight-based fuel economy standard for autos and light trucks in 2005, nationwide new vehicle fuel economy has improved by 10 percent. In the United States, fuel economy standards reduced oil consumption by about 3 million barrels per day and lowered annual CO<sub>2</sub> emissions 28 percent between 1975 and 2005.

Experience shows that vehicle performance standards must be well designed to be effective. In the United States, for example, the federal government increased the stringency of its standards every year from 1975-85. As a result, automobile and light truck fuel economy nearly doubled during that decade. But from 1985 to 2008, the standards remained static and fuel economy improvement halted, stagnating at about 28 miles per gallon (mpg) for cars and 20 mpg for light trucks. That failure cost the U.S. economy some 12 billion barrels of oil.

#### 4.14.2 Equipment standards and labels

Energy efficiency standards and labels have proven to be an outstanding method to reduce energy use and greenhouse gas emissions from appliances and industrial equipment. These policies essentially pay consumers to save energy. As of 2010, more than 1,700 appliance standards have been adopted in 78 countries around the world.

In 1995 the Mexican government introduced energy efficiency standards covering four major appliance classes: refrigerators, air conditioners, three-phase electric motors, and clothes washers. These standards reduced gross energy generation by more than 15 terawatt-hours (TWh), or 10 percent of the country's electricity use, in 2005. This avoided emissions of 40 Mt of CO<sub>2</sub> and saved consumers \$2.7 billion (IIE, 2006).

China established its first energy efficiency standards in 1999; by 2008 it had enacted national standards covering 18 major appliances. The Chinese government increases the stringency of the standards every three to five years to reflect technological improvements and cost reductions. From 2000 to 2005, these standards lowered energy consumption 47 TWh, reduced CO<sub>2</sub>

emissions 50 Mt, and saved \$3.4 billion (Fridley et al., 2007). The majority of these savings, which accounted for about 5 percent of total annual energy consumption in 2005, came from refrigerator standards.

Perhaps the most dramatic example of the effectiveness of energy efficiency standards and labels is the transformation of the refrigerator market in the U.S. (Collaborative Labeling and Appliance Standards Program). New refrigerators sold in the U.S. today use, on average, less than a quarter of the electricity of those sold 30 years ago, despite their increased size and added features. Appliance and equipment standards reduced total U.S. energy consumption by a cumulative 2,780 TWh from 1990 to 2005, with most of the savings coming from the residential sector. This is equivalent to taking over 375 million cars off the road (U.S. EPA, 2011a). In addition, appliance and equipment efficiency standards created over 300,000 jobs in 2010 (ACEEE, 2011).

Although such standards have been very successful in reducing energy consumption and CO<sub>2</sub> emissions, poorly designed policies often failed to capture a significant proportion of the available savings. This is primarily because only a relatively small number of products are covered by standards, particularly in the commercial sector. The stringency of regulations also varies by country, and there is considerable room for higher levels of ambition. Aligning product standards with the best technology available and accelerating the timing of improvements in standards to comport with product cycles (about every three to four years) would significantly increase the future savings potential.

This is precisely the idea behind Japan's extremely successful "Top Runner" program, introduced in 1998 (Nordqvist, 2006). Under this system, officials periodically test all the products currently available in the market within a specific category, determine the most efficient model, and make that model's level of efficiency the new baseline for energy efficiency standards. In this "survival of the fittest" program, the best available technology becomes the new normal, which significantly promotes technology development and market transformation.

#### 4.14.3 Clean energy supply

A clean, reliable, and sustainable energy supply is a *conditio sine qua non* for low emissions development. Today's fossil-fuel-based power sector is a major source of CO<sub>2</sub> emissions: Energy-related greenhouse gas emissions totaled 30 gigatonnes (Gt) in 2008. Of that, 12 Gt, or roughly 41 percent, is attributable to electricity generation.

Although some renewable energy technologies are already cost-competitive with new fossil fuel generation (such as onshore wind versus combined-cycle natural gas plants), policy is still needed to drive investments in clean energy and ensure that it is deployed on a massive scale. Good policy is especially important to encourage development of technologies that are close to becoming commercial as well as less mature technologies with large potential. In these cases, the

knowledge gained from market deployment, and support for research and development, can accelerate technology innovations (see policy No. 10, below).

As countries around the world start to address the planet's pressing energy and climate challenges, they are sparking a "race to the top" to reap the rewards of economic growth, job creation, and public health benefits that accompany the development of innovative clean technologies. Even in the U.S., which is arguably falling behind in this race, conservative estimates tally more than 700,000 green jobs at the end of 2007, versus 1.3 million employed by utilities, coal mining, and oil and gas extraction (PCT, 2009). Another report estimates that the U.S. could add 4.2 million green jobs by 2038 (GI, 2008). According to the International Energy Agency (IEA), however, only a few countries have implemented policies to effectively increase the penetration rate of renewable energy sources (IEA, 2008). Significant potential remains to improve policy design and implementation.

Three policy instruments have been widely used to support the deployment of renewable energies.

- i. **Renewable portfolio standards** (RPSs, also known as renewable obligations) require a specific fraction of the electricity supply in a given country or region to be produced from renewable energy sources such as wind, solar, biomass, small hydro, and geothermal. RPSs generally obligate electricity supply companies such as utilities to meet these requirements.
- ii. **Feed-in tariffs** (FITs) guarantee generators a premium price for the renewable electricity they produce, along with preferential grid access and, in most cases, long-term, guaranteed purchase contracts. Typically, the obligation to purchase this electricity falls on regional or national electric grid utilities.
- iii. **Renewable energy tenders** are a form of auction in which developers bid for the right to build and operate renewable energy plants of a predetermined capacity. Essentially, bidders compete to enter into a power-purchasing agreement with the government at a guaranteed price and for a specific contract duration.

Policymakers and energy providers continue to debate the costs and overall effectiveness of these mechanisms. The experience gained by countries that have implemented one or more of these policies provides useful insights.

According to Bloomberg New Energy Finance, FITs have proved extremely effective at encouraging wind and solar energy deployment, given that about 64 percent of global wind capacity and 85 percent of solar PV capacity have been built in markets subject to these regimes (Bloomberg, 2011). However, their cost-effectiveness has varied. Onshore wind power FITs have demonstrated their cost-effectiveness, with Germany the model for good policy design. But FITs for less mature technologies such as solar PV have proved so costly (accounting for 0.1 to

0.4 percent of a country's GDP) that most countries, including Germany, Italy, and Greece, are considering abandoning them. FITs fix the price up front, so they are not adjusted to reflect any price discovery or further cost reductions beyond those originally established by the policy. Instead, any cost savings achieved during the course of a FIT regime go straight into the pockets of investors—mainly equipment manufacturers and developers.

In contrast, by fixing the proportion of renewable energy rather than the price, RPS programs offer almost the opposite benefits and shortcomings of FITs. Although designed to set a minimum, RPSs can become a de facto “cap” on the share of renewable energy in a given region. And price variability and the attendant uncertainty of future cash flows can also create financing issues for renewable technologies. This is a particularly sensitive issue when the economy is weak or contracting and energy demand is lower than the market anticipated. To accommodate such uncertainties, renewable energy investors may demand higher margins.

These factors have made renewable energy tenders the most popular policy option in most of the developing world, where energy prices are a politically charged issue. Argentina, Brazil, Mexico, Peru, Uruguay, Morocco, Egypt, Chile, and China have all conducted successful wind auctions. Tenders are undoubtedly an effective way to lower the cost of policy support for renewable energy sources. But if developers underbid and the profit margin is too tight, they may fail to deliver the contracted capacity. This is a typical example of “winner's curse.”

Successful renewable energy policies have two elements: They let the market find the price, and they ensure that the contracts are long-term and stable, so that developers can mobilize capital at a reasonable rate. These conditions can be built into all three types of renewable energy policy—but, symmetrically, any of the three can fail on this front, with predictable failure in the policy.

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**IGES Conference Report-PMO/KUC-2011-01**

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

*Getting for Local Energy Solutions  
after the 3.11 Triple Disaster*



Held on the occasion of  
The International Forum for Sustainable Asia and the Pacific  
(ISAP2011)

26 – 27 July 2011, Pacifico Yokohama



**YOKOHAMA  
CITY  
UNIVERSITY**

Global Cooperation Institute  
for Sustainable Cities



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## **Introduction to the IGES – YCU Joint Seminar**

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

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

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

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

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

*IGES – YCU Joint Seminar on Low Carbon and Smart Cities*  
**Part 1: Concept and Implementation of Smart Cities - Lunch Session**

## **Part 1: Concept and Implementation of Smart Cities**

### **Lunch Session < Local Energy Solutions >**

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

Pacifico Yokohama, Japan

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

## Summary of Presentations

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

### Local Energy Solutions:

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

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



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

### The Kitakyushu Smart Community Creation Project:

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

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

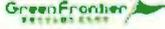
renewable energy, 2) Hydrogen use as fuel for household power generation and hydrogen fuel-cell cars, 3) Energy saving at district level, and 4) Testing of a more efficient traffic system such as on-demand community buses. The most important element is the development of a Centralised Energy Management System named the “Regional Energy Saving Station” which involves the introduction of Building Energy Management Systems (BEMS) and Home Energy Management Systems (HEMS) with a focus on using them at the community scale. Demand-side management of energy will become crucial, and measures such as dynamic pricing of electricity and provision of incentives for energy-saving are currently under consideration.

### 3. Functions of the Regional Energy-saving Station

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

↓

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



#### The Yokohama Smart City Project:

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

and industrial areas of the city. Yokohama Smart City Project, with key private sector partners, targets the installation of solar panels and HEMS in 4000 households, introduction of 2000 electric vehicles, and a total of 27 megawatts of renewable energy generation capacity. By being Japan’s most populous municipality, Yokohama City’s diverse settings present numerous opportunities for exploring innovations in green and low carbon growth, which could be relevant for cities in many other parts of the world.

#### Urban Strategy for Environmental Initiative

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

**Provision of business chance through demand-creation**

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

**Businesses: Deployment of the Yokohama Smart City Project**

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



**Promotion of technology innovation among local companies**

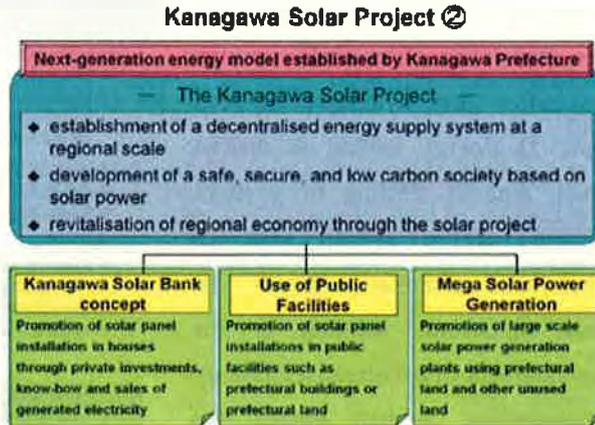
Support for SME growth in environmental technology	Innovative Promotion of Yokohama Green Valley
Attraction of environmental technology companies	Generation of new business chances

**The Kanagawa Solar Project:**

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

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

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



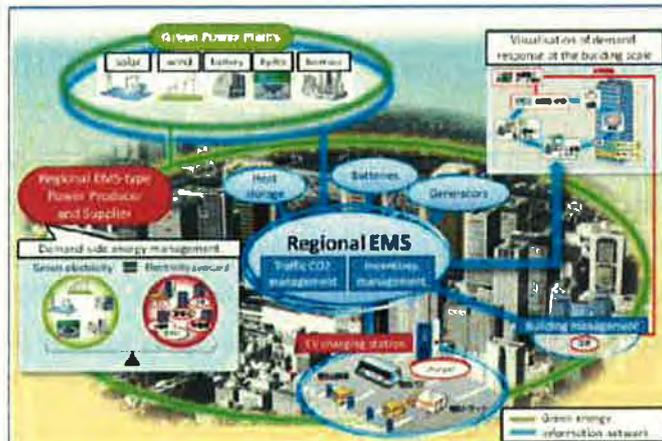
*Private company actions: In response to the increasing demand for GHG emission reductions under national and local government policies, private companies are developing new technologies and business models which could serve as a starting point for an alternative energy infrastructure.*

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

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

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

in central Tokyo, it has been found that solar power is not a feasible means to supply electricity to all the offices. Mitsubishi Estate has thus decided to purchase “raw green electricity” from renewable sources outside Tokyo, resulting in a reduction of 20000t CO<sub>2</sub> compared to the previous year. As introducing renewables makes the energy supply unstable, demand-side management has become essential, as well as electricity storage. In order to reach its emission reduction target, Dai-Maru-Yu district will have to make use of external sources by balancing the supply and demand of energy through effective energy management systems.



**Expand EV’s Value – Mobility and Beyond – :**

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

The distribution and uses of electric vehicles (EV) in Japan, Europe and the US were introduced, taking the “Leaf” model (Nissan’s EV) as example. Leaf models generate data on battery charging and transportation mileage, which are stored in a data centre. This data serves as the basis for development of the smart grid technology. With over 3800 Leaf models running in Japan, EVs are now attracting interest as a backup power source for households in case of disasters, as well as potential batteries for storing electricity from renewable sources to the stabilise the supply. One Leaf model can store 2.5 days worth of household electricity, and technologies for smart-house/EV combination are already being developed by Nissan Motors. The challenge now is to identify the regulations that apply to these technologies and to explore possibilities for institutional reform in partnership with government bodies.

**Discussions - Key Points**

**SUMMARY BY THE MODERATOR**

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

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

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

#### **FINANCIAL MECHANISMS**

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

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

#### **INSTITUTIONAL BARRIERS**

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

**TECHNICAL INNOVATIONS**

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

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

**Part 1: Concept and Implementation of Smart Cities – Expert Workshop**

## **Expert Workshop < Concept and Implementation of Smart Cities >**

Tuesday 26 July 14:45-17:00

Pacifico Yokohama, Japan

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

## Opening Remarks

### **Yokohama City University and IGES Collaboration:**

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



## Summary of Presentations

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

### **Roles of Cities and Urban Energy in Climate Policy:**

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

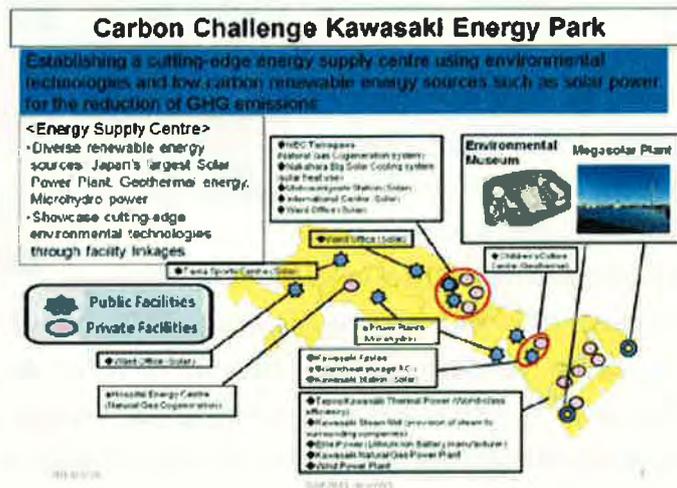
Dr. Dhakal presented his views on the roles of cities and urban energy in climate policy. He underlined the urgent need to limit climate change, which has in the recent years been following one of the worst scenarios from 2000 onwards. If climate change is to be contained within the 2 degrees threshold, emissions should be peaking now but this is not the case. The role of cities in these circumstances is central. In developing countries, which will soon overtake the OECD countries in GHG emissions, there is a need for strong policy initiatives beyond individual technologies, so that urban systems can integrate the diverse approaches for emission reduction. In order to make this transition, we need to determine how much “low-carbon” is needed for different cities, monitor the plans and achievements of mitigation measures, and be able to compare internal “energy smartness” against exported emissions. There is a vast improvement potential but most require management of systemic change such as recycling, cascading, system integration, urban form, land use, and transport. The hierarchy paradox in urban CO<sub>2</sub> reductions and governance (the order of policy priority and greatest achievable leverage are inversed) need to be acknowledged and overcome.

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

**Carbon Challenge Kawasaki:**

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

Kawasaki City has a long history in tackling pollution issues. Being a highly industrialised city, Kawasaki has opted for the promotion of emerging industries and R&D as a strategy to maintain competitiveness in a context of industrial decline. There is currently a strong interest in renewable energy, in particular the mega solar plant in



the coastal part of Kawasaki City which will be in operation from August with a generation capacity of 20,000 kW. The plant will comprise of an environmental education facility for visitors to learn about technologies that support the 3Rs (Reduce, Reuse and Recycle), solar power, water management, ground source heat pumps, lithium ion batteries, and smart metres. The city aims to increase installations of household solar panels from 600 to 1500 households this year, and will explore new policies to provide support for solar panel installations in apartments. Also in response to high demand, financial support will be provided for solar water heaters. Large scale installation of LED lamps has been approved by the city council, and green electricity has been introduced to the city hall buildings. By purchasing green electricity, the city supports renewable energy production businesses in rural parts of Japan. The city focuses on regional level energy saving, and places importance on demand-side energy management.

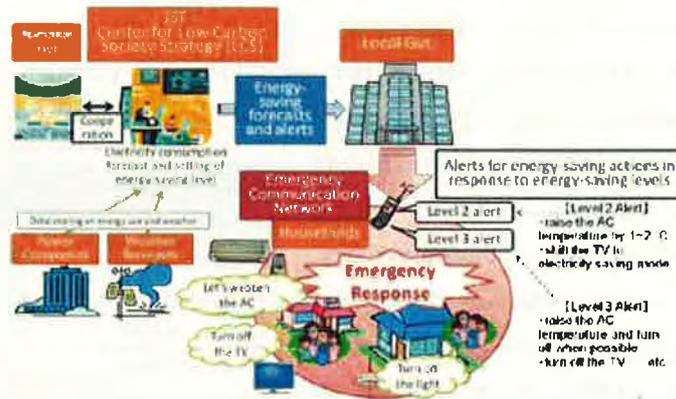
*Demand-side energy management: To induce effective peak-cuts and energy-saving actions among consumers, it is essential to assess detailed consumption patterns and to select adequate messages that can be conveyed in a timely manner.*

**Network for Blackout Prevention:**

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

LCS is contributing to overcoming the electricity shortage from a research institution's standpoint. The large consumers of energy are ordered to make a 15% cut, leaving some space for balancing supply and demand. But if consumption levels rise to over 97% of the generation capacity, a planned blackout will have to be

**LCS' option for overcoming electricity shortages  
"Communication Network for Blackout Prevention"**



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

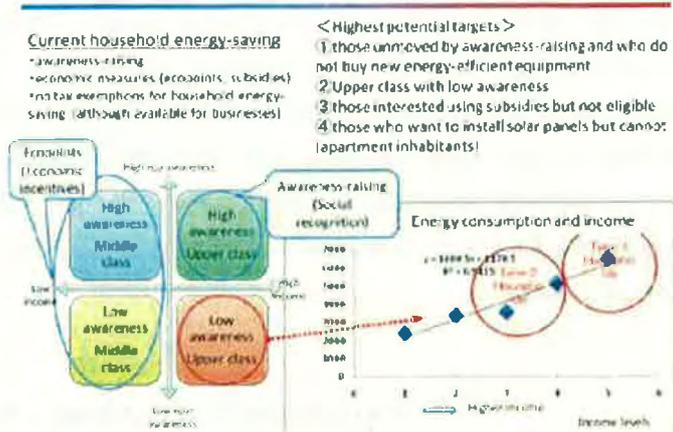
**Life-stage Energy Management Strategies:**

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

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

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

### Appropriate Incentives and Energy Management



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

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

### Energy Management Opportunities and Challenges in India:

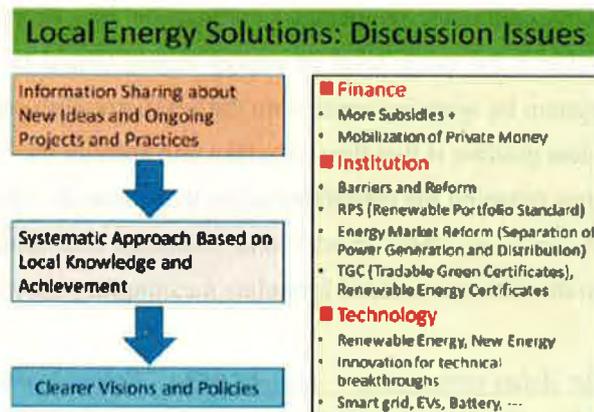
**Dr. Leena Srivastava, Executive Director, the Energy and Resources Institute (TERI)**

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

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

### Roundtable Discussions – Key Points

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



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

#### 1. Scale of Low-Carbon Cities and Smart Cities

##### MEASURES TAKEN AT THE DISTRICT-LEVEL

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

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

#### **JOINT INITIATIVES BEYOND THE DISTRICT-LEVEL**

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

Although acknowledging the need for the development of intra-district energy management, Mr. Inoue of Mitsubishi Estate Co. also underlined the fact that in cases like Dai-Maru-Yu district, efforts to introduce renewable energy sources would be insufficient to meet the energy demands. In districts with high construction densities, the challenge is to secure a CO<sub>2</sub>-free source of electricity, and the only solution that has so far been implemented is to use green electricity from other districts or regions. However, these measures can also serve as an opportunity for collaborations between urban and rural or industrial and residential districts.

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

## **2. Means of implementing Low-Carbon and Smart Cities**

#### **TECHNOLOGICAL POTENTIAL**

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

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

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

From the technological aspect, the case of Nissan Motor Co.'s EV presented by Mr. Tsunehiko Nakagawa shows a high potential for overcoming stability barriers of renewable energy through its use for electricity storage. In an era where CO<sub>2</sub> emissions need to be limited to a strict minimum, even vehicle manufacturers cannot escape the restrictions, and thus need to strive to provide zero emission products. These technological potentials also need to be acknowledged and supported by the consumers, the products need to reach a certain level of standardisation, and be backed by appropriate infrastructures such as sufficient number of charging stations. However, it was acknowledged that many of the technologies already available to date are often obscured by the financial and institutional barriers to their dissemination.

#### **FINANCIAL MECHANISMS**

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

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

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

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

With regards to the national scheme of Feed-in Tariffs for renewable energy, Mr. Kazuhiko Kobayashi of Kitakyushu City noted that although this measure constitutes a monetary incentive to invest, there is in fact no need to sell away all of the locally produced electricity as Smart Cities allow a regional sharing of electricity. Local production and consumption of electricity could generate new businesses and financial flows to revive the economy at a more local scale.

It was suggested that low-carbon development be pursued through energy-use at the “middle-ground” between local and national scales. However, this kind of structural reform cannot be realised without considerable institutional changes.

#### **INSTITUTIONAL REFORM**

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

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

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

### **3. Low-Carbon / Smart City Business Model**

#### **OVERALL COORDINATION**

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

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

*IGES – YCU Joint Seminar on Low Carbon and Smart Cities*  
**Part 2: Low Carbon Cities in Asia and the Pacific – Expert Workshop**

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

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

Wednesday 27 July 9:30-12:00

Pacifico Yokohama, Japan

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

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

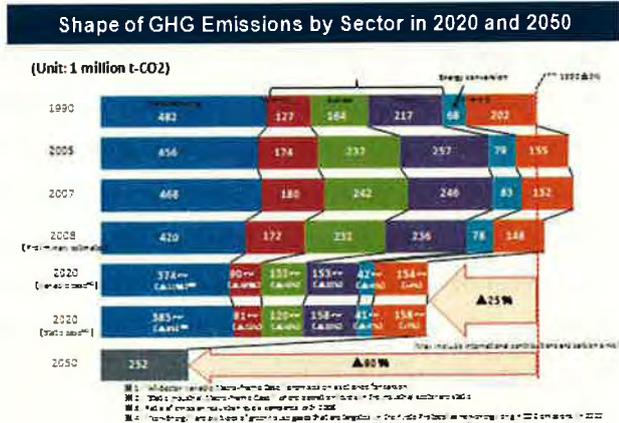
### Summary of Presentations

#### National Government Policies and Programmes for Promoting Low-Carbon Cities

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

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

Prof. Kobayashi underlined the need to promote low-carbon city development through reductions of greenhouse gas (GHG) emissions from the household, business and transport sectors towards achieving Japan’s national target (a 25% reduction by 2020 and an 80% reduction



Japanese GHG emissions by sector, and reduction targets for 2020 and 2050

by 2050 compared to 1990 levels), and introduced the activities carried out by the MOEJ. He explained the history of the 1998 Act on the Promotion of Global Warming Countermeasures, which led to the establishment of Global Warming Countermeasures Action Plans among local governments and the integration of climate change mitigation and energy management into city planning through monitoring and reporting mandates. Prof. Kobayashi also introduced effective measures taken by the MOEJ and other ministries to support local government initiatives in waste heat recovery, improvement of public transport, or the promotion of energy-efficient housing.

##### The Eco-Model City Project and Future Directions:

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

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



Main activities by the 13 Eco-Model Cities

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

Local Government Perspectives and Efforts in GHG Emission Reductions

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

BMA aims to reduce its GHG emissions by 15% during the period 2007 to 2012, and is promoting the development of public transport, dissemination of renewable energy and energy-efficiency, development of waste management and wastewater treatment systems, and increase of green spaces. These activities involve cooperation from diverse organisations including national government members, private companies and industrial associations, and international cooperation agencies such as the World Bank, JICA, and UNEP. To date, initiatives in solid waste management, wastewater management and greenery expansion are approaching their respective targets, but the transport and energy management sectors are behind the schedule because it takes time (1) to assign responsibilities for public transport development between national and local levels and (2) to obtain the understanding of the public on construction site preparation and compensation.

**Targets for Reducing Greenhouse Gas Emissions**

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

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

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

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

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

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

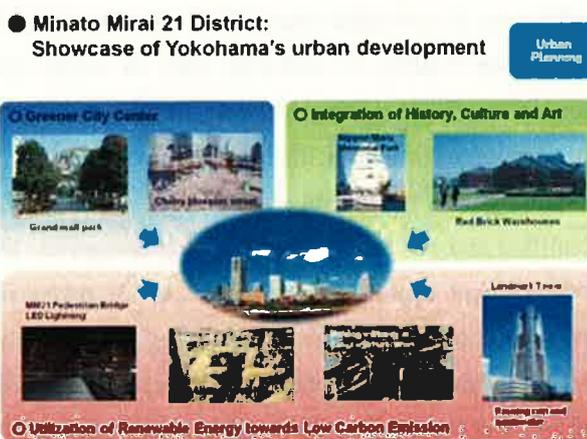


Car-free day campaigns by Surabaya City

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

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

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



Showcase of Yokohama City’s urban development

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

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

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

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

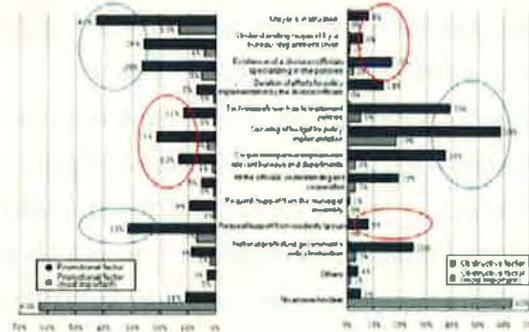
**Prof. Mitsuru Tanaka, Professor, Centre for Regional Research/Faculty of Social Sciences, Hosei University**

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

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

**6. Promotional/obstructive factors for low-carbon policies**

Promotional/obstructive factors for low-carbon policies for local communities



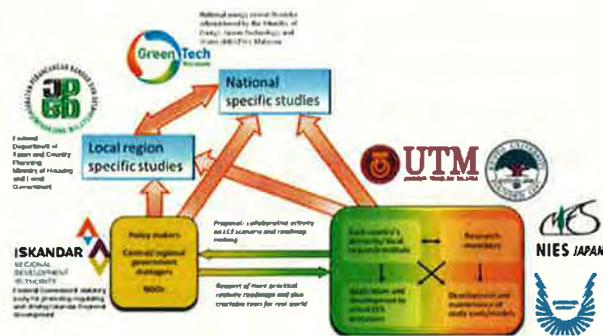
Promotional/obstructive factors for low-carbon policies by local governments

**Low-Carbon City Roadmap in Asia:**  
**Dr. Junichi Fujino, Senior Researcher,**  
**Sustainable Social Systems Section,**  
**Centre for Social and Environmental**  
**Systems Research, National Institute**  
**for Environmental Studies (NIES)**

Roadmap and scenario building activities were carried out by NIES in collaboration with Japanese and Asian Cities aiming for low-carbon urban

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

**Organizational Arrangement of the project**



Stakeholders of Iskandar's low carbon roadmap building project

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

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

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



Diverse Eco-Town (Eco-industrial estates) developments

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

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

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

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

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



CITYNET's training programme and partners

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

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

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

IGES plays the role of secretariat for the ASEAN Model Cities Programme of Environmentally Sustainable Cities (ESC). This programme funded by the Japan-ASEAN Integration Fund (JAIF) is a result of recommendations formulated at the High Level

Seminar on ESC (HLS-ESC) held under the framework of the East Asia Summit Environment Ministers Meeting, and draws on the experiences of the Japanese Eco-Model Cities Programme. The 14 Model Cities selected from among the ASEAN member states were introduced, and participants were invited to attend the 3<sup>rd</sup> HLS-ESC (scheduled in Cambodia in February or March 2012) where the outcomes of the Model Cities programme will be presented.

VAP 2011 RITS YCU Joint Seminar: Low Carbon and Smart Cities (Part 2)  
Introduction of an ESC Model Cities Programme to ASEAN Member States

**List of selected 'Model Cities'**

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

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

ESC Model Cities selected in member countries

**JICA's Effort for Low-Carbon Urban Development:**

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

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



JICA Schemes for intercity cooperation

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

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

### **Results of the Meeting and Prospects for Future Collaborations**

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

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

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

Agreement was reached between CITYNET and IGES for collaborating in CITYNET's training and capacity-building programme. A training programme on solid waste management is scheduled in October in Kuala Lumpur, Malaysia, and a seminar on climate change in November in Dhaka, Bangladesh. Furthermore, it has been agreed to include selected cities of

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the ASEAN ESC Model Cities Programme among the recipients of CITYNET's training programmes. CITYNET will be considering the introduction of JICA's third-country training programme within its training components.

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

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

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

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

### **Key Points**

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

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

**Institute for Global Environmental Strategies (IGES)**

Kitakyushu Urban Centre, International Village Center 2F  
1-1-1, Hirano, Yahata-Higashi-Ku, Kitakyushu City, 805-0062 Japan  
TEL: +81-93-681-1563 FAX: +81-93-681-1564 E-mail: [iges@iges.or.jp](mailto:iges@iges.or.jp)  
URL: <http://www.iges.or.jp>

# **Discussion Paper: Building Resilient Societies**

**Prepared for the plenary session on building resilient societies at the International Forum for a Sustainable Asia-Pacific (ISAP) 2011 held in Yokohama, Japan**

Henry Scheyvens (IGES), Hideyuki Mori (IGES), Robert Kipp (IGES), Shinano Hayashi(IGES), SVRK Prabhakar(IGES), Izumi Tsurita (IGES), and Masanori Kobayashi (IGES)

July 26, 2011

The purpose of this draft of the discussion paper is to frame the discussions that will take place in the Resilient Societies Plenary Session in the International forum for Sustainable Asia and the Pacific (ISAP) in July 26, 2011. The discussions will later be reflected in this paper and IGES will publish it as one of the outputs of ISAP 2011.

This discussion paper begins by looking at the only international agreement on disaster risk reduction, the Hyogo Framework for Action, and considers the review of progress made on this agreement in light of the current situation facing Japan – the so-called East Japan Great Earthquake/Tsunami (EJGET). In the discussion the question is raised as to what is a resilient society – in particular in the context of modern development and technological advances. Cases are given drawing on recent fieldwork carried out in the areas most severely affected by the triple disaster in Japan (tsunami, earthquake, nuclear) which provides a backdrop for the deeper discussion on building resilience to extreme events and making resilience a part of the recovery and rebuilding process.

## **1. The need to invest more in building disaster resilient societies**

Globally, the frequency and magnitude of catastrophic disasters is projected to increase. The series of disasters in eastern Japan that the nation is now grappling with highlight the need and urgency for greater attention towards building disaster resilience through national and sub-national policy and planning.

Just a few weeks after the 2004 Indian Ocean tsunami the World Conference on Disaster Reduction was held in Hyogo, Japan. The main output from that meeting was the *Hyogo Framework for Action 2005-2015: Building Resilience of Nations and*

*Communities to Disasters*, a comprehensive and systematic guidance document to strategically reduce disaster losses which was endorsed by 168 member states in 2005. The Hyogo Framework for Action (HFA) builds on a previous document, the Yokohama Strategy, and was the first document of its type to be developed and agreed upon internationally on disaster risk reduction. With the expected outcome of “the substantial reduction of disaster losses, in lives and in the social, economic and environmental assets of communities and countries”<sup>i</sup> the HFA outlines five priorities for action:

1. Ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation.
2. Identify, assess and monitor disaster risks and enhance early warning.
3. Use knowledge, innovation and education to build a culture of safety and resilience at all levels.
4. Reduce the underlying risk factors.
5. Strengthen disaster preparedness for effective response at all levels.

The 2009-2011 HFA progress review shows increasing attention to risk identification, preparedness, and monitoring; in addition the HFA and associated processes have contributed to creating a common language and understanding of the key components of disaster risk management.<sup>ii</sup> However, across income levels and regions achievements have been much slower or even regressing in addressing the underlying risk drivers, developing governance structures and institutions, and in using education and knowledge to build a culture of resilience. The result is an impaired ability to prepare for and respond to disasters, often as a result of disaster risk management being spread across multiple ministries or located in institutions with little resources or power to influence change to address extensive and intensive disasters.

Extensive risk develops through mainly localized but frequently occurring disasters spread across a country or region and are often related to climate variability such as flooding in Bangladesh.<sup>iii</sup> In the case that a particular area is subject to infrequent but highly destructive disasters with relatively greatly lose of human life, the intensive risk of the area is said to be high (Ibid.). The Haiti earthquake in 2010 which resulted in almost 500,000 casualties and 1.2 million displaced persons,<sup>iv</sup> and the triple disaster in Japan which resulted in almost 25,000 dead or missing and over 100,000 displaced persons<sup>v</sup> are recent examples of intensive disasters.

Natural disasters can be classified as biological, geophysical, hydrological, meteorological and climatological. There is potential for the human toll and economic costs of all of these to increase. Due to climate change, some areas are likely to become more vulnerable to biological disasters, such as insect infestation. The series of disasters in eastern Japan and the recent series of earthquakes in Christchurch, New Zealand remind us that developed countries are not immune to geophysical events such as earthquakes and volcanic eruptions, though deaths are likely to be greatest in countries experiencing rapid, unplanned urbanization, such as Haiti,<sup>vi</sup> where 222,570 deaths were reported from the January 12<sup>th</sup> 2010 earthquake.<sup>vii</sup> Hydrological disasters such as flooding are projected to increase in some areas because of climate change, but experiences in China, the Philippines and other countries of the region show that environmental degradation, e.g. reduced forest cover in upper catchments, also contributes to the frequency and scale of these disasters. The summer heat wave in Russia in 2010 responsible for wildfires that destroyed a third of the wheat crop and that caused up to 56,000 deaths<sup>viii</sup> was an example of an *abnormal weather event*, many of which have been reported from around the globe in recent years. These provide signals of the increasing frequency and severity of meteorological disasters (storms) and climatological disasters (extreme temperature, drought and wildfire) that are projected due to climate change.

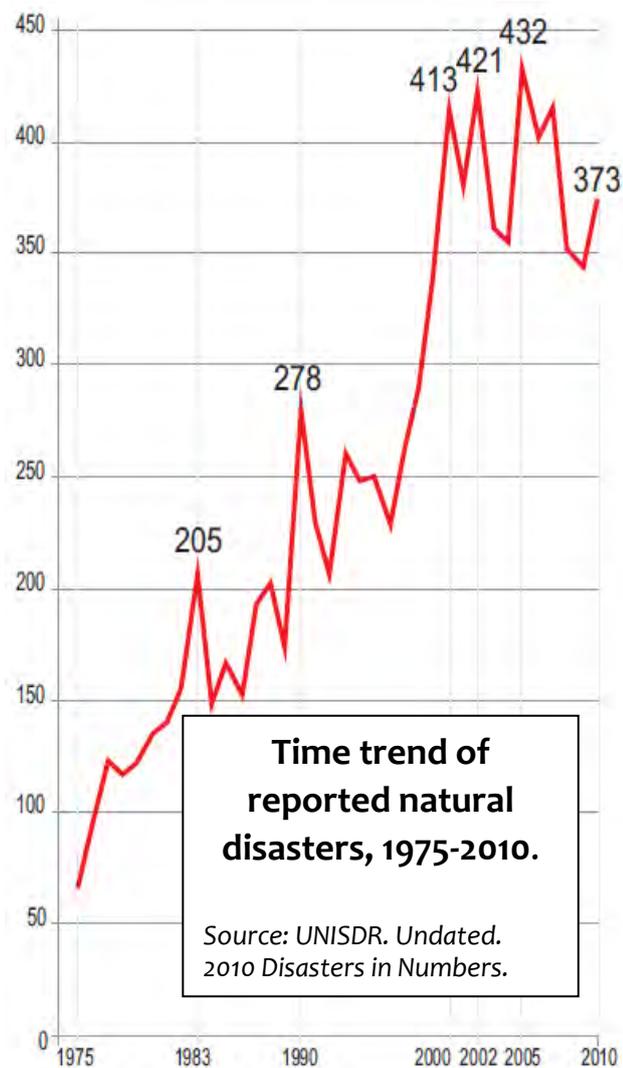
Due to better preparedness and recovery planning made possible in part by economic growth, over the past 40 years mortality risk from natural hazards has been decreasing; however economic growth has not resulted in lowered economic loss from natural hazards.<sup>ix</sup> From the 1970s to 2008 while the number of fatalities from disasters significantly decreased, world economic losses due to natural disasters has been steadily – and often times sharply- rising.<sup>x</sup> However these losses only account for the direct physical impacts of disasters – the long term affects on the local economy in a case such as the recent disasters in Japan could result in significant impacts on Japan’s economic outlook in addition to their energy future – and that of other countries which have included nuclear energy as a major part of their energy mix. In terms of extensive disasters the impacts have been greater in lower income countries and those with governance issues, but as the recent incidents in Japan shows new vulnerabilities can arise as a result of the complexities and interdependencies created in technologically advanced, modern, higher-income countries if resilience is not reassessed in terms of the new development context. Without suitable governance and institutional arrangements risk can actually be

constructed rather than mitigated through development, regardless of the size of the economy or system of government.

The interconnectedness of development, technology, and disaster risk raises questions as to the resilience and vulnerability of societies – not just developing societies, as has been the primary focus of discussions on these two factors, but also the resilience and vulnerability of modern “developed” societies in the face of intensive risk, partly as a result of technology and infrastructure development, and increasing extensive disasters due in part to climate change, the so called “emerging risks”.

**Globally, the number of natural disasters and their costs are increasing**

The EJGET is set against a backdrop of upwards trends in the number of global disasters reported and the costs of their impacts. As reported on the International Disaster Database EM-DAT, which is maintained by the Centre for Research on the Epidemiology of Disasters (CRED), 2010 was the deadliest year in at least two decades for natural disasters. CRED reports that in 2010 some 385 natural disasters killed more than 297,000 people worldwide, affected more than 217 million others and caused damages to the tune of US\$124 billion.<sup>xi</sup> Asia is particularly vulnerable. From 2000-2009, almost 85% of global deaths from natural disasters occurred in the region.<sup>xii</sup> These upward trends are set to continue due to *unplanned urbanization, environmental degradation and climate change.*



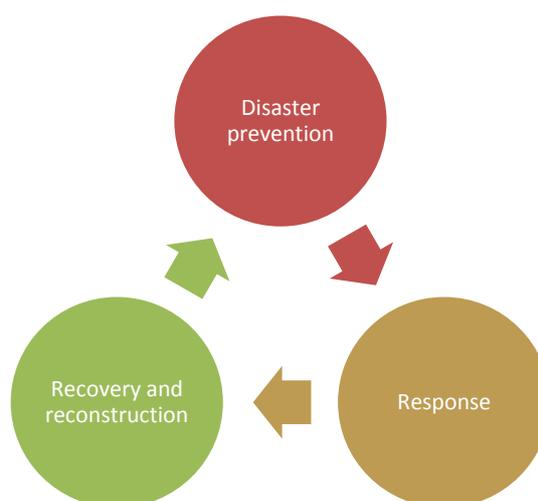
## **What is a disaster resilient society?**

Until the EJGET, Japan was presented as an example of a resilient nation, well advanced in mitigating and bouncing back from natural disasters. The magnitude of the EJGET, however, was not planned for. With a large population, much of whom resides on the coastal plains and fringes, a modern economy in which production chains are spread across the country (and globally), and with a centralised domestic energy system, Japan found itself vulnerable to this catastrophic event. Already, central and local governments are discussing a range of practical solutions, but these specific solutions need to be underpinned by a shared vision of what a disaster resilient society looks like, and a set of principles for building disaster resilience into the recovery process.

As Brenton Prosser and Colin Peters point out, it can be difficult gaining agreement amongst policy makers on what resilience actually means.<sup>xiii</sup> Nevertheless, there appears to be enough common ground to build policy.<sup>xiv</sup>

Put simply, a disaster resilient community can be defined as “the safest possible community that we have the knowledge to design and build in a natural hazard context”<sup>xv</sup> “minimizing its vulnerability by maximizing the application of disaster risk reduction measures”.<sup>xvi</sup> The expressions “safest” and “minimizing its vulnerability” are important. We cannot completely insulate our communities from natural disasters. We cannot conquer the more powerful forces of nature, and indeed this has been a painful lesson from the EJGET.

In terms of the disaster management cycle, which consists of disaster prevention (mitigation and preparedness), response, and recovery and reconstruction, a disaster resilient society is one that “mitigates and prepares for the possibility of natural disasters, is able to deliver quick and effective emergency assistance to victims, and is capable of a smooth transition to implementation of recovery and reconstruction.”<sup>xvii</sup>



There are several concepts that are useful for understanding disaster resilience. First is the notion that resilience consists of a number of elements: Robustness – inherent strength, resistance; Redundancy – system properties that allow for alternative options, choices, substitutions; Resourcefulness – capacity to mobilise resources; and Rapidity – speed with which disruption can be overcome and services, income, etc. restored.<sup>xviii</sup>

Second is the notion of “resilience domains”. These are: Technical – physical systems – location based and distributed critical facilities; Organization – attributes, dynamics of organizations and institutions; Social – attributes, dynamics of communities and populations; and Economic – attributes, dynamics of organizations and institutions.<sup>xix</sup> In Japan, perhaps too much emphasis and confidence has been placed on the technical domain, i.e. engineering feats designed to protect communities and infrastructure from natural hazards, and too little on organizational, social and economic domains.

The concepts of *levels and scope of preparedness* are also important. The literature on disaster resilient *communities* focuses on the local level, and discusses the broader context for community resilience in terms of “enabling conditions”. However, in a highly integrated economy, such as Japan, the EJGET teaches us that resilience requires the state to provide more than just enabling conditions for local, community-level resilience. Disaster resilience at the national level requires a whole-of-government approach that builds disaster resilience into the national economy. The EJGET has taught us that in Japan even energy policy must be considered in the design of national disaster mitigation strategies.

Facing once in hundreds of years natural disaster, the society which can minimize the damage and return normal as soon as possible, is sustainable. Above all, building resilient society means nothing more or less than establishing sustainable society.

### ***Principles for building disaster resilient society***

In his reflection on the series of disasters in eastern Japan, Professor Ryokichi Hirono proposes a set of principles relevant to building disaster resilience in Japan using the concept of the 4H's (Horizon, Head, Hands, Hearts).<sup>xxii</sup>

He discusses *horizon* as the need for “national and local visions of long-term development of all regions of the country”, with a particular emphasis on areas previously affected by catastrophic disasters. Here, a scenario approach to natural and man-made disaster prevention and impact minimization that lays out cost-effective alternatives would be useful.

*Heads*, he explains, refers to:

Immediate and early drafting by local governments on the basis of the closest consultation among the people in the [disaster affected areas], with assistance and support of central government, of immediate, short-,medium- and long-term measures to be taken by individuals, communities and all the other stakeholders, to prevent and minimize the adverse impact of all disasters, all of which requires the following: i) strong political leadership at the top, ii) transparency of public information and accountability of local and central governments to all stakeholders, iii) closest possible cooperation and collaboration among all stakeholders; iv) clear definition of the responsibilities of all stakeholders, particularly the roles of local and national governments, v) cross-sectoral coordination and integration among sectors and government ministries and departments, e.g. agriculture, fishery, forestry, manufacturing, power, transportation , communication, finance, services, housing, health, education, welfare, security and armed forces, etc.<sup>xxii</sup>

*Hands*, Professor Hirono explains, is about mobilising all traditional and recent knowledge and experiences, as well as generating new knowledge, through public participation and expert analysis to prevent and mitigate both natural and man-made disasters.

*Hearts* is about:

Involving all stakeholders in the decision-making processes related to disaster prevention and impact minimization through: i) basic education at school and in communities, ii) practical skill training and exercises at all levels, c) inculcating of the sense of ownership and participation among all citizens in local communities.<sup>xxii</sup>

Although Professor Hirono's discussion is specific to Japan, many of the principles are generic and have broad application.

### ***Japan faces its most severe crisis and largest reconstruction effort since WWII***

Just before 3pm on 11 March 2011, at a magnitude of 9.0  $M_w$  one of the largest earthquakes since modern recording began occurred off the eastern coast of Japan. With its epicenter approximately 72 km east of the Oshika Peninsula, the earthquake generated a massive tsunami that breached and washed over wave barriers and destroyed entire towns on Japan's eastern coast. Analysis later showed that the tsumami was over 20 – 30 meters in some areas.

Magnifying the scale of the disaster, the tsunami also washed over wave defenses protecting the Fukushima I and II Nuclear Power Plants, destroying reactor cooling systems at the No. 1 Plant and triggering a meltdown in three of its reactors. Hydrogen explosions destroyed the storage chambers of two reactors. On 12 March 2011, the Government ordered residents within 20km of the Fukushima power plants to evacuate. A scheduled evacuation order was released for some villagers located in the 20 – 30 km zone. Other areas in the 20 – 30 km zone were designated as “emergency evacuation preparation areas”.

The impacts of the EJGET have been enormous and a massive humanitarian relief effort involving government, civil society and international support is now underway. 15,550 deaths, 5,688 injured, and 5,344 people missing have been confirmed.<sup>xx</sup> Almost half a million houses and buildings were totally or partially destroyed,<sup>xxi</sup> and more than 130,000 people have been placed in temporary shelters. The survivors have experienced shortages of food, water, shelter, medicine and fuel. Prime Minister Kan described the aftermath of the EJGET as the most difficult crisis that Japan has faced since the Second World War. With the Government setting aside US\$48.5 billion in emergency spending as a first step, Japan’s largest reconstruction effort since the War is now underway.

As a mountainous island nation located on the “Pacific Rim of Fire” in one of the most tectonically active parts of the world, and with a climate that features both typhoons and heavy snowfalls, Japan is used to natural hazards, whether earthquakes, tsunamis, floods, or landslides. Japan has built up a certain degree of resilience to these and, in fact, people from around the world have travelled to Japan to study the lessons it has learned and its technological advances on disaster preparedness. New Zealand, for example, is interested in learning from Japan on how to reconstruct the city of Christchurch, which was badly damaged by a series of earthquakes beginning in September 2010.

While Japan continues to struggle with the resulting humanitarian and nuclear crisis, discussion has already begun on how to build a more disaster resilient society. In a press Conference on 01 April 2011, Prime Minister Kan presented an ambitious vision for reconstruction:

We must then begin preparations toward reconstruction. In fact, we will go beyond mere reconstruction, creating an even better Tohoku and even better Japan. We

are moving forward with the creation of a reconstruction plan that has this big dream at its core. I have received many opinions over the telephone from the mayors of each city, town and village in the disaster-stricken area. These opinions will be incorporated into the plan for instance, in some areas we will level parts of mountains in order to create plateaus for people to live on. Those residing in the area will then commute to the shoreline if they work in ports or the fisheries industry. We will create eco-towns, places which use biomass and plant-based fuel to provide natural heating. We will outfit cities with infrastructure to support the elderly. We aim to create new kinds of towns that will become models for the rest of the world.

The Cabinet Office established the multi-stakeholder reconstruction planning council (officially named “The Reconstruction Design Council in response to the Great East Japan Earthquake”). The Council held 12 meetings over three months and adopted an action plan that underscores the need to promote reconstruction driven by the local communities. Disaster preparedness and wider use of renewable energy were also highlighted as guiding principles. Each prefecture and city has also formed reconstruction committees.

### ***Case study: Rikuzentakata, Iwaki Prefecture***

Rikuzentakata, a city located on the coast in Iwaki Prefecture, is one of the tsunami affected areas. The city's death toll was 1,087 with 704 people recorded missing as of May 2011, out of a total population of 24,246. Economic damages included 3,159 houses completely destroyed; 1,368 fishing boats destroyed (the loss valued at 6.4 billion yen); seaweed and shellfish farming facilities destroyed and fish products damaged; damage to the harbor to the tune of 3.5 billion yen; livestock farms destroyed in two places (3 million yen); horticulture destroyed in 99 places (77.4 million yen); and 336 ha of rice paddy inundated (7.1 billion yen). The number of persons evacuated reached 10,143 and as of May 2011 49 evacuation shelters were operating. The temporary housing is being developed, with 2,200 units expected to be available.

In Rikuzentakata, about 10 fishery ports were operating before disaster. One contentious issue is whether to restore all the ports or consolidate them into a few that will be reconstructed. Funds are limited but the local fishermen are generally against privatizing the ports. The fishermen prefer to maintain schemes based on fishing rights that are in the form of collective fishstock/marine resource management. The current reconstruction financing is bound to support the restoration of the previously existing infrastructure, and is not designed to support the rationalization or consolidation of infrastructure systems. Private partnerships have also been considered, for instance, to support oyster farming restoration in Miyagi. However, this is closer to philanthropic donations rather than investment, and the volume of financing is still far below actual needs.

## **2. Building resilience to contend with extreme events (infrequent, catastrophic disasters)**

Building resilience for infrequent, catastrophic disasters needs special attention. Economic imperatives may lead to a playing down of the risks and likely consequences of extreme, irregular events, though Professor Ryokichi Hirono argues that that Japan should have been prepared for the EJGET and provides a list of previous large-scale events that pointed to the possibility of this type and scale of geophysical event.<sup>xxii</sup>

### ***Restoration of inundated and salinity affected paddy lands***

Restoration of inundated and salinity affected paddy lands is another important task in the reconstruction process in the aftermath of the EJGET. Farmers face financial and physical constraints to restore damaged paddy land and farms. Options that have been suggested include removing saline soil and replacing it with deeper lying unaffected soil or soil from other areas. Phytoremediation – the treatment of environmental problems by growing plants –such as rice, sunflower and rape/colza has been suggested. However, once paddy land is converted to farmland, it would take years to convert the farmland back to paddy land. The pros and cons of these proposals need further assessment.

Extreme events are sometimes labelled “black swans”. They are events that are outside of normal expectations as past experience does not suggest their likelihood of occurrence. Human memory may not span sufficient generations to ensure that lesson from the history of extreme events is incorporated into today’s planning and decision-making, or there simply may be no past human experience of a similar event. Even when there is living memory, the profit motive or competing demands on public funds may lead to avoidance of the costs for preparing for infrequent disasters.

A lesson from the EJGET is that human engineering feats that aim to obstruct the forces of nature cannot protect against the most powerful natural phenomena. Wave barriers have, in the past, successfully protected parts of Japan from tsunamis and will continue to do so for more frequent events of average magnitude. But this type of engineering solution can lull people into a false sense of security, with potentially very high human and economic costs, as we have witnessed with the EJGET. The discussion in Japan has turned to the organizational, social and economic domains of disaster resilience.

### ***Case study: Inter-community relief***

The value of inter-community support during the relief and recovery stage has been observed in the aftermath of the EJGET as well as disasters in other countries. As national and prefectural (state) governments must cover all areas directly impacted by the EJGET and because of their internal rigidities, they have found it difficult to supply timely relief on a priority basis. Community-to-community relief has been observed as more flexible than the vertical relief channel of national government to local community.

When a community not directly impacted by the disaster is coupled with a disaster affected community to provide relief, the relief work can be better focused and thus more effective. When organizing relief in the aftermath of the Sichuan earthquake, the Chinese central government paired disaster affected communities with communities in unaffected areas. The unaffected communities competed between themselves to assist their counterpart communities, and this unconventional approach of inter-community relief aid worked successfully.

In Japan, inter-community relief gained popularity after the Hanshin earthquake in 1995. After the EJGET, relief was provided by various communities and municipalities; from both inside the disaster affected area (Tono City, Kurihara City, etc.), and outside the area (League of Kansai Municipalities, Suginami Ward, etc.).

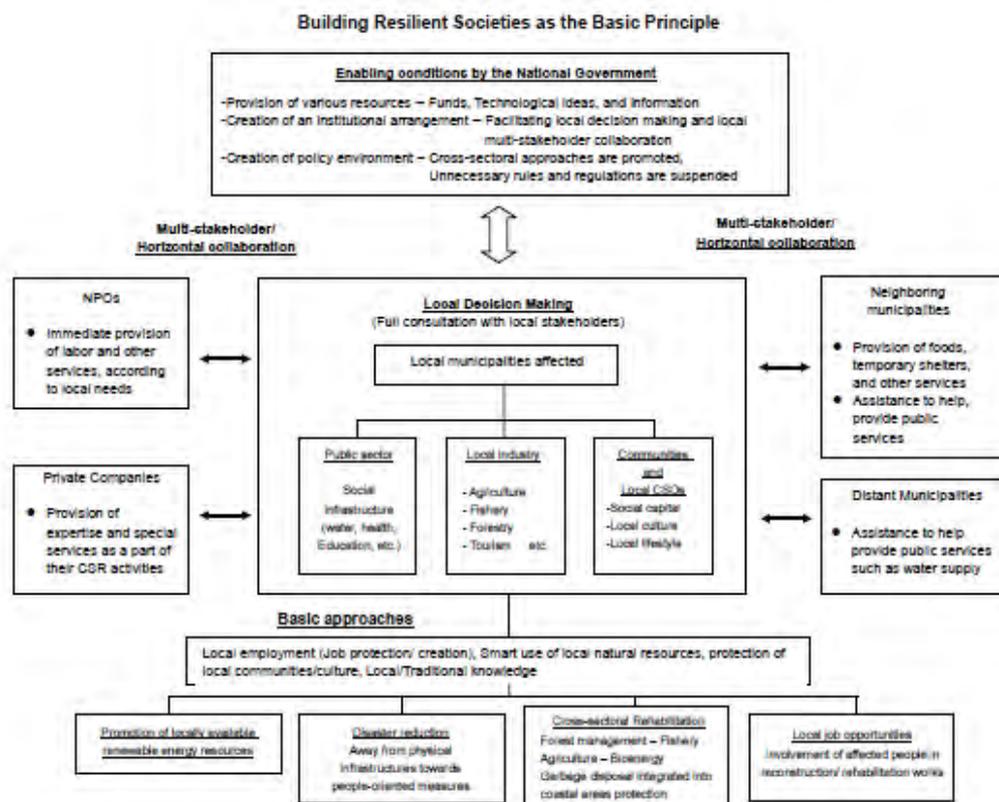
Tono City, located in Iwate Prefecture, where the impacts of the earthquake and tsunami were particularly severe, was relatively unscathed and became a relief supply center for non-governmental organizations (NGOs). An advantage of this inter-community aid was that Tono City is close to the devastated areas, which facilitated information collection and logistics. This is somewhat of an unusual example as in a widely damaged area it is difficult to find less affected communities that can extend a helping hand. Communities further removed from the disaster affected areas can also provide important support, however. Suginami Ward in Tokyo and the Unions of Kansai Governments (UKG) are good examples. Suginami Ward and other cities have long relationships with Minami Souma Cho, one of the areas affected by radiation from the Fukushima Daiichi Nuclear Power Plant, as sister cities. Suginami ward used its inter-municipality network to provide relief assistance to Minami Souma Cho while UKG sent water and sewerage technical teams to the area.

A challenge in organizing inter-community relief aid is coordination. Matching affected and unaffected cities to ensure that the relief provided is based on needs can take time, though sister city affiliation certainly facilitate this process. In Japan, further thought is now required on how government can encourage inter-community relationships as part of a process of building more effective channels to provide relief in the aftermath of disasters.

### 3. Building resilience into recovery and reconstruction

In the aftermath of a catastrophic disaster, decisions will be taken that have long-term consequences. At an early stage there is a need to identify effective processes for ensuring that resilience building is integrated into the recovery and reconstruction process, so that the impacts of future natural hazards are better mitigated and societies more able to cope with these. Disaster management planning should provide a framework for making informed decisions in a time of chaos and uncertainty, as well as direct decision-makers towards the longer term goal of disaster resilience.

Diagram below presents holistic approach for recovery from catastrophic disasters. It lays out a general governance structure for building resilient society by taking a multi-level, multi-stakeholder scheme. There are many stakeholders involved; nonetheless, it is necessary for each of them to conduct actions which can be delivered most efficiently. For instance, national government should provide atmosphere where local stakeholders can play active roles such as providing funds, decentralizing authorities, creating special economic zone, etc.



At the local level, local government needs to know community specific demand of assistance, and implement policies. At the same time, options and tools – regulatory (e.g. land use zoning) and non-regulatory (e.g. the acquisition and setting aside of hazard-prone lands) – should be set out and their costs and benefits closely studied. Relief aid conducted by NPOs and private companies is important as well as that of other municipalities. Coordination of these stakeholders’ activities is crucial, since national and prefectural governments cannot flexibly correspond various needs in local areas. Challenging task is to maintain consistent relief aids from these stakeholders; therefore, national government should set environment to facilitate enduring voluntary relief from different kinds of stakeholders.

#### ***Renewable energy promotion in Kuzumaki Town***

Kuzumaki Town is a leading locality in promoting renewable energy. Based in the mountainous area in Iwate Prefecture, Kuzumaki produces far more energy through its wind turbines, wood chips and bark, and cow dung than it consumes and sells the surplus to the local power company. The success of Kuzumaki can be attributed to its entrepreneurial mayor and ingenious staff of the town office trained in the leading dairy farm, Koiwai. Kuzumaki was successful in obtaining subsidies from the government. On the other hand, it also faces some constraints in expanding renewable energy. The local power company has a quota to buy renewable energy and it prevents the town from investing in renewables. The distance between the site and settlement area makes it difficult to promote cogeneration and

#### **4. Moving from linear to holistic thinking and contemplating deeper structural reforms**

Prosser and Peters explain that disaster resilience is characterized by its “complexity, interactivity and interconnectedness” that traditional linear policy thinking, which is reductionist and works from policy to solution within “tightly defined conceptual modes”, is unable to handle.<sup>xxiii</sup> They call for non-linear and holistic policy approaches, which require disaster resilience to be the collective responsibility of all members of society. The challenges are to facilitate both bottom up and high level engagement, and implement the principle of subsidiarity to promote local level flexibility within a strong national framework for disaster resilience.<sup>xxiv</sup> This understanding leads to the definition of a disaster resilient community as one that “works together to understand and manage the risks that it confronts, but is also aware of the responsibility of all levels of government.”<sup>xxv</sup>

Resilience includes the ability to “bounce back”, but this should not be viewed as merely returning to the way things were. Catastrophic natural disasters can highlight structural weaknesses in societies that make them vulnerable to large-scale natural hazard events. Deep structural reforms may be required, and the aftermath of a major disaster may allow for discussion of reforms that otherwise could not take place in “normal” circumstances.

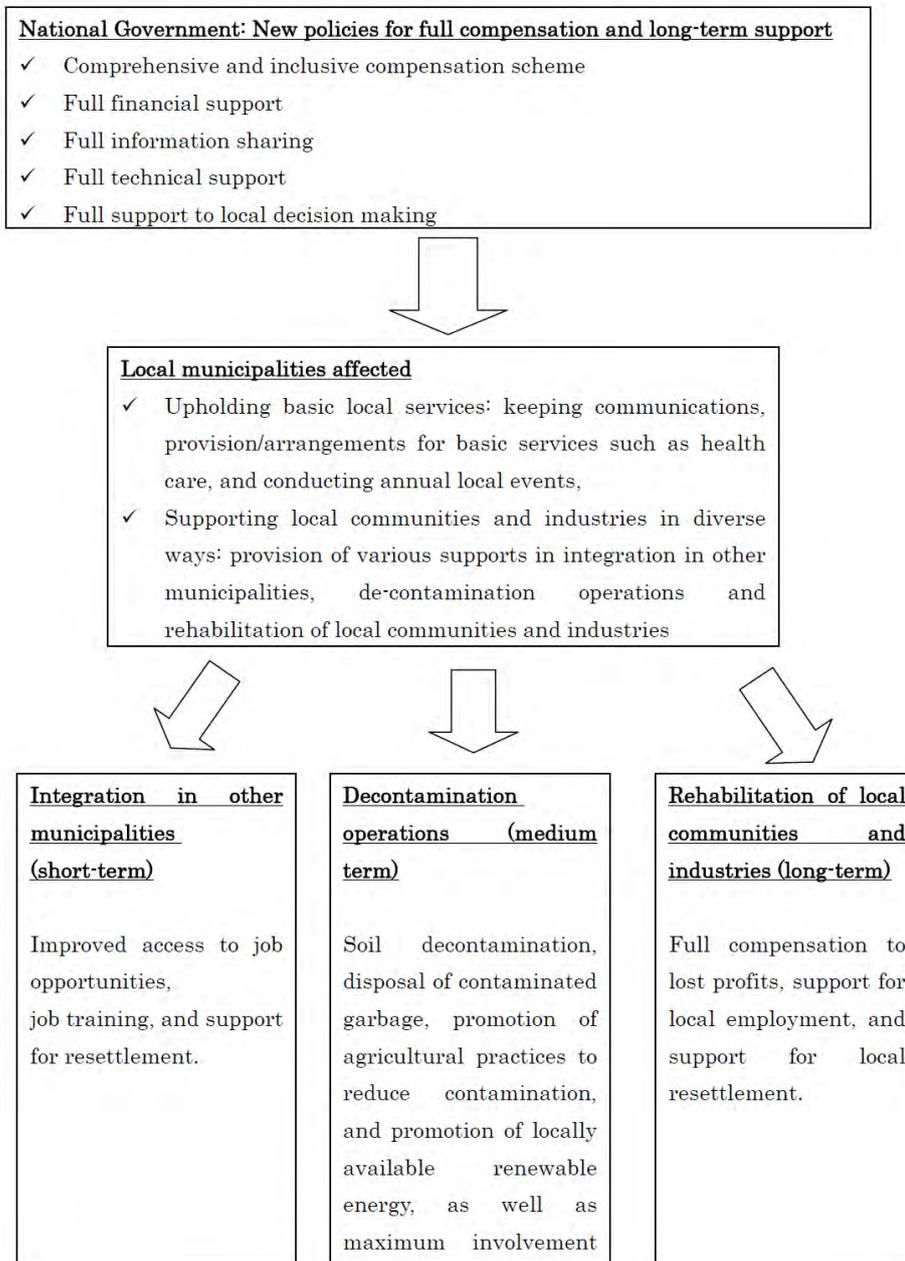
#### ***Dealing with waste***

Millions of tons of waste were generated by the EJGET that is now obstructing the reconstruction process but might also provide opportunities. Basic separation of waste has been undertaken, but this is not sufficient for final disposal. Biofuel production from wooden waste has been suggested as one way to make constructive use of the waste; however, this requires time for storing the waste and could interfere with reconstruction processes. Creating wave/tide breaking woodlands on waste mounds or using them for memorial parks have also been suggested, though the technical feasibility of these proposals needs to be further examined.

The EJGET has shown that the belief that the preventive measures taken against earthquakes and tsunamis at nuclear power plants were adequate was mistaken. This has led to a deep review of the nuclear power policy in Japan. At the G8 Summit in France, Prime Minister Kan explained his government’s determination to, as soon as possible, reduce Japan’s dependence on nuclear power by increasing the use of renewable energy such as solar, wind and geothermal power to 20% of the total electricity requirement of Japan by 2020. Will this be possible or “enough”? What other deep reforms are necessary for building disaster resilience in Japan that should now be on the discussion table? How can these reforms be embraced by a future vision for a low carbon, resource efficient, and resilient Japan? These and similar questions about deep reforms and a future national vision now need to be placed on the discussion table. Determining who should participate in this discussion and how it should be facilitated are equally important as deciding the subject matter.

In light of these questions, and to facilitate discussion on solutions, the following framework for rehabilitation in the Fukushima area of Japan near the damaged nuclear power plant was created:

### Suggested Framework for Rehabilitation of Fukushima



Approach to disaster areas in Fukushima should be different with others, since effects of radioactive materials need to be considered carefully. The diagram above lays out holistic approach divided into various levels. Considering characteristics of the hazardous materials, compensation scheme is major part of relief actions, including providing alternate lands for locals.

## 5. Conclusion and the way forward

The preceding sections have outlined major global issues facing policy makers and other stakeholders facing disaster management challenges using the triple disasters in Japan as a current case of risk, relief, and recovery. Globally the most outstanding success factor has been a marked reduction in mortality-risk from disaster. Saving lives is, for obvious reasons, of primary importance, but quality of life is also a fundamental development and disaster management issue. Economic growth and technological advances have added immeasurably to quality of life and changed the social, political, and environmental landscape more rapidly in the past century than any other period of time in history. However these advances have also opened up new risks due in part to the human contributions to climate change generated by our rapid growth, to remarkable technological advances such as nuclear energy, and infrastructure developed without sufficient planning for disaster risk. The latter two situations are arguably made all the more troubling by poor governance and institutional failures due in no small part to short-term thinking. The results of such actions are more extensive and intensive risks suffered mainly by the most vulnerable populations, and increasingly within more developed areas.

The sudden, shocking, and in some ways unexpected nature of the recent disasters, in particular the triple disasters in Japan, are cause for deeper discussion on vulnerability, risk, and the policy decisions that need to be made for building a resilient and sustainable society.

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<sup>i</sup> UNISDR (United Nations International Strategy for Disaster Reduction Secretariat). 2007. *Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters: Extract from the final report of the World Conference on Disaster Reduction*.

<sup>ii</sup> UNISDR (United Nations International Strategy for Disaster Reduction Secretariat). 2011. *Global Assessment Report on Disaster Risk Reduction*. Geneva, Switzerland: United Nations International Strategy for Disaster Reduction.

<sup>iii</sup> Ibid.

<sup>iv</sup> UNOCHA (United Nations Office for the Coordination of Humanitarian Affairs). 2010. *Haiti situation report 19*. New York, USA: United Nations Office for the Coordination of Humanitarian Affairs.

<sup>v</sup> Japanese Red Cross Society. 2011. *Japan: Earthquake and tsunami*. Operations Update n4. [http://www.jrc.or.jp/vcms\\_lf/kokusai\\_290611.pdf](http://www.jrc.or.jp/vcms_lf/kokusai_290611.pdf), accessed 12 July 2011

<sup>vi</sup> <https://www.cia.gov/library/publications/the-world-factbook/fields/2212.html>, accessed 12 July 2011.

<sup>vii</sup> Guha-Sapir, D., F. Vos, R. Below and S. Ponserre. 2011. *Annual Disaster Statistical Review 2010 – The Numbers and Trends*. Centre for Research on the Epidemiology of Disasters (CRED), Université catholique de Louvain – Brussels, Belgium, p.1.

<sup>viii</sup> Ibid. p.25.

<sup>ix</sup> UNISDR. 2011.

<sup>x</sup> Baritto. 2009. *Disasters, Vulnerability and Resilience from a Macro-Economic Perspective, Lessons*

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from the Empirical Evidence. Background paper for the 2009 ISDR Global Assessment Report on Disaster Risk Reduction.

<sup>xi</sup> Guha-Sapir, D., F. Vos, R. Below and S. Ponserre. 2011. p.1.

<sup>xii</sup> UNISDR. Undated. 2010 Disasters in Numbers.

[http://www.unisdr.org/preventionweb/files/17613\\_rectoversodisasters2010.pdf](http://www.unisdr.org/preventionweb/files/17613_rectoversodisasters2010.pdf), accessed 11 July 2011.

<sup>xiii</sup> Prosser, B. and C. Peters. 2010. Directions in Disaster Resilience Policy. *The Australian Journal of Emergency Management*, 25:3.

<sup>xiv</sup> McAslan, A. 2009. *The Concept of Resilience*. Torrens Resilience Institute, Adelaide.

<sup>xv</sup> Geis, D.E. 2000. By Design: The Disaster Resistant and Quality-of-Life Community. *Natural Hazards Review* 1(3). pp.151-160.

<sup>xvi</sup> Twigg, J. 2009. *Characteristics of a Disaster Resilient Community: A Guidance Note*. University College of London.

<sup>xvii</sup> JICA. 2008. *Building Disaster Resilient Societies: JICA's Cooperation on Disaster Management*. Japan International Cooperation Agency.

<sup>xviii</sup> Bruneau, M. and K. Tierney. *Resilience: Defining and Measuring What Matters*. Multidisciplinary Center for Earthquake Engineering Research.

<sup>xix</sup> Ibid.

<sup>xx</sup> Japanese National Police Agency. 11 July 2011. Damage Situation and Police Countermeasures associated with 2011Tohoku district - off the Pacific Ocean Earthquake. [http://www.npa.go.jp/archive/keibi/biki/higaijokyo\\_e.pdf](http://www.npa.go.jp/archive/keibi/biki/higaijokyo_e.pdf), accessed 11 July 2011.

<sup>xxi</sup> Ibid.

<sup>xxii</sup> Hirono, R. 2011. *East Japan Great Earthquake/Tsunami (EJGET) and Tokyo Electric Power Company's (TEPCO's) Fukushima No. 1 Nuclear Power Plant Disaster (NPPD), 11 March, 2011: Lessons Learnt from the EJGET and NPPD*. Presentation at the PECC Seminar, Perth, W.A., Australia, 11-13 April, 2011.

<sup>xxiii</sup> Prosser, B. and C. Peters. 2010. p.10.

<sup>xxiv</sup> Ibid. p.11.

<sup>xxv</sup> COAG. 2009. *National Disaster Resilience Statement*, Excerpt from Communiqué, Council of Australian Governments, Brisbane, 7 December. Quoted in Prosser and Peters. 2010. p.11.

(Prepared for the International Forum for sustainable Asia and the Pacific 2011 in July 26, 2011)



# POLICY BRIEF

June 2011 vol. 12

## Green Economy for Sustainable Development: Japan should lead the policy shift towards global poverty alleviation

### Policy Proposals

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The present socioeconomic activities of developed countries are in excess of environmental carrying capacity. Accordingly, the adoption of environmental taxes and payment for ecosystem services (PES) schemes that reflect the consumption of ecosystems services and environmental services on economic activities is required to establish a genuine green economy model that is compatible with environmental carrying capacity of the Earth. The creation of such a model calls for shifting away from values that excessively seek convenience and reconsidering lifestyles dependent on mass production and mass consumption.
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In order to spread the advanced energy and environmental technologies of Japan to emerging and developing nations eager to switch to green economy models, it is essential to carry out precise matching of needs, giving consideration both to Japan's green innovation and to the green economy models of emerging and developing countries. A detailed plan for international standardisation of technologies, regulations, norms and standards in the environmental field (in co-operation with other Asian countries) is also urgently required.
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In order to prevent policy on green economy from leading to green protectionism, efforts are necessary to create mechanisms by which green economy policies promote sustainable production within exporting countries. This can be accomplished through the bilateral combination of green certification and technology transfer to promote sustainable methods of production that fulfil the conditions of green certification.
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A framework to carry out effective green economy-related discussions that overcome the differing standpoints of countries must not be based on any uniform definition of green economy. Rather, we must promote flexible approaches that allow countries to utilise not only their own green economy policies but also those of others to achieve their priority goals, including poverty eradication, while sharing a common objective: to shift to green economy on a global scale.

(For further details on these proposals, please refer to p.6)



**Satoshi Kojima**  
Director  
IGES Economy and  
Environment Group  
kojima@iges.or.jp



**Kei Kabaya**  
Associate Researcher  
IGES Economy and  
Environment Group  
kabaya@iges.or.jp



**Takashi Yano**  
Policy Researcher  
IGES Economy and  
Environment Group  
yano@iges.or.jp

“Green economy” draws considerable attention internationally. “Green economy in the context of sustainable development and poverty eradication” will feature as a key theme for the United Nations Conference on Sustainable Development (UNCSD), to be held in Rio de Janeiro in 2012, marking 20 years since the Rio Earth Summit in 1992. The United Nations Environment Programme (UNEP) has carried out the Green Economy Initiative since 2008, and released the Green Economy Report in February 2011 (UNEP 2011). The Organisation for Economic Co-operation and Development (OECD) launched the Green Growth Strategy in 2008, and green growth is set forth as the theme for the 50<sup>th</sup> anniversary of its founding in 2011.

The concept of green economy is not new. It has been advocated since the late 1980s to imply a balance between environment and economy. Furthermore, the report released by the World Commission on Environment and Development (WCED 1987) in 1987, that put the concept of sustainable development in the spotlight, also sparked debate on green economies.<sup>1</sup> However, it was in the latter half of the 2000s that the green economy concept began to attract its current level of attention. At the Fifth Ministerial Conference on Environment and Development in Asia and the Pacific (MCED 2005), held in 2005 in the Republic of Korea, the Seoul Initiative on Green Growth was adopted as a regional co-operation framework aimed at achieving a balance between environmental preservation and economic growth through methods such as improvement of eco-efficiency. The Republic of Korea has since pursued green growth and a green economy with great fervour. President Lee Myung-bak, inaugurated in 2008, set forth “low carbon and green growth” as the national vision. Likewise, Japan set forth the formation of a “low carbon society,” a “sound material-cycle society”, and a “society in harmony with nature” as the pillars of its Strategy for an

Environmental Nation in the 21st Century, and policy and initiatives have been put into place toward forming a green economy.

The financial crisis of 2008 further raised the status of green economy to the level of a major global issue. As a means to overcome the financial crisis, many major industrial nations, including the US, the EU, Japan and the Republic of Korea, have laid out green new deal policies focused on employment creation and economic stimulus based on large-scale investment in renewable energy and other green industries. While the concept of a green economy has been highlighted as a method to stimulate economies based on growth of green industries, there is also debate on interpreting green economy as a shift from existing economic models focusing on GDP growth to more sustainable socioeconomic systems. Moreover, there are negative arguments against the green economy concept of developed countries that are blessed with advanced technological capacity and a wealth of funds and human resources. Doubts have been raised on whether the concept can provide a prescription for sustainable development on a global scale that includes emerging and developing nations.<sup>2</sup>

In this manner, while the green economy concept holds great potential and has captured the interest of many countries and international organisations, the lack of agreement on definition increases the risk of convoluting the debate. This policy brief will explore the debate regarding the green economy concept within the UNCSD process, and will cover initiatives in various countries from the perspective of advancement of global sustainable development. It will also analyse Japan’s initiatives related to green economy and make a proposal on the vital role of Japan in linking green economy policies from developed countries to global sustainable development.

<sup>1</sup> For instance, the work published as an introductory guide to environmental economics in 1989 by Pearce et al. (1989), that aroused a great deal of interest, defined a green economy as an economy in alignment with sustainable development.

<sup>2</sup> In this document, OECD member countries are referred to as developed nations, BRICS (Brazil, Russia, India, China and South Africa) as emerging nations, and all other countries as developing nations.

## I Trends in Debate on Green Economy within the UNCSD Process

The two Preparatory Committee Meetings and one Intersessional Meeting held by the UNCSD have played a key role in leading discussion on green economies. At the First Preparatory Committee meeting held in May of 2010, definition and interpretation of the concept of a green economy was the main subject of discussion, and arguments both for and against the concept were revealed. Issues of concrete green economic policy and the outcomes expected from UNCSD were also given the floor as framework for future debate took shape.

At the subsequent First Intersessional Meeting held in January 2011, a positive common recognition of the green economy as a means to realising sustainable development began to ferment. Debate on the content of a green economy also began to take shape, and became divided into roughly two categories. The first of these is international issues, such as support for

emerging and developing countries and the potential for environmental policies to hinder equity of trade (green protectionism); the second category involves domestic issues, such as the decoupling of economic growth from environmental burden and green taxation schemes including environmental taxes.

At the Second Preparatory Committee meeting held in March of 2011, attention focused more on concrete issues, in particular international issues, rather than the definition of a green economy. The debate covered support for technology transfer, financial assistance and capacity building for emerging and developing nations, as well as avoidance of green protectionism in international trade. In this manner, the debate on green economies within the UNCSD process has changed course with each meeting, shifting from debate on definition to more concrete issues, and from discussion on domestic issues to international ones.

## 2 The Respective Positions of Countries on Green Economy Initiatives and International Debate

Regarding initiatives towards a green economy, it is found that Japan purports formation of the three pillars (a “low carbon society,” a “sound material-cycle society”, and a “society in harmony with nature”). It is also clear from debate within the UNCSD process that international interest lies in the areas of “international co-operation” and “green protectionism”. Based on these issues, this brief presents the following overview of the respective positions of countries related to policy and international debate on green economies.

A glance at various countries shows that interest in low carbon societies is on the rise. The stable supply of energy, indispensable for economic activity, is an issue faced by most countries. The creation of low carbon societies requires a shift in energy source from fossil fuels to clean energy, which is less dependent on carbon. Plans and initiatives on the development and adoption of renewable energy in particular are gaining force in many countries. Improvements in energy efficiency are one way of switching to low carbon and are regarded as important in many Asian

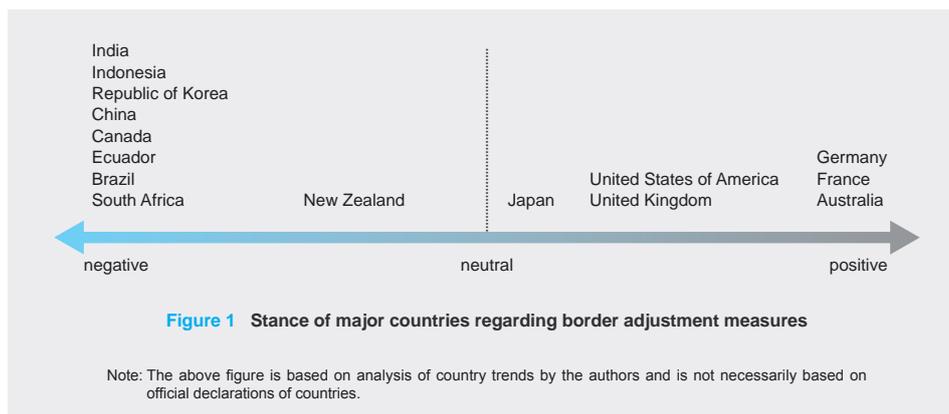
countries and developed nations. Many countries are engaged in initiatives in waste management and recycling in attempts to form sound material-cycle societies. Environmental labelling and green purchasing initiatives have been carried out mainly in OECD member nations, with Europe implementing the most aggressive measures in this area. However even in Europe, where importance is attached to resource efficiency, it is rare to find cases that utilise these measures to achieve a fundamental shift towards systems based on environmental carrying capacity. In response to calls to create societies in harmony with nature, many countries carry out biodiversity conservation efforts or economic value assessment of ecosystem services. Aiming to measure the costs of environmental burdens such as pollution and to reflect economic value assessment of ecosystem services in policy formation, the UN and World Bank have taken on a leading role in advancing the development of green national accounting.

An examination on the progress of initiatives in various countries shows that of the three areas, relative headway has been made in the formation of low carbon societies. This state is due to the vigour of private industry activities. Namely, the low carbon market has already been established and is closely related to energy issues toward which private investments have actively been made. Measures aimed at the formation of sound material-cycle societies are both those that promote cyclic use of resources and those that control and manage the toxic substances and waste formed in course of resource use. While pricing mechanisms function effectively for the former, adjustments based on market mechanisms do not adequately function in the case of the latter. Initiatives related to the formation of a society in harmony with nature are insufficient. Namely, the costs of restoring ecosystems and the value of ecosystem services are neither necessarily reflected in the pricing of goods and services nor integrated into market mechanisms. National accounting has drawn attention as an attempt to internalise these costs and values. However, mere comprehension of the state of environmental and ecosystem capital use is insufficient. The pressing issue remains as to whether these costs and values can be reflected in actual market prices through payment for ecosystem services (PES) or other schemes.

In order to shift from the current brown economy to green economy, funds and technology are essential regardless of the stage of economic development. Developing countries in particular, without sufficient funds and technology, have strongly asserted that developed countries should provide support. On the other hand, while developed countries understand the necessity of international co-operation in creating green economies, and have promoted funding and technological support, most efforts are related to the formation of low carbon societies: very few international efforts have been seen in the formation of sound material-cycle societies and societies in harmony with nature. One cause of this discrepancy is the fact that initiatives are not appropriately integrated into market mechanisms, much in the same manner as debate over domestic initiatives. Furthermore, there is

neither an international treaty related to the formation of sound material-cycle societies, such as the Framework Convention on Climate Change for low carbon societies, nor international funding mechanisms related to the formation of sound material-cycle societies. Another factor is the difference of geographical scopes. While global issues such as the reduction of greenhouse gas emissions are relatively easily justifiable for international co-operation, the formation of societies in harmony with nature is an issue greatly influenced by local conditions, and is difficult to address through international co-operation.

Regarding green protectionism, there are fears that green certification and border adjustment measures could be used to protect domestic industries. Green certification is a method of awarding certification to products that meet environmental standards as a means to differentiate them from those that do not. If based on the high environmental standards that follow developed nations' technological capacity, green certification has the potential to hinder the exports of developing countries. Moreover, border adjustment measures could potentially lead to excessive protection of domestic industries. Border adjustment measures aim to prevent decline in the international competitiveness of countries that have adopted climate change mitigation measures, such as carbon tax and emissions trading schemes, in relation to countries that have not adopted similar measures. They are a system for re-funding climate change mitigation costs on exports to countries that have not adopted measures or of taxing imports from these countries. The respective positions of major countries on border adjustment measures are shown in Figure 1. With the exception of certain countries, Annex I countries to the Kyoto Protocol either support or favour these measures, while non-Annex I countries are opposed. In general, the figure shows the juxtaposition of developed versus emerging and developing nations, with emerging and developing nations particularly fearful of green protectionism. Therefore, creation of a system that allows for the realisation of the primary goals of border adjustment measures while avoiding the traps of green protectionism is necessary.



### 3 The Green Economy Aspirations of Japan and Related Issues

The course Japan has mapped toward a green economy and the initiatives underway in that direction warrant examination. Furthermore, the stance Japan has revealed on the major points of debate within the UNCSD process (namely support for technology transfer, financial assistance and capacity building and avoidance of green protectionism), is also examined herein.

Japan named the Environment and Energy Superpower Strategy based on green innovation one of the seven strategies of the New Growth Strategy set forth by cabinet decision in 2010. Policies and initiatives with relevance to the economy are being put in place toward formation of a “low carbon society”, a “sound material-cycle society” and a “society in harmony with nature”, as set forth in the 2007 Strategy for an Environmental Nation in the 21st Century. The low carbon field in particular has heralded attention from industry, government and academic sectors, and relevant activities are particularly robust, including development of low carbon technologies and deliberation on taxes for global warming mitigation, as well as drafting of a roadmap for reduction of greenhouse gas emissions. On the other hand, economic policies on sound material-cycles and harmony with nature are at present less advanced. Some efforts are evident, such as the initiative to reflect the resource productivity indicators adopted domestically in the OECD Green Growth Strategy, as well as the declaration of intent to support the partnership on green national accounting promoted by

the World Bank. While the former focuses on production efficiency, the fact that the initiative will not bring about reduction in production or consumption volume itself is an issue. Regarding the latter, there is doubt that the political will exists domestically to adopt measures in earnest, from the perspective of a shift from conventional national accounting.

Regarding support for technology transfer, financial assistance and capacity building and avoidance of green protectionism, two issues under debate in the UNCSD preparatory process, Japan has shown a favourable stance towards the former, but has not revealed its position on the latter. In the background of Japan’s support for international co-operation in building green economies lies its experience in carrying out numerous development support projects in social infrastructure and other fields, mainly in Asia. As a matter of fact, the New Growth Strategy clearly states the intent to unfold environment-related social infrastructure provision packages in Asia. However, the prominence of China and the Republic of Korea in recent years is striking, and competition in the Asian region has intensified in Japan’s strong areas of environmental technologies and advanced infrastructure provision. Hence, support paired with national interest certainly requires a shift from conventional methods as well. Meanwhile, avoidance of green protectionism must be considered, including measures to address various situations. Japan must consider whether or not to levy tax on imported products equal to that of

domestic ones if carbon taxes are domestically adopted. Further, this stance must be revealed to the

international community.

## 4 The Vital Role Japan Should Play in the Realisation of Green Economies: a Proposal

The twin ultimate objectives of green economies on the path to realising sustainable development are poverty eradication and a shift towards socioeconomic systems compatible with environmental capacity of the Earth. Meanwhile, promotion of a green economy is a pressing issue for Japan. It is an approach to creation of a sustainable society through employment generation and economic growth while tackling environmental commitments such as the achievement of emissions reduction targets agreed upon in the Kyoto Protocol. We propose the following win-win approach, in which Japan's green economy policy can be utilised to solve global issues, while contributions to the world through international co-operation can in turn lead to promotion of Japan's green economic policy.

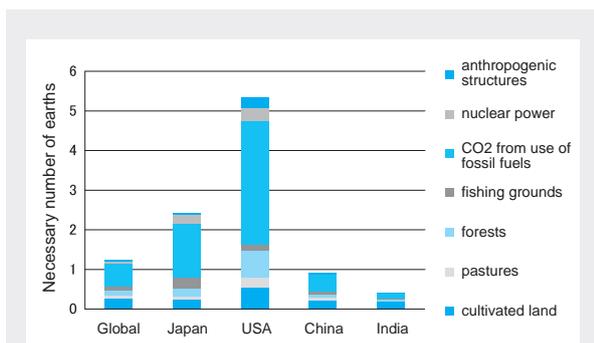
- Creation of a green economy model compatible with environmental carrying capacity of the Earth
- Promotion of international co-operation and green innovation via dispersion of Japan's energy and environmental technologies
- Formation of trade policy that promotes sustainable production while guarding against green protectionism
- Contribution to international debate on green economies

### (1) Creation of a green economy model compatible with environmental carrying capacity of the Earth

Along with advancing various policies on the 3Rs, Japan has pioneered policy for realising a sound material-cycle society that takes into account controls on resource use, such as the application of resource productivity indicators as policy objectives. Furthermore, revision of energy policy greatly dependent on nuclear power is unavoidable following the critical accident at the Fukushima Daiichi Nuclear Power Plant, and the need to control the volume of resource use according to environmental carrying capacity of the Earth, including energy consumption, has become widely recognised. The shift to a socioeconomic system that

is compatible with environmental carrying capacity of the Earth is an extremely difficult issue. It will sometimes require industrial restructuring which may make considerable and painful reductions in scale in some industrial sectors. The majority of debate on green economy makes allowances for affected industries and tends to be limited to discussion on improvement of productivity and efficiency that does not require extensive adjustments to the scale of activity. However, it has become widely recognised that the socioeconomic activities of developed countries at present are in excess of environmental carrying capacity of the Earth. If all people in the world realised a standard of living on par with developed countries, the Earth would suffer too heavy a burden to withstand. Developed countries are strongly called upon to make earnest efforts to realise genuine green economies that are compatible with environmental carrying capacity of the Earth. It is essential to shift away from values that excessively seek convenience and to rethink lifestyles dependent on mass production and mass consumption.

In two regards, Japan enjoys advantageous conditions for the creation of a green economy model. First, Japan has a record of past achievements in promoting policy aimed at creation of a sound material-cycle society. Moreover, the recent earthquake and nuclear accident have resulted in an opportunity to review the appropriate socioeconomic systems. If we consider the present crisis as a critical turning point for shifting to a green economy compatible with environmental carrying capacity of the Earth, such a shift would not only spur Japan's sustainable development, but would also facilitate other developed nations to develop their own green economy models. It would further lead to securing the resources required for provision of the fundamental infrastructure essential to the eradication of poverty in developing countries. Such a shift would be a great contribution to international society.



**Figure 2 Ecological footprint (2003)**

Prepared by the authors based on WWF research (2006).  
 Note: This figure shows the amount of environmental resources that would be required if all people in the world were to lead lifestyles at the various consumption levels (y-axis units: number of earths). For example, if all people of the world lived at the same consumption level as the people of Japan, approximately 2.44 earths would be required. The breakdown in color shows that the contribution of CO2 from use of fossil fuels (the area of forests required for absorption) is large. Moreover, nuclear power energy is shown in fossil fuel conversion.

From the perspective of facilitating the shift to a green economy, we must consider mechanisms for reflecting our consumption of ecosystem services and environmental services on economic activity, such as environmental taxes and PES schemes. Furthermore, the adoption of green national accounting and environmental accounting in private industry must be deliberated in order to reflect the value of the ecosystem and environmental capital that provide these services onto accounting systems.

**(2) Promotion of international co-operation and green innovation via dispersion of Japan’s energy and environmental technologies**

Dispersion of Japan’s advanced energy and environmental technologies to the emerging and developing countries that are eager to shift to green economies is another important international contribution. For instance, export of social infrastructure projects in water-related technologies and green transportation, both in partnership with private industries and utilising overseas development assistance (ODA), has the potential to link the promotion of a green economy in Japan to the eradication of poverty and facilitation of sustainable development in developing countries. Japanese companies could also benefit by securing a market for green products.

In order to materialise this win-win solution, a detailed matching process that takes into consideration the perspectives of both Japan’s green innovation and the green economy in emerging and developing countries is essential. It is further imperative to immediately draft a detailed plan for international standardisation of technologies, regulations, norms and standards in the environmental field in co-operation with other Asian countries. Utilising the knowledge Japan has accumulated related to policy on the 3Rs, investigation and information provision in areas where potential need for technological and financial support is high (such as creation of sound international systems for cyclic use of resources) could be effective. Additionally, if the economic benefits of the sustainable use of ecosystem services can be reflected in market mechanisms through adoption of green national accounting, technological innovations in the use of ecosystem services (green agriculture technologies and technology to utilise lumber from thinning), which have developed comparatively slowly until now, can be expected. This would further enable international co-operation related to the creation of societies in harmony with nature.

**(3) Formation of trade policy that promotes sustainable production while guarding against green protectionism**

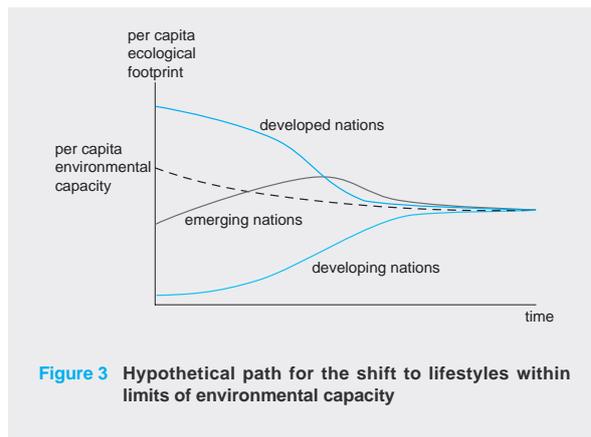
In order to avoid green protectionism, mechanisms to prevent obstacles to equitable trade must be deliberated based on assessment of the influence of green economic policy on trade and the environment. Efforts are also necessary to venture even further to create mechanisms that allow for policy to promote sustainable production on the part of exporting countries. For instance, if green certification and technology transfer are paired bilaterally, sustainable production methods to meet with green certification are facilitated. Research on sustainable production and border adjustment measures is relatively embryonic. If proposals on such mechanisms are made through new policy research in addition to existing research, further important international contributions can be made.

**(4) Contribution to international debate on green economies**

Differences in the standpoints of countries within

the international debate on green economies have become evident. While some countries have doubts about the concept of green economy or believe the concept should be loosely defined according to the circumstances of respective countries, some argue that if the definition of a green economy is made overly flexible, the validity of the concept itself will be damaged. A major point of dispute is the fear that the concept of green economy according to developed nations is premised on green technologies and will thus be a constraining factor on development in least developed countries in particular.

In order to address this negative potential and to advance constructive debate that overcomes the different standpoints of countries, it is desirable to allow countries to utilise not only their own green economy policies but also those of others to achieve their priority goals, including poverty eradication, while sharing a common objective: to shift to green economy on a global scale. For instance, realisation of green economies in developed countries could imply a shift to socioeconomic structures that are compatible with environmental capacity and environmental constraints. For emerging and developing countries, realisation of green economies could imply becoming greener (such as improvements in efficiency and advances in productivity in countries eager to improve energy efficiency and resource efficiency). At the same time, it



**Figure 3** Hypothetical path for the shift to lifestyles within limits of environmental capacity

is important to pursue a win-win approach which links these green economy policies to poverty eradication and the promotion of sustainable development in countries apprehensive that the green economy concept will put constraints on development.

Application of such a flexible approach allows for countries with differing standpoints to debate on an equal footing, and paves the way for debate on ways to facilitate co-operation among countries with differing circumstances. As international debate on the green economy concept is furthered in the future (both within the UNCSD process and otherwise), creation of a framework for effective debate that overcomes differences in country standpoints will surely be an important intellectual contribution.

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**Institute for Global Environmental Strategies**

2108-11 Kamiyamaguchi, Hayama, Kanagawa, 240-0115 Japan  
 TEL : +81-(0)46-855-3700 FAX : +81-(0)46-855-3709 E-mail: [iges@iges.or.jp](mailto:iges@iges.or.jp) <http://www.iges.or.jp>

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Author:



Anindya Bhattacharya  
Policy Researcher  
IGES Economy and  
Environment Group  
[bhattacharya@iges.or.jp](mailto:bhattacharya@iges.or.jp)

## Renewable Energy: A Strategic Policy for Sustainable Development

*Anindya Bhattacharya*

There is ample evidence of underproduction of renewable energy across the world, in spite of there being the necessary resources to produce RE, including technology and finance. It seems politicians and law-makers have yet to be persuaded about the importance of renewable energy to solve the problem of energy security and sustainable development and to act on it seriously. As a matter of fact, renewable energy sectoral investment is highly correlated to the international oil price movement. This further proves the continued myopic views of the law-makers about the spectrum of benefits that renewable energy brings. Hence, a lack of steady policy support for renewable energy is not only jeopardising the matured development of this promising market but also stopping the world from taking advantage of using it for multipurpose benefits including its use as a risk hedging instrument in the increasingly uncertain conventional energy market. Renewable energy policy has fallen into the trap of a boom-bust cycle of world economy and the corresponding international energy price fluctuation. Such policy is therefore unable to deliver its full benefit to society, including creation of green collar jobs and even reducing the electricity tariff for consumers. To overcome this bottleneck, the author has suggested a two-tier solution. First, mainstreaming risk-explicit cost benefit analysis of renewable energy policy at a country-specific level and second, improving regional cooperation to harness the maximum benefits of available resources scattered across countries with geographical proximity. It is indeed a strategic choice for the policy-makers to decouple renewable energy development activities from the boom-bust cycle of economy for seamless progress towards sustainable development.

Many Governments and law makers have not yet been persuaded on the direction of mainstreaming renewable energy generation in the overall energy policy development processes in the world. Renewable energy-based green power policy is still considered to be an expensive path for development, and so even after several boom-bust cycles of the world economy, policy makers remain hesitant to take a target based approach to increase green energy supply in the total energy mix. There are several other cases in and around Asia where in spite of having excellent potential and a good enabling environment, renewable energy is still heavily underproduced. It seems that politicians and lawmakers are yet to be persuaded about the use of renewable energy to address the issues of energy security especially in the case of energy price fluctuation. It has been estimated that out of 2700 Twh total theoretical potential of renewable energy in Asia, only around 6% has been harnessed (Romero et al 2008). In fact, technical and financial constraints can limit the commercially available renewable energy by around a half of the total theoretical potential. While it is true that many governments are now proactively promoting renewable energy in the face of imminent price hikes for fossil fuels due to increasing demand, there are several countries which have not yet taken actions to add more renewable energy into the supply mix and which are still focusing on a future energy supply based on fossil fuel. As a matter of fact, the new concept of Green New Deal, a green economy policy initiative which also includes renewable energy, might also be very short lived indeed as it primarily depends on the individual country's plan of future development and growth.

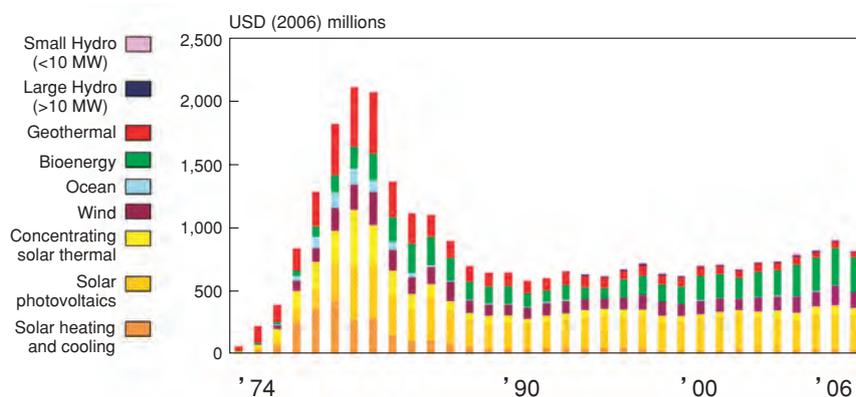
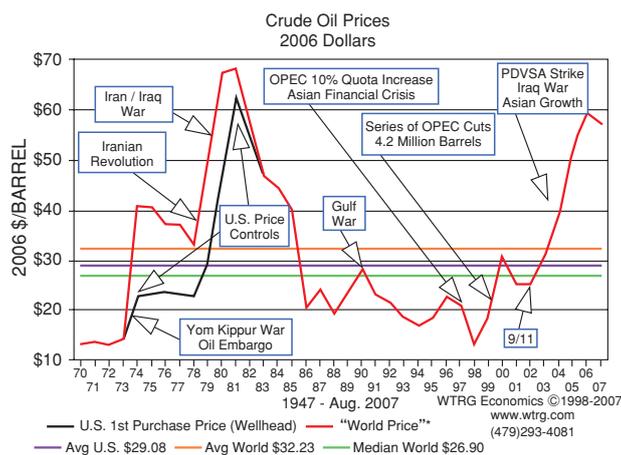
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*“Whenever there is an increase in oil price, more green energy budgets tend to be introduced into the market.”*

In the past, whenever the price of fossil fuel fell for various reasons including economic recession, there was a sharp reduction in renewable energy investment and Research and Development (R&D) budget along with a drop in decisions to adopt new policies to promote renewable energy. Figure 1 below consists of two juxtaposed graphs showing the trend in the last couple of decades of total research and development budget allocation for renewables especially solar and wind in IEA member countries, and compares this trend to international oil price fluctuations. It indicates that whenever there is an increase in oil price, more green energy budgets tend to be introduced into the market. This is not only the case for the developed world but also in developing countries too. Anticipating more uncertainties in the world economy in the near future, oil and other fossil fuel prices are expected to remain volatile in nature. Hence, renewable energy will continue to be subject to the boom-bust cycle of fossil fuel prices in the international market.



Source: IEA, 2008

Figure 1: Renewable energy R&D budget compared to the crude oil price

The major problems arising out of such fluctuation in renewable energy policies are a decrease in investment interest from the private sector companies in this sector as well as an increasing amount of sunk cost<sup>1</sup> which is finally becoming irrecoverable and is a bad investment for the whole economy. Overall, the inconsistent and fluctuating government policies in the renewable energy sector creates boom/bust cycle in the market jeopardising any long-term investment planning by companies. The renewable energy sector is still in the developing stage and so needs continuous policy support from the Government to become matured. It is difficult for private sector investors to afford longer market uncertainties while the main onus is on the government to create enabling environment for renewable

*“Inconsistent and fluctuating government policies in the renewable energy sector creates boom/bust cycle in the market jeopardising any long-term investment planning by companies.”*

<sup>1</sup> Sunk cost refers to the investment which never gives a return to the investors.

*“Having negative perception about the relatively longer time span needed to accrue the benefits of high-cost renewable energy”*

*“Underestimating the co-benefits of renewable energy such as power sector investment risk coverage.”*

*“Ignoring the benefit of larger use of renewable energy to create downward pressure on retail energy prices.”*

energy investment. As a matter of fact, abandoning one 5 MW wind farm (on-shore) project during its construction period will generate around USD5 million in sunk assets which will never give any return. Similarly, a 10 MW solar PV project if abandoned can generate USD25 million in sunk assets plus around 70 year-round jobs (Kobos et al.)

Lack of understanding of comprehensive benefits of renewable energy use is perhaps the main reason of failure to persuade the law makers for having a stable renewable energy policy in the country. There could be three main reasons for lack of understanding. The first one is, having negative perception about the relatively longer time span needed to accrue the benefits of high-cost renewable energy compared to conventional energy. Although the gestation periods for renewable energies are much shorter than conventional large scale power plants but their pay back periods are still very long mainly due to high installation costs and lower off-take level. In Japan, pay back time is around 10 years for solar energy even with the increased level of Feed-in-Tariff scheme. It may take more than 5 to 10 years to observe the net benefits of the green energy supply in the economy.

The second one is, underestimating the co-benefits of renewable energy such as power sector investment risk coverage. Benefits are accruable even in a shorter time. Renewable energy investment in an investment portfolio for the electricity sector can be considered a substitute to risk insurance premium which is paid mainly to mitigate the adverse impacts of a sudden rise in oil prices or a sudden increase in carbon price. The mechanism of using renewable energy as risk coverage insurance is based on the modern financial market portfolio theory whereby an increasing number of less risky assets in an investment portfolio whose investment returns are not correlated among each other can actually hedge the risk of single asset investment. The investment return should be seen from the portfolio's total return perspective rather than any individual investment return. Energy portfolio diversification with more renewable energy options whose fuel supply risk is nil or very low could actually give a wider space for risk mitigation of fossil fuel price fluctuation.

The third one is, ignoring the benefit of larger use of renewable energy to create downward pressure on retail energy prices. More renewable energy means reduced demand of fossil fuels for power generation and therefore, reduced price of fossil fuels in the market. Less expensive fuel can further help to compensate consumers' additional spending on higher electricity tariff due to increased level of expensive renewable energy supply. It has been estimated that in the United States, a 1% drop in natural gas demand can reduce the long-term wellhead gas price by 0.75-2.5% (Wiser, 2004) and there would be a subsequent reduction of retail gas prices on the market. In certain cases like wind and solar PV technologies, use of renewable energy may not increase the retail tariff for the consumers (like remote area water pumping, refrigeration, street lighting etc. WEC, 1994) but can still help to reduce the fossil energy demand and prices subsequently. Moreover, as explained by Neij (1997), learning-by-doing can also reduce the costs of renewable energy supply which further increases the net benefits of renewable energy for retail fossil energy price reduction. There are three different studies ( EIA, UCS and Tellus) shown together in Figure 2 below which demonstrate the impacts of increasing renewable energy generation ( by increasing RPS quota from 10% to 20%) on average wellhead gas price on the US market. It has been estimated that increasing RE generation from 50 to 800 Billion kWh can reduce the average wellhead gas price by 60 cents/MMBtu. This indicates that even though renewable energy is apparently expensive, it has a certain damping effect on the fossil fuel price by controlling the demand in the market<sup>2</sup>

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<sup>2</sup> Set of these studies predict that increase in renewable energy generation can cause a reduction in US natural gas consumption within the range of 1 to 11% and this can further suppress the natural gas prices within the range of zero to 18% ( Bolinger et al. 2008) ( The broken line indicates the trend of decreasing well head gas price compared to increasing level of renewable energy generation)

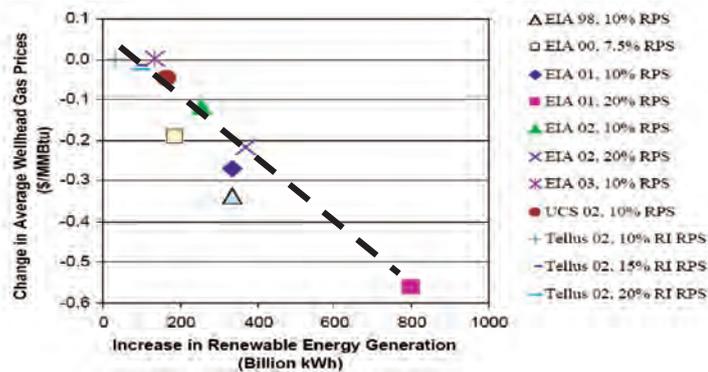


Figure 2: Renewable energy generation Vs Wellhead Natural Gas Price

It is a policy decision of the law-makers to create an enabling environment first where investors can invest more in renewable energy in spite of it not being cost competitive. In the end, by virtue of the economy of scale and learning by doing, the renewable energy sector itself can break the inertia of growth which will bring benefits to the consumers by helping to reduce the electricity tariff. Thus an increase in the supply of renewable energy can bring an additional benefit to the whole economy in the long term.

*“Risk explicit cost benefit analysis of the renewable energy is very much needed.”*

In this respect, risk explicit cost benefit analysis of the renewable energy is very much needed. Policy makers should think of an effective alternative to reduce the risk of international fossil fuel price fluctuation and its negative economic and financial consequences on the national economy. Risk covering financial instruments like forward contracts and options which sometimes account for a half of the total supply cost, often play a decisive role in investment planning in the highly price-sensitive energy market. In natural gas importing countries like the United States, power companies are paying 0.4 to 1.7 cents/kWh (Bolinger et al, 2008) additionally to the gas supplier as price premium just to have a long-term price contract to avoid very high prices in the spot market. From 1996 to 1999 oil importers in the United States already paid around USD 5 per barrel as premium for a 12 month contract compared to the world average price of crude oil, which is around 17 to 20 billion USD per annum (EIA, 2009). Very recently, US crude oil futures for delivery in 2014 are traded at USD 80/barrel while the market price was just USD 50 /barrel. This further indicates that even during the lower crude oil price oil importers are still ready to pay hefty premiums (USD 30/barrel in this case) just to avoid supply uncertainty. Risk explicit cost benefit analysis of the power sector investments can influence the investors in favor of renewable energies even though they are apparently more expensive than the conventional sources. It is therefore, important for the law makers to create an enabling environment in the market where the investment risks not covered by the government are explicit. It has been estimated that a 1% increase in renewable energy supply in the Japanese electricity supply portfolio can reduce the portfolio risk by 1% which can significantly reduce the expenditure on risk-covering premiums (Bhattacharya and Kojima, 2010).

*“Regional cooperation can help to have cost competitive renewable energy supply domestically.”*

Regional cooperation can help to have cost competitive renewable energy supply domestically. Policy-makers can also think of increasing multi-country regional cooperation to enhance the utilisation of renewable energy in the domestic market. There is unlikely to be uniform distribution of the renewable energy potential among the countries. To avoid both underutilisation and higher marginal production costs, regional cooperation among the countries to harness all possible potential of renewable energy can overall bring a win-win solution to the problem of high cost. Quite often it happens that the RE potential lies within the country which has less capacity to harness, in contrast to having less potential than a more capable country. To avoid such disparities, having cross border renewable energy infrastructure development can be a win-win solution. It has been estimated that

Jinghong hydro power project in the Yunnan province of China can export more than 3 million kW of electricity to Thailand over a cross border transmission system by 2017. This would be around 30% less expensive compared to the cost of same amount of electricity production in Thailand (Bhattacharya et al. 2009). Similarly, a power transmission line connecting China, Republic of Korea (ROK) and Russian Far East (RFE) can help to bring hydro electric power from RFE to ROK during summer and RFE to China during winter to meet the peak demands. RFE power flows to China can displace coal-fired power generation within China. As a matter of fact the net benefits of such interconnection could be around USD 750 million per year as avoided costs in the recipient countries like China and ROK (Hippel, 01). Moreover, this kind of project can also bring a win-win solution to the macroeconomic effects on both the countries in terms of increased GDP. Both China and Thailand can expect their respective GDP to increase by USD76 and USD47 million respectively thanks to this Jinghong hydro power project alone. In addition, both the countries would be able to reduce CO<sub>2</sub> emissions by 1 million tonnes each. Table 1 shows the impacts of Jinghong cross border hydro power project investment on China and Thailand.

Table 1: Impacts of energy sector investment on economy and environment in Asia

Countries	Cross border hydro project investment	Impact of cross border hydro project investment on GDP growth	Impact of energy sector investment on CO <sub>2</sub>
	Million USD	Change from BAU (Million USD)	Change from BAU (mil.t-CO <sub>2</sub> )
China	3090	76	- 1.0
Thailand		45	- 0.9

Source: Bhattacharya and Kojima, 2009

*“Creating green collar jobs.”*

Creating green collar jobs. Policy-makers can use renewable energy to create a new employment category called ‘green collar jobs’ and can then even improve the national employment rate amidst global economic downturn. Table 2 shows the job creation potential of each renewable energy technology on a global average basis which is indeed comparable to conventional power generation cases. In fact, the US economy under the Obama administration is now emphasising the green growth mechanism in spite of the ongoing economic recession to create more “green-collar” jobs to address both the environmental and the economic development issues together. It is expected that this new economic stimulus package worth around USD one trillion, can create more than 3.5 million jobs in the United States. Table 2 below shows how different renewable energy technologies can create employment at different stages of development. It appears that there are more jobs created during the commissioning period than after commissioning. Nevertheless, the renewable energy sector can further nourish the development of a skilled global labour force that is required for its long term operation and maintenance activities. In Asia, given the potential of renewable energy generation and given its employment generation capacity, around 1 million jobs can be created<sup>3</sup>. Apart from such organized sector job creation, renewable energy can immensely contribute towards the rural livelihood generation through unskilled and semi-skilled job creations. Renewable energy can even engage women in the income generating activities in the rural areas which can further create multiplier effects on the national economy as well ( Mehta et al.). Finally, while the policy-makers puzzle over the issue of effective utilisation of the billions of dollars of special stimulus money to revitalise the economies across the world, investment in renewable energy can bring relief to the economy.

<sup>3</sup> Number of jobs has been estimated using both the REN21 projection of number job creation per MW of renewable energy and estimated Asian renewable energy potential (Romero et al. 2008). As a conservative estimate it is assumed that only 50% of the total theoretical potential would be harnessed.

Table 2: Employment generation potential of renewable energy technologies

Technology	Estimates of Employment Coefficients ( No. of Job/MW)		
	Manufacturing & Installation	O & M	Total
Thermal (Conventional)	2	5	7
Small hydro	11.3	0.22	11.52
Wind	2.6	0.3	2.9
Biomass	3.7	2.3	6
Solar PV	7.1	0.1	7.2
Waste to energy	3.7	2.3	6

Source: REN21 RE Global Status Report 2007, p37

## Conclusion

By virtue of its less risky characteristics coupled with other benefits including dampening impacts on fossil fuel prices, electricity tariff and enlarging impact on macroeconomic outputs, employment status etc., renewable energy can bring a win-win solution to this world which is reeling under severe economic, social and environmental crisis. Moreover, based on the previous discussion, renewable energy can be treated as context neutral strategic solution for sustainable development and can be freed from any conditionality of the surrounding economic situation. Unfortunately, global renewable energy policies appear to be very unpredictable and closely follow the trends in fossil fuel prices, which is further linked to the economic boom-bust cycle. Instead of their context neutrality nature, the reality surrounding renewable energy development is still very much subject to context. However, we can no longer afford to continue with such swinging policies of renewable energy which can permanently jeopardize sustainable economic growth. The world cannot afford to see another oil shock in the near future either, and so needs to invest more on renewable energy. If so, that will determine the point of no return on the path to sustainable development. Policy and law makers should realise that given the level of uncertainties in the modern economy, it is almost impossible to predict the energy market with any reasonable certainty. As a matter of fact any delay could prove very costly. It is much safer to develop an alternative like renewable energy to protect the world from future energy uncertainties and to ensure a sustainable growth path. Continued promotion of renewable energy is therefore indispensable for modern society.

*“Renewable energy can bring a win-win solution to this world which is reeling under severe economic, social and environmental crisis.”*

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**Institute for Global  
Environmental Strategies**

2108-11 Kamiyamaguchi, Hayama,  
Kanagawa, 240-0115 Japan  
TEL : +81-(0)46-855-3700  
FAX : +81-(0)46-855-3709  
E-mail: [iges@iges.or.jp](mailto:iges@iges.or.jp)  
<http://www.iges.or.jp>

IGES Policy Report-2011-04

Strengthening international  
environmental governance  
by two-phased reform of UNEP:  
Analysis of benefits  
and drawbacks



Governance and Capacity Group, Institute for Global Environmental Strategies (IGES)



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**STRENGTHENING INTERNATIONAL ENVIRONMENTAL  
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**Simon H. Olsen and Mark Elder**

## **Institute for Global Environmental Strategies (IGES)**

2108-11 Kamiyamaguchi, Hayama, Kanagawa, 240-0115, Japan

Tel: +81-46-855-3720 Fax: +81-46-855-3702

E-mail: [iges@iges.or.jp](mailto:iges@iges.or.jp)

URL: <http://www.iges.or.jp>

### **Strengthening International Environmental Governance by Two-phased Reform of UNEP: Analysis of Benefits and Drawbacks**

IGES Policy Report

**AUTHORS: SIMON H. OLSEN, POLICY RESEARCHER, AND MARK ELDER, PRINCIPAL RESEARCHER AND DIRECTOR; GOVERNANCE AND CAPACITY GROUP  
INSTITUTE FOR GLOBAL ENVIRONMENTAL STRATEGIES (IGES)  
2108-11 KAMIYAMAGUCHI, HAYAMA, KANAGAWA, 240-0115 JAPAN;**

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## ACRONYMS AND ABBREVIATIONS

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ASEAN	Association of Southeast Asian Nations
CBD	Convention on Biodiversity
CM	Council of Ministers
COP	Conference of the Parties
COW	Committee of the Whole
CPR	Committee of Permanent Representatives
ECOSOC	Economic and Social Council
EMG	Environment Management Group
EU	European Union
GA	General Assembly
GEF	Global Environmental Facility
GHG	Greenhouse gases
GEGC	Global Environmental Governing Council
GC/GMEF	Governing Council/Global Ministerial Environment Forum
IEG	International Environmental Governance
ILO	International Labour Organization
LDC	Least developed country
MEA	Multilateral Environmental Agreement
MoU	Memorandum of Understanding
SWMTEP	System-wide Medium Term Environment Programme
TEMM	Tripartite Environment Ministers Meeting
UM	Universal Membership
UNEO	UN Environment Organization
UNEP	UN Environment Programme
WEO	World Environment Organization
WHO	World Health Organization
WMO	World Meteorological Organisation
WTO	World Trade Organisation

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Although this work provides recommendations for international environmental governance, the views and opinions contained within are those of the author alone, and in no way does it imply the endorsement or acquiescence of the Ministry of Environment or any other government agency in Japan.



## ABSTRACT

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This paper aims to contribute to the debate on strengthening international environmental governance (IEG) architecture towards more effectively promoting environmental sustainability. To this end, the paper will analyse two broad reform options: 1) introducing universal membership of UNEP's Governing Council, and 2) elevating the status of UNEP to a specialized agency. The paper will analyze the broad reform options by focusing on their legal, financial and structural implications as well as on potential benefits and drawbacks of each option. In addition to these broad reform options, the paper acknowledges the importance of incremental reform of environmental governance that is taking place to enhance efficiency of environment work within the United Nations (UN) and on national levels. While these incremental improvements are valuable, the paper argues broader reform of IEG and UNEP in particular will be necessary to improve environmental governance, as stronger legal clout is ultimately necessary to arrive at more effective environmental governance architecture. Proposing broader reform, the paper argues that the two summarized IEG reform options should be implemented in a phased approach, and that benefits of broader reform would accrue not only to international environmental policy making, but also strengthen the role of environmental *vis-à-vis* economic policy making on national and local levels. Thus, the paper recommends that countries' and citizens' support the broad IEG reform options for the benefit of both international and national environmental governance.

## 1. INTRODUCTION: DEFINING THE SCOPE OF THE PAPER

---

Many countries are making progress addressing their environmental problems, but it is unlikely that a purely nation-state approach will suffice in addressing the international and global dimensions of environmental issues. At the same time, however, the current international governance architecture that has emerged over the last four decades is disjointed and inefficient and therefore unable to function effectively. As a result, environmental legislation remains notoriously weak. Stronger international environmental governance (IEG) architecture is necessary to safeguard the international and national environment and ensure that human well-being does not suffer from environmental degradation.

IEG refers to the international mechanisms, institutions and stakeholders that manage environmental challenges. The concept is related to how environmental issues reach the political agenda, how policies are formulated, and how programmes are implemented (IGES 2006). To match the limited scope of this paper, IEG will be defined as governance in context of the United Nations and particularly its relation to reform of the United Nations Environment Programme (UNEP). It should be pointed out that IEG is undertaken by a multitude of actors, and even though its role looks to be primarily international, bolstering it on the intergovernmental level would possibly benefit both national and local environmental decision-making.

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### 1.1 IEG REFORM AND MULTILEVEL RELEVANCE

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While much of the IEG debate has taken place in the intergovernmental arena, vertical linkages must be made to the realities on domestic implementation level. For example it should be emphasized that stronger legal and financial capacity of the IEG architecture will have multilevel benefits. Neglecting the impact on national level will make little sense, as decision makers, who represent their nation states, will not recognise the relevance and interest in supporting IEG. IEG reform should therefore be analysed for the potential contributions to national level policy making.

Apart from the need for vertical integration to enable to downstream flow of benefits from the international to the national and local levels, environmental policymaking can be bolstered by horizontal integration. This can happen by uniting ministries, as for example the ministry of ecology, sustainable development, transport, and housing in France. Germany introduced green cabinets, which improved the agenda setting capacity of its environmental ministry (Lenschow 2009:102). Sweden and the Netherlands have experimented with green reviews of national budgets (*Ibid.*:75). Above and beyond national levels it has also been possible to strengthen environmental legislation. For example the Treaty establishing the European Union (EU) states that environmental protection, "...requirements must be integrated into the definition and implementation of the Community policies" (EU1997).

These tools and processes exemplify how national level environmental policy making has been strengthened to allow environmental concerns to gain more influence compared to traditional economic policy making. While these examples are inspirational and encourage reproduction in other contexts, the strengthening will continue ad-hoc and in a haphazard fashion as long as the main agenda setter on the international level remains weak. The paper will therefore emphasize

that strengthening UNEP by altering its legal, structural and financial composition would realize considerable scope for improving effectiveness of multilevel environmental governance.

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## 1.2 WHY BROADER REFORM IS NEEDED AND WHY IT WOULD MATTER

---

IEG needs to be strengthened not only because of the emerging environmental problems faced by multiple countries, but also to allow environmental decision-making to better match economic decision-making. Before examining the details of that argument in the context of UNEP, it will be necessary to provide a brief overview of some of UNEP's inbuilt shortcomings. UNEP was founded in 1973 with a broad mandate establishing it as the designated authority of the United Nations system in environmental issues at the global and regional level (UNEP 2011). However, it was never given autonomous decision-making power, and with the global increase of environmental issues, the lack of legal independence and funding has proven detrimental for its ability to successfully address environmental challenges. Earlier research (WRI 2002; Ivanova 2010; Biermann and Bauer 2007) establishes a number of reasons to the mixed successes of UNEP, which – among other factors - emphasize limited authority and funding as main reasons for UNEP's weakness.

The lack of centralized authority on IEG has resulted in the current fragmented environmental governance architecture. As could be observed over the last four decades, the gradually emerging environmental challenges have resulted in an impressive web of multilateral environmental agreements (MEAs) and programmes both within and outside of the UN's purview. It has been established (Kanie 2007, Najam *et al.* 2006) that there currently are well over 500 such MEAs. Many of them overlap, and governments, especially those with limited financial and human capacity, are severely challenged with their administration (ECOLOGIC 2004). Thus, the decentralized decision-making regarding these agreements can be said to be one detrimental characteristic of the currently fragmented IEG regime. In response to that fragmentation, the section on universal membership (see below) will argue that universal membership of UNEP GC/GMEF has the potential to address the issue.

Universal membership could centralize decision-making, which would resemble a significant efficiency and effectiveness improvement of IEG. However, the paper will argue that establishing universal membership is not an end in itself, but a strategic step towards strengthening IEG. The paper argues that a universally representative forum of environment ministers begs the subsequent provision of autonomous decision-making authority. Equipping environment ministers at the GC/GMEF with such authority would enable stronger international environmental policy making. This benefit can be assumed not only because of the purely environmental mandate and specialization of the GC/GMEF, but also in comparison to the current situation it would be an advantage for IEG. Currently, environmental proposals are always at risk of being sidelined in the United Nations General Assembly (GA), where decisions from the GC/GMEF have to be approved.

Finally, it must be emphasized that IEG reform must be approached with a view to make a change to some of the above-mentioned weaknesses. It would make little sense for example to increase the authority of UNEP without matching funding to enable the institution to address the environmental issues. The sections below will address the issues of decision-making as well as funding.

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### 1.3 CHRONOLOGY OF THE IEG DEBATE

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The debate on environmental governance goes as far back as the Stockholm Conference on Human Environment in 1972, which resulted in the creation of UNEP. Twenty years later, the Rio Summit gave birth to the Commission for Sustainable Development (CSD), with a broader mandate on sustainable development, tasked to oversee progress of Agenda 21. Later on, the UN established a Task Force on Environment and Human Settlements, which found gaps in the IEG system. To improve coordination, the Environment Management Group (EMG) and the Global Ministerial Environment Forum (GMEF) were created, the latter as a bi-annual forum to take place with the UNEP Governing Council. In the first years after the millennium, European and French initiatives attempted in vain to create sufficient momentum for the establishment of a World Environment Organization (WEO). Subsequently, the UN itself established a High Level Panel on System-wide Coherence, which articulated 'Delivering as One' as a priority undertaking to improve coherence and coordination within the UN system (UN 2006). Two internal assessment reports of the Joint Inspection Unit (JIU) followed in 2008, and 2010, respectively, making concrete recommendations towards UNEP reform (Inomata 2008). The debate also went to the General Assembly, which resulted in a draft paper on options for strengthening IEG, however this never led to a Resolution, and in 2009, the GA tabled the issue due to lack of consensus. Although there was consensus on the overall need for stronger IEG, the way forward was still out of reach for agreement in the GA. In 2009, the GC/GMEF revived the process by establishing a consultative group of ministers of high-level representatives, who were tasked with identifying options for strengthening IEG. Late in 2010, the group presented the *Nairobi-Helsinki Outcome* on the options for reform (UNEP/GC.26/L.4/Add.1 2011). The recommendations were subsequently debated in UNEP's 26<sup>th</sup> Governing Council in February 2011, which brought overall agreement on the options, but lacked consensus on which of them should be taken to strengthen IEG. It is now hoped that the occasion of Rio20 could serve as a platform for countries to make headway on the issue.

Research on the issue has brought a large number of analysis of the situation and proposals for a way forward. They can be classified as ranging from 1) those that support broader reform (Biermann 2007 and 2011; Biermann and Bauer 2004 and 2005,); 2) those that debate whether reform would benefit the delivery of governance on the ground (Ivanova 2011; Tarasofsky 2002 and 2003) those that believe that incremental changes are the best, ranging from extending membership of the UNEP GC/GMEF to universality (Tarasofsky 2002), or the most realistic (Najam, Moltke, and Adil Najam, Tarasofsky 2002), given the lack of commitment to broader reform from governments at large. The research of this paper leans on the existing body of work on IEG in the way that it does not dispute the utility of incremental reforms, however it takes vantage point in assuming the feasibility of the most ambitious of the existing research proposals, if they could be carried out in the right sequence, as illustrated in subsequent sections.

## 1.4 THE REFORM OPTIONS

The introductory section above established that there are shortcomings to the current IEG architecture and that reform is needed. However, several details have to be clarified to determine the actual steps that the international community needs to take to realise a stronger IEG architecture. Addressing demand for such information, the paper will argue for the feasibility of two options: a) introducing universal membership (UM) of UNEP's Governing Council/Global Ministerial Environment Forum (GC/GMEF); and b) establishing a specialized agency on environment. The paper will highlight both benefits and drawbacks of these options, as providing more information on the implications can garner more support for strengthening IEG. In addition to providing information on the feasibility of these options, the paper will argue that a phased approach of introducing the legal and structural changes would be the most successful. The sequence in which the reform options could be introduced is depicted in the figure below, essentially arguing that incremental reforms, as ongoing, are fundamental to broader reform, where universal membership of UNEP GC/GMEF represents the initial step, and the creation of a specialized agency, the second step. Of course this kind of contextual sequence is artificial and begs the question as to how precisely such institutional upgrading would benefit environmental governance at multiple levels. To answer this, the subsequent chapters will examine each reform option, and propose a structure on implementation levels as well.<sup>1</sup>

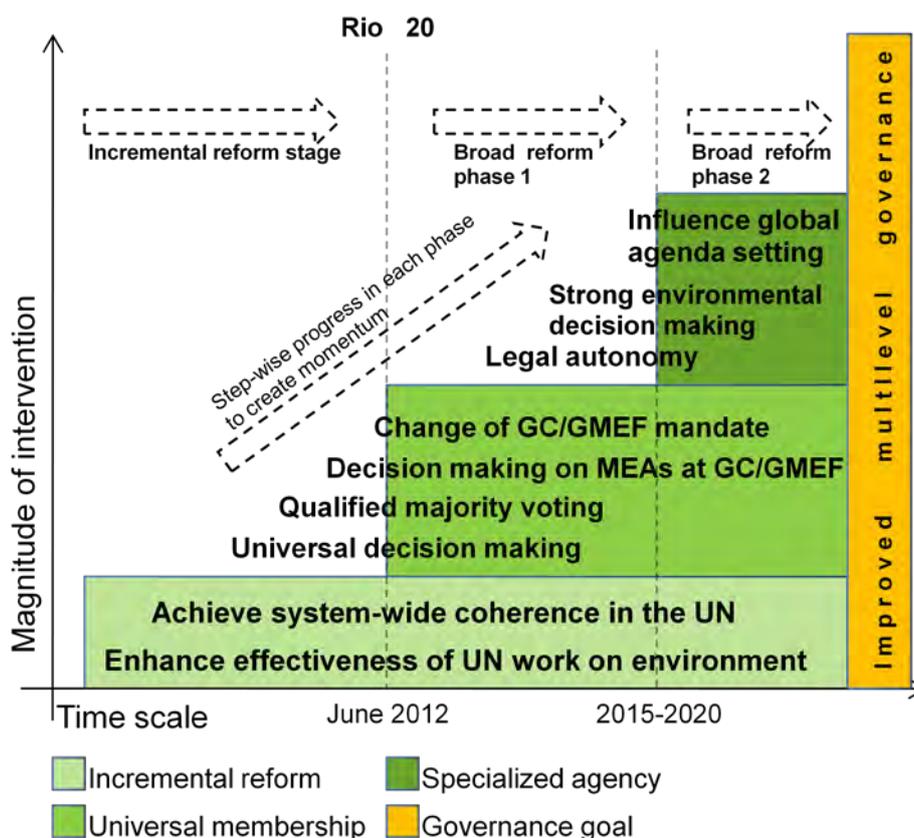


Figure 1: Thrust of IEG Reform

Source: Authors interpretation

<sup>1</sup> See Figure 4 "Cooperation on implementation levels" on page 23.

Apart from the broad reform options, there are other areas that need strengthening, both within the UN and outside of the UN's regime, and particularly on national and local levels. Incremental reform options to IEG in a UN context are often supported by UN member states. The incremental changes are can be immediately implemented within UNEP's current mandate and within the UN system. For example, the recent report of the UN Joint Inspection Unit (JIU) has made a series of recommendations that fall into the 'incremental category' (JIU 2008 and 2010). These are mainly focused on improving effectiveness within the UN system.

Many improvements can be introduced that can benefit effectiveness of environmental governance and efficiency of overall UN response, including the "One-UN Initiative", which aims to bring more coherence into UN response at all levels. The incremental reform options are certainly important, because their implementation may determine the level of subsequent support to broader reform. In addition, they can be implemented under the current institutional settings. However, if environmental governance is supposed to be strengthened in earnest, incremental options will not suffice. Broader reform is necessary to equip UNEP with the authority and budget to better carry out the tasks related to environmental governance.

The need for better institutional infrastructure to respond to current and emerging challenges can be seen in another significant anthropogenic effect, namely climate change, whose abatement is arguably one of the most important global concerns. There is significant global agreement that greenhouse gases (GHGs) have to be drastically reduced by the middle of this century, but the details and sources of mitigation are still cause for much disagreement among countries. Nevertheless, it can safely be assumed that the current business-as-usual will not effectuate the needed reduction in GHGs, and that a socio-economic transformation, aided by effective and strong institutional architecture will be necessary.

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## 1.5 THE ARGUMENTS

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The last decades have given birth to a wide variety of actors and institutions in the environmental governance field. This has happened as a result of growing demand for research, capacity building on implementation, multi-level governance, monitoring, reporting and information sharing, and participation to name but a few. The various areas as well as their cross-cutting nature makes it is clear that many actors, not one, will be necessary to answer to the demands for stronger environmental governance. Acknowledging this multi-stakeholder aspect of the discussion on improving environmental governance, the paper will approach the IEG discussion in the context of the United Nations, its reform and what IEG reform could mean for UNEP (GA 2010). The paper will focus on the financial, legal, and structural implications of the options and will assess their feasibility and potential benefits and drawbacks.

The paper will argue that the creation of universal membership of the Governing Council (option a) may be necessary to create the appropriate forum for examining other more broad reform options, including the option of elevating UNEP to a specialized agency for the environment (option b). It is important to remember that the discussion on a specialized agency has been addressed in the Governing Council before. At the same time, a proposal for universal membership has also been submitted to the UN Economic and Social Council (ECOSOC) for approval at the UN GA in the past. But neither proposal succeeded in achieving ratification.

For one, this hints that ECOSOC and the GA may not be appropriate forums for decision-making on environmental governance, and secondly, that another forum could be better suited for this debate. ECOSOC's mandate may be too broad and the GA too preoccupied with other issues. Additionally, proposals to strengthen environmental governance may have been met with scepticism because decision makers there have viewed the proposed measures for strengthening environmental governance as potentially compromising political and economic issues that are primarily dealt with in these larger decision-making forums.

The lack of attention can be appreciated, as ECOSOC "...serves as the central forum for discussing international economic and social issues, and for formulating policy recommendations addressed to Member States and the United Nations system" (UN 2011). It is with this experience in mind that the creation of universal membership of the Governing Council must be viewed not as an end in itself, but as an important step towards creating a legally autonomous decision-making forum. A dedicated forum for decision-making on environment may better be able to make subsequent decisions on environmental governance, needed to more effectively address the mounting challenges to environmental sustainability.

In view of the above, the paper will argue that both options (a and b) for reform are feasible and effective means for strengthening IEG and must be considered seriously by decision makers if the stalemate of international environmental governance is to be solved. The options are presented in logical succession, arguing that achieving agreement on universal membership would be an initial step to strengthen IEG. Providing universal membership (see figure above) to the GC/GMEF would turn it into a global environmental governance forum with global representation and universal decision-making capacity. Arguably, such a forum could be better suited than ECOSOC or GA for debate and decisions on subsequent reform options for IEG, in particular also on option b) the establishment of a specialized agency on environment (Section 3).

## 2. REFORM PHASE 1: UNIVERSAL MEMBERSHIP OF UNEP GC/GMEF

The option of universal membership dates back to 1998, when a UN task force recommended it in a report on environment and human settlements (UN 1998). Member States were unable to agree on the issue, because its advantages were not clear (UNEP 2004). Universal membership, however, clearly relates to a part of UNEP's mandate, and introducing it would enable UNEP to better "...keep under review the *world* environmental situation in order to ensure that emerging environmental problems of wide *international* significance receive appropriate and adequate consideration by Governments" (GA 1972).

The added emphasis shows one of the shortcomings on non-universal membership; because how can a non-universal council like the current Governing Council with its 58 members adequately address global environmental issues? This shortcoming is known, and has been one of the main arguments in earlier proposals for universal membership (UNEP 2004). Related to this lack of representation, the limitation of 58 members of the GC can also be said to perpetuate the north-south divide and inhibit the establishment of global governance including effective environmental cooperation.

Establishing universal membership is an important step signaling commitment of the international community to equal participation and responsibility, which are important aspects

of empowerment and sustainable development governance. Universal membership is certainly no guarantee that the north-south divide may be bridged as negotiation blocks may form that perpetuate the schism. But creating a global decision-making forum will send an important political signal that values such as common responsibility and inclusiveness are taken seriously.

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## 2.1 THE DIFFERENCE BETWEEN UNIVERSAL MEMBERSHIP AND UNIVERSAL PARTICIPATION

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When universal membership was proposed in the past, a compromise was achieved by establishing the UNEP's Global Ministerial Environment Forum.<sup>2</sup> This provided for the next-best solution: universal participation. Subsequently that forum would take place in parallel with the UNEP GC. However, participation does not equal membership. In reality, once decisions have to be made, the GMEF becomes the "exclusive" GC with only 58 voting members. Counterarguments to the proposal for universal membership have emphasized the benefits that universal participation already lends to the GC/GMEF. Certainly these have to be acknowledged, and much awareness and capacity has been built by this arrangement that has provided a forum for the world's environmental policy makers to meet and greet. However, universal membership should be viewed as a step towards establishing global representation of environmental decision makers in the true sense of 'decision-makers'.

If universal decision-making were achieved it would subsequently be possible to argue for the provision of legal autonomy to the GC. Doing so would ensure that environmental issues could find sufficient response amongst the world's environment ministers, who are mandated to give importance to environment related issues. This could remove some burden from the United Nations General Assembly (UNGA), which in any event may give environment issues attention in the way they relate to economic and political issues. Addressing environmental issues in an economic and political forum is also important but just not sufficient. Instead, it may be necessary to grant universal membership to UNEP GC and create a more dedicated decision-making body necessary to address many challenges facing environmental sustainability.

The need to create a stronger environmental decision-making body can be recognised in the historical context. Since UNEP's inception in 1972, crosscutting environmental problems have increased globally. Coherence in addressing issues related to air, biodiversity, climate, desertification, or water has become relevant for all countries' development. Extending the membership to all states would match the global scope of overarching environmental challenges, including the need to properly address Principle 7 of the 1992 Rio Declaration on common but differentiated responsibilities. Moreover, it would empower the GC/GMEF to better determine the course of environmental governance as it was originally envisioned in Resolution 2997 from 1972.

Skeptics argue that universal membership would make decision-making cumbersome when many voices have to agree on many points. This is a valid concern, which could be partly addressed by establishing either an executive board or an elected bureau of GC representatives. This bureau would be mandated to deal with day-to-day management issues and leave

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<sup>2</sup> It was established in 2000.

overarching issues related to the governance of the environment to the GA of the UNEP Governing Council.

One major drawback to introduction of universal membership is that it could mean that some countries lose comparable advantage in the GC decision-making process, as their vote will mean less with increased numbers of voting members. This has to be acknowledged as a significant hurdle hindering its introduction. In addition to the issue on influence, some countries oppose universal membership, because they fear it would create precedence for other UN organisations and bodies. Universal membership may be viewed as cumbersome for decision-making. To accommodate this, it could be possible to alter the decision-making structure of the GC. The following sections will summarize legal, financial and structural aspects of universal membership of UNEP's Governing Council as well as provide information to the benefits and drawbacks of such decisions.

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## 2.2 LEGAL ASPECT OF UNIVERSAL MEMBERSHIP

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The legal implications of universal membership are related to the convening role of the GC/GMEF and, as previously mentioned, it should be noted that the GC/GMEF has a dual function, distinguishing between the GMEF with universal participation, and the GC with its decision-making mandate limited to the 58 members. It can therefore be observed that the plenary of the GC, called the Committee of the Whole (COW) shifts between acting as GC and GMEF, depending on whether decisions have to be made or not. Changing this practice by extending decision-making responsibility to all countries would require a UNGA resolution, but it would not be considered impossible, as UNEP could remain a subsidiary body of the UNGA.<sup>3</sup>

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## 2.3 UNIVERSAL DECISION-MAKING

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Currently the GC uses the UN unanimity rule of decision-making. While this may be the most democratic method of voting, it also has certain drawbacks, including the increasing difficulty and inefficiency in reaching consensus amongst a greater number of voting members. To address this it could be possible to consider introducing new decision-making techniques. This could avoid opaque negotiation situations,<sup>4</sup> as well as lowest-common-denominator decisions or stalled negotiations due to inability to reach consensus.

There are examples from existing institutions that utilize multi-level co-decision-making systems. The co-decision procedure has become central to the European Community's decision-making. It is based on the principle of parity and means that neither the European Parliament nor the Council of Ministers (CM) may adopt legislation without the other's agreement (EU 2008). If agreement cannot be reached at initial attempt, disagreeing parties have the option of proposing changes to the proposal. These then have to go through a second reading by

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<sup>3</sup> If UNEP's status is elevated to that of Specialized Agency, then its reporting line may change. Legally, specialized agencies are not required to report to the UNGA but can specify the nature of their relationship to ECOSOC and the GA additionally.

<sup>4</sup> The World Trade Organization (WTO), which bases decision-making on consensus-based voting, has been criticized for being non-transparent in its decision-making process. It is said that negotiations often are kept informal with major developed countries being the most influential representatives in these negotiations <<http://www.towside.org.sg/title/bg13-cn/htm>>.

the European Parliament in order to either pass or be vetoed. This modality could be used in two instances being a) cases where block politics happen and working compromises need to be identified; and b) in cases where the GC/GMEF and the UNGA disagrees.

Other European Union (EU) voting practices can enhance efficiency of decision-making. At the moment, EU proposals are decided by *qualified majority* voting.<sup>5</sup> In a qualified majority voting scenario, a majority of over 71 percent of voting members' *weight* has to agree before a decision can pass. In practical terms it means that each member is assigned a weight (a number of votes); and in order for the CM to pass a bill, the aggregate weight of those voting for it must equal or exceed a set quota of 71 percent.<sup>6</sup>

Due to increasing number of EU member countries, the Lisbon Treaty (2009) decided to amend the voting structure to *double majority* voting in 2014. This means that the qualified majority condition specifies requirements not only in terms of a certain percentage of voting members but also with regards to the proportion of population represented. The new system is meant to ensure fairness in decision-making, as larger countries can benefit in terms of their share of population, while the one-country-one-vote part of the double weighed system in turn benefits smaller countries.

Primarily, the new voting system will be introduced to ensure that the larger countries will not be able to force decisions without sufficient support by smaller countries.<sup>7</sup> As a secondary benefit majority voting speeds up the decision-making process, when compared to consensus based decision-making and thus can be considered useful also for efficiency improvements. A potential drawback to this kind of decision-making could include its apparent complexity. Implementing such a system may require awareness-raising of its functions and advantages. In the case of UNEP, Nairobi could design voting software that calculates the qualified thresholds automatically so that only the essential delivery of position remains as key task for negotiators.

A similar method is practiced by the Global Environmental Facility (GEF), which uses double weighed majority. In a GEF voting scenario, support for a proposal requires at least 60 percent majority from all member countries and 60 percent majority from total contributions. This ensures that important decisions are not made only by those members that contribute the most to GEF's budget, but provides voice also to those that do not necessarily have the most financial capacity for a certain decision (Werksman 2003).

The evolving voting systems of the EU (supplemented by the example from GEF) indicate that increasing memberships of any group or forum will result in more complex decision-making procedures. However, the example shows that decision-making systems can be adjusted to accommodate both needs for efficiency as well as for democratic influence even in face of increasing (or universal) membership. Overall this indicates that institutions can evolve to respond better to the demands of the environment and that of their growing membership. Moreover, and perhaps most importantly, it also shows how decision-making systems can be

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<sup>5</sup> Also called weighted decision rule.

<sup>6</sup> The concept of weight is calculated by countries' population size.

<sup>7</sup> In detail the double majority voting system means that at least 55% of EU states must vote in favour of a proposal and at least 65% of the EU population must be represented in that group. To block a proposal, at least four countries must form a so-called 'blocking minority' <[http://www.eu-ophlysningen.dk/euo\\_en/spsv/all/43/](http://www.eu-ophlysningen.dk/euo_en/spsv/all/43/)>

designed to anticipate the heterogeneity of members and bring the highest degree of transparency and fairness into the decision-making modalities.

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## 2.4 APPLICATION IN PRACTICE

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Double weighted majority could be applied to situations for decisions involving larger funding for programmes. One factor could include funding as a variable additional to number of supportive countries. When legislative changes were proposed, a special *triple weighted* majority could be envisioned, in which not only funding but also number of countries as well as population determine the outcome of a vote. At the same time changing the voting structure would not be a precedent, because as shown above, if GEF is considered as a part of environmental institutions, then decision-making systems of the current environmental institutions are already diverse. This being said, it may be useful to propose additional research into the benefits and drawbacks of these options, to better provide information on the most suitable option for decision-making at a Global Environmental Governing Council (GEGC). This could be a conditionality to be managed by initiating countries that make the proposal for universal membership in Rio.

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## 2.5 FINANCIAL ASPECT OF UNIVERSAL MEMBERSHIP

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Similar to the overall core funding of UNEP, funding of the GC/GMEF is administered by the UNGA. This is a normal *modus-operandi* for programmes and funds that are subsidiary to the UNGA. Financing of the annual GC/GMEF derive from the UN Environment Fund.

It is important in this respect to note that the GC/GMEF itself absorbs only around one percent of UNEP's total annual budget. Thus, compared to the funding that is in fact needed to halt the destruction of the environment, the financial consequences of introducing universal membership of the governing council are negligible at best (ECOLOGIC 2004)). Since the event itself spends only miniscule proportions of UNEP budget, it makes little sense to use financial implications to argue against universal membership.

Earlier research on the issue of funding support for GC/GMEF revealed that the budgeting of the GC already anticipates and calculates the participation by non-members as well as members (reflecting the current universal participation of the GMEF). Countries are aware of that, and even developing countries that are not current members of the GC are invited to participate at the GC/GMEF with the understanding that the UN will cover the logistical cost of their participation. As this kind of support for participation is already common practice, universal membership would not place any additional financial burden on member states, neither directly as financial expenses for their participation, or indirectly on member states' contributions to UN budget.

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## 2.6 ESTABLISHING PERMANENT COUNTRY REPRESENTATION

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A drawback related to the financial implications of universal membership, however, could concern states that do not yet have permanent representation in Nairobi (Ecuadorian Ministry

of Foreign Affairs 2011).<sup>8</sup> Especially Latin American countries do not have embassies in Kenya,<sup>9</sup> and universal membership would incur additional expenses to establish a permanent presence in Nairobi. However, it can be expected that the bulk of the cost would be a one-time expense to establish a consulate or embassy on location. Until that is achieved, currently practiced interim solutions are possible: Latin America appoints representative focal points to ensure that information from UNEP's Committee of Permanent Representative (CPR) meetings is forwarded to all countries concerned (Danish Ministry of Environment 2011).<sup>10</sup> However in the long run, countries would have to establish permanent missions on location, and additional cost would be expected from that.

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## 2.7 UNANSWERED QUESTIONS OF FUNDING OF THE GOVERNANCE REGIME

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In a larger perspective, universal membership of the GC could form a suitable platform for discussions on expanding UNEP's funding options. Perhaps the granting of universal membership could come with a conditionality that requires the universal forum to earnestly deal with the larger issue of lacking funding for IEG. Fair decisions on this issue could then be made in a forum with global membership consisting of developed and developing countries at equal level and with equal influence in the decision-making process (see section above on change of voting structure).

The modalities of introducing innovative financing mechanisms such as Tobin Tax, levies on international air-travel, or assessed contributions as a miniscule proportion from countries' defense budget should also be openly discussed. These are well-known options for financing the environmental governance regime. More focus on such discussions would be timely; as would more focus on a related issue being the overall lack of consistency of funding, which is hampering with effectiveness of planning and execution of UNEP's operations.<sup>11</sup>

There remain additional questions pertaining to financing of a functional environmental regime and financing of the implementation of Multilateral Environmental Agreements (MEAs) on national level. Universal membership is clearly not a silver bullet for environmental governance, but it should be considered as an important intervention to strengthen it. It is clear, however, that much higher budgets for environment will be necessary in the coming years to address implementation gaps, as well as lacking capacity and access to technology - all pertinent issues repeatedly addressed by developing countries in intergovernmental negotiations. These substantial hurdles to implementation could be addressed by a GC/GMEF with universal membership.

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## 2.8 STRUCTURAL ASPECT OF UNIVERSAL MEMBERSHIP AND ITS RELATION TO MEAS

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As was briefly mentioned in the introductory paragraphs, the sense in establishing a global forum to address international environmental issues could be considered a normative truism.

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<sup>8</sup> Personal communication

<sup>9</sup> See <http://embassy.goabroad.com/embassies-in/kenya#> for a list of embassies in Nairobi. Currently the only Latin American countries represented are Argentina, Brazil, Chile, Colombia Costa Rica, Honduras and Venezuela.

<sup>10</sup> Personal communication

<sup>11</sup> Personal communication

And as such, most people would tend to agree with need for a better IEG architecture. However, it should be clearly illustrated how universal membership could better address shortcomings in the current environmental governance structure as well as how it would contribute to improving the environment. This is necessary to make a convincing argument for universal membership.

One oft mentioned criticism of environmental governance focuses on the problem of overall fragmentation, overlap and inefficiency. In response to this critique, mainstreaming efforts have been undertaken in the chemicals cluster and the biodiversity related conventions. These efforts show that MEAs can either be clustered according to issue-based, functional/organizational criteria, or they can have a particular regional scope by co-locating and merging secretariats (Najam 2006; Fauchald 2010).

In this regard, introducing universal membership could potentially contribute to enhancing coherence and efficiency of the several hundred existing environmental agreements by creating an umbrella forum for centralized decision-making on MEAs. The close relationship between UNEP and many MEAs is written in the text of the conventions. For example, the following excerpts from the Convention on Biodiversity (CBD) show structural and financial links between UNEP and the MEA:

Decision I/4: “Designates the United Nations Environment Programme to carry out the functions of the Secretariat of the Convention while ensuring its autonomy to discharge” (CBD 1994).

Decision I/6: “Designates the United Nations Environment Programme as the Trustee of the Trust Fund for the Convention on Biological Diversity” (CBD 2010).

The Rotterdam Convention contains similar decisions, cementing its relationship with UNEP (and the FAO):

Decision RC-1/9: “Invites the Executive Director of the United Nations Environment Programme and the Director General of the Food and Agriculture Organization of the United Nations to appoint an Executive Secretary in consultation with the Conference of the Parties through the Bureau” (Basel 2010).

“The Executive Director of UNEP and the Director-General of FAO delegate their authority to the Executive Secretary from UNEP and FAO, to act on their behalf, to represent the Secretariat and to carry out its functions” (WHO 2007).

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## 2.9 CLUSTERING MEAS UNDER A GC UMBRELLA

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The examples above illustrate the institutionalized relationships between UNEP and the MEA Secretariats. They show that, in addition to being responsible for the initial establishment of

many MEAs, UNEP functions as a secretariat for many of them. As can be seen in the legal text from these conventions, there may be possibilities for further developing the relationship between UNEP and the MEAs, in particular if UNEP GC/GMEF is equipped with universal membership and decision-making capacity. That way, the forum could become a venue for co-reporting, sharing of best practices and enhance coherence among MEAs. Establishing such a forum might incur some up-front cost for establishing it, but it is expected that it could yield cost-benefits in the long term (Urho 2010).

The possibilities for introducing such co-reporting and decision-making on MEAs at GC/GMEF would have to be researched in detail, since drawbacks could include that it might compromise the legal autonomy of MEAs as well as overlap with the functions of the Conference of Parties (COP). Such potential for conflict between UNEP and MEAs may also be one of the major reasons to why universal membership has not been accepted despite repeated suggestions and arguments in its favour.<sup>12</sup> To avoid the potential for conflict between UNEP and MEAs it would be necessary to formulate agreements that clearly designate the roles of the respective forums. Doing so might make the option of MEA COP co-location with UNEP GC a politically viable and acceptable option for UNEP and for the established MEA secretariats. This could make the current IEG system less fragmented and more efficient, both in terms of time, and finances.

Apparent discrepancies between the universality of the GC/GMEF and MEAs with only limited membership could be addressed by way of discerning between ‘multilateral’ and ‘plurilateral’ agreements (Biermann 2011). Accordingly, members of GC that would yet have to ratify an agreement could participate with observer status, as is already practiced in other forums. Such multi-tier membership could also have the potential of enhancing ratification ratios of MEAs among laggard states.

Finally, positioning some MEAs under a UM GC/GMEF would present a good opportunity for effectiveness gains, as doing so could result in better reasoning for national level policy and implementation committees that could better articulate policies and measures to respond to the needs of thematically related MEAs on the ground. In the long-term, the clustering of MEAs in a single forum could enhance compliance and enforcement of the agreements. Modalities used in the trade regime hint at possible measures, as the WTO is utilizing a system of ‘cross-agreement sanctioning’ (Wendell 2011). This option allows the suspension of concessions under other agreements, if some reason or another, penalties under the non-compliant agreement is impossible.

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## 2.10 IN SUM

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UNEP GC 26 was not able to make a decision on universal membership. While some countries stated their support, others clearly did not; and diverging views on this issue remain. The arguments presented above will hopefully contribute to a better understanding of the potential advantages of universal membership and the options for introducing new voting systems to

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<sup>12</sup> See Fauchald, Ole 2010. *International Environmental Governance: A Legal Analysis of Selected Options*. Fridtjof Nansens Institut. <http://www.fni.no/doc&pdf/FNI-R1610.pdf> for a detailed analysis of the benefits of clustering MEAs under UNEP. Additionally, see <http://www.iisd.ca/vol16/enb1619e.html> for details on countries’ in favour of universal membership.

outweigh and avoid some of the potential drawbacks of increased membership. As stated, it will be important to clearly demonstrate to decision makers that universal membership will not change the amount of funding needed to convey the annual GC/GMEF. The following table summarizes some of the main points made in the previous section:

<p><b>Expected benefits</b></p> <ul style="list-style-type: none"> <li>• Global representation and increased voice of ministries of environment and better recognition of global environmental issues;</li> <li>• Increased efficiency in decision-making;</li> <li>• Enhancement of coherence and efficiency of MEAs;</li> <li>• Clustering of MEAs under a forum with universal membership could yield long term cost-benefits;</li> <li>• Better addressing MEAs would enhance UN credibility with member states and increase likelihood of continued support for subsequent broader reform of IEG;</li> </ul>	<p><b>Potential challenges</b></p> <ul style="list-style-type: none"> <li>• Some countries may perceive increasing number of ‘voices’ in GC/GMEF as loss of comparable advantage in decision-making process;</li> <li>• Could create precedence for other UN organizations and bodies’ membership structure;</li> <li>• Financial consequences of introducing universal membership of the UNEP GC should be fully investigated and reported;</li> <li>• Not all countries have permanent representatives in Nairobi;</li> </ul>
<p><b>Required input</b></p> <ul style="list-style-type: none"> <li>• Change decision-making modality from consensus to qualified majority;</li> <li>• Establish executive board or elected bureau for day-to-day management;</li> <li>• If GC/GMEF becomes decision-making umbrella over related MEAs, ‘cross-agreement sanctioning’ to incentivize compliance with agreements could be introduced;</li> <li>• Multiple MEAs under one roof should be handled by way of discerning between ‘multilateral’ and ‘plurilateral’ agreements;</li> <li>• Certainty among member states that universal membership will not change cost of annual GC/GMEF;</li> </ul>	<p><b>Expected output</b></p> <ul style="list-style-type: none"> <li>• Global forum could make strong decisions on environment and improve effectiveness of IEG;</li> <li>• Faster decision-making process;</li> <li>• Possibility to cluster decision-making on MEAs;</li> <li>• Lessen operating cost of COP/MOPs when mainstreamed with GC/GMEF;</li> <li>• Possible to enhance compliance by use of ‘cross-agreement sanctioning’ between related MEAs;</li> </ul>

Table 2: Universal Membership

Source: Author’s compilation

Trade-offs will have to be taken into consideration if environmental governance is to be meaningfully reformed. The tradeoffs refer to the potential efficiency gains from locating a number of MEAs under UNEP GC. Existing MEA secretariats might not agree to that. However it is worth to remember that the final decision to change the location of the MEAs or not can be executed gradually, and ultimately depends not on the willingness of the MEA Secretariat but the intentions of member states.

Finally, the introduction of universal membership could be combined with a conditionality, i.e. that the empowerment of the forum shall be linked with commitment and responsibility to deal with other central issues to the IEG process such as predictability of funding, proposing the establishment of legal autonomy and decision-making power, implementation assistance from UNEP in support of MEAs on country level, and other concrete steps needed to strengthen

environmental governance and bridge the implementation gap. However, these issues require consensus on important but contentious further steps that a universal forum equipped with decision-making power could address. Subsequent tasks of determining detailed strategies for supporting MEAs on country level, additional capacity building for governments, and other crucial issues needed to strengthen environmental governance could be approached effectively by elevating the status of UNEP from its current programme to a specialized agency on environment.

### 3. REFORM PHASE 2: ESTABLISHING A SPECIALIZED AGENCY ON ENVIRONMENT

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The discussion on strengthening international environmental governance has progressed over the last decades but a conclusion is as lacking as ever. The recent Nairobi-Helsinki consultation process established points on forms, functions and responses that, if implemented, will bolster IEG. The discussions concluded with agreement to focus on five different forms, some of which entail incremental improvements to existing bodies as well others with broader reform objectives (UNEP 2010). This section will limit its focus to the option for establishing a specialized agency on environment.

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#### 3.1 LEGAL ASPECT, BENEFITS AND DRAWBACKS OF A SPECIALIZED AGENCY:

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In the UN context, specialized agencies are created to address issues that UN and member States deem important enough to justify the creation of an autonomous agency. Such agencies have their own legal identity, a plenary decision-making body (General Assembly), a representative executive body and a secretariat. They can be established by a resolution from UNGA (UN Charter, Article 57), to which they are linked through ECOSOC. In addition, the UNGA (UN Charter, Article 63) can determine the details of the agency's relationship with the UN, and to what extent it would have to follow recommendations of ECOSOC.

Establishing a specialized agency for environment would demand great political commitment from the international community, because it entails creating a legally autonomous agency with its own decision-making power. This is a conscientious issue, because doing so could remove environmental decision-making power from the GA and ECOSOC. Critical voices argue that this drawback is sufficient to consider elevating UNEP's status to a specialized agency for environment as an unrealistic option.

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#### 3.2 DECENTRALISED DECISION-MAKING

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The decentralization of autonomous decision-making may certainly deter some parties from supporting this option. However, it might be helpful to consider this issue in a different context and argue that if decision-making on environment related issues were to be deliberately removed from ECOSOC and GA, it would be possible for the latter bodies to better focus on overarching economic and political governance issues. Indeed, these issues have an environmental dimension, but concentrating environmental decision-making in an autonomous agency could potentially make environmental decision-making more effective, and this is needed for the current governance structure.

EU practices indicate that decentralization of power can be useful. In its establishing treaty (Amsterdam Treaty), the institution acknowledged the importance of 'proportionality, and subsidiarity' and made them central and determining principles of its decision-making structure (EU 2011). Accordingly, subsidiarity is used to decentralize decision-making on behalf of the EU, " ...in areas which do not fall within its exclusive competence" (EU 2006). For environmental governance on the UN level it could mean that the UNGA delegated technical decisions on environment to the specialized agency. Contrarily, similar rules would apply to the GA of the specialized agency, which would have to (and legally could, by means of UN Charter Article 63) consult decisions of great economic and social importance with the UNGA before making decisions.

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### 3.3 STRENGTHEN THE ENVIRONMENT VOICE ON INTERNATIONAL AND NATIONAL LEVELS

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While the call for establishing a specialized agency on environment is pertinent, it has not yet been accepted and international environmental governance remains crippled. A similar situation can be observed on country levels, where ministries of environment often find themselves positioned rather badly in the national decision-making hierarchy. There is a need for elevating the status of environmental agencies and ministries on national as well as on international levels, because UNEP in a sense is representing all national environmental authorities. Compared to the situation in 40 years ago, environmental authorities in the world have become full-fledged ministries in many countries. This gives a good reason for strengthening UNEP accordingly. Establishing a specialized agency for environment would create an autonomous decision-making structure on the international level that could help policy makers translate international decisions into national level environmental policies. More national level clout of environmental ministries could benefit not only increased capacity of environmental officials, but also enhance agenda setting and negotiation power in the national policy formulation and assessment processes.

The potential drawback of creating a separate decision-making structure has often been used as one of the main arguments for UNEP retaining its status as a programme. Countries have argued that a programme by its very definition is nimble, flexible and therefore able to better mainstream environment throughout decision-making (Ivanova 2007). It is an important point; in fact the increase of cross-cutting environmental issues has only lent more amplitude to the need for integrating environmental concerns throughout policy making processes at all levels. However, the question is whether weak and badly funded programmes are really the right vessels to enhance the voice of the environment in a choir of strong singers.

As was mentioned, an environment programme has not been able to sufficiently determine the international political agenda. A stronger body with legal impetus to oversee the integration of environmental concerns throughout decision-making is becoming increasingly relevant to halt environmental degradation. In relation to the sustainable development discourse, it has also become clear that the environmental dimension of sustainable development has been neglected in favour of economic growth. Realizing the need to reaffirm the importance of the environment as fundamental foundation economies and well-functioning societies, it is therefore argued that ministries of environment and natural resources need a much stronger and autonomous body to place the environmental agenda better at all levels of the governance discourse.

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### 3.4 COMBINING TOP-DOWN AGENDA SETTING WITH BOTTOM-UP INTEGRATION

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A specialized agency would not displace environmental focal points in other ministries, nor would its purpose be to unite and mainstream all environmental divisions and programmes under one. This kind of bottom-up integration on the implementation level is already underway. Environmentalists perceive as a significant progress that many public and private sector institutions have established either environmental terms of reference as part of their mission, or have positions dealing with environmental mainstreaming. At the same time, however, bottom-up integration is not sufficient, and a specialized agency would be needed to steer top-down integration of environmental concerns into planning, policy-making and evaluation. Options that are specific to the legal clout and personality of a specialized agency would include better agenda setting in the policy making process, stronger legal and regulatory purview, and the ability to raise serious concerns with regards to other environmentally harmful policy proposals.

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### 3.5 FINANCIAL ASPECT, BENEFITS AND DRAWBACKS OF A SPECIALIZED AGENCY

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In addition to considerable political will for its establishment, a specialized agency will need more and predictable funding to position environment higher on the agenda and carry out the functions of its mandate. Normally agencies determine the details of their funding arrangements with their constituents. Many specialized agencies, as for instance the International Labour Organization (ILO), the World Meteorological Organization's (WMO) and the World Health Organization (WHO) derive parts of their funding from assessed contributions.

Assessed contributions are normally based on countries' capacity to pay and measured by factors such as national income and size of population. There are minimum and maximum ceilings to the contributions, ensuring that no state pays more per capita than the per capita contribution of the highest contributor (WHO 2000). Other parts of the budget can derive from extra budgetary donations, trust funds and partnership agreements that can be earmarked for special cooperation programmes.

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### 3.6 MEMBERSHIP DEFINED BY LEVEL OF CONTRIBUTION

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Some agencies, including the WHO, also allow for differentiated memberships that provide space for countries, territories, or other actors with lesser contributions to partake as observers, or with a limited voting capacity (WHO 2009). A concrete example of heterogeneous membership systems can be seen in the World Tourism Organization that was elevated to become a UN Specialized Agency in 2003. It has differentiated membership status that apart from effective members also accommodates associate members, affiliate members and observers (UNWTO 2011). The membership status however, does not depend on level of financial contributions, as these are decided on an assessed scale, but membership status is tailor made to sovereign states, territories, associations, or private entities. While this example shows the option of differentiated membership status, it would have to be determined whether similar differentiation would be possible as a factor of funding contributions, since such could potentially increase the political willingness towards establishing a specialized agency. However, such proposal should also be cautiously approached, since it might result in an agency without "effective" and paying members.

The ILO introduced a flexibility mechanism in 2006 to give countries some leeway in the event that they were unable to cover their assessed contributions. Since resilience to financial and economic fluctuations would be considered a necessary element of any funding structure for the future, it could be useful to design the financing structure of a specialized agency with such an inbuilt flexibility mechanism. In addition, a specialized agency could derive parts of its funding from 'other' sources and 'miscellaneous income', and allow fund raising from the private sector and philanthropists to play a role that matches the expected responsibility from various stakeholders in a more effective and multi-level environmental governance system. A related issue was also briefly mentioned in the section on universal membership, where the intention would be to establish the GC/GMEF as suitable forum determining the details of such 'innovative funding' systems.

Comparing the financial implications of a specialized agency with those of universal membership of the GC/GMEF, it becomes clear that the former would entail much greater changes to funding structure and amount to have a fair chance to succeed. Merely establishing a specialized agency without making inroads on funding issues would be a recipe for disaster and probably even weaken environmental governance if that is possible. A honest effort therefore requires that details are determined with regards to how the agency should respond to requirements set forth in its mandate, including concrete budget lines for implementation activities. The funding related issues may also constitute one the most major drawbacks of the specialized agency option, and also explains why, despite prolonged attention in international negotiations, it has been impossible to introduce such upgrading of UNEP.

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### 3.7 STRUCTURAL ASPECT, BENEFITS AND DRAWBACKS OF A SPECIALIZED AGENCY:

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As seen in Resolution 2997, a main component of UNEP's mandate is to coordinate as well as review the direction of the environmental work within the UN system (UNEMG 2011). Formerly, this part of the mandate fell under the System-wide Medium Term Environment Programme (SWMTEP). It was introduced in 1999, but then abandoned and replaced with the current Environment Management Group (EMG).

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### 3.8 ENVIRONMENTAL MAINSTREAMING IN THE UN: DONE DEAL?

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Today there are as many as 44 environmental divisions and offices in the UN. Most of those have appeared not because of UNEP's success in mainstreaming environment in the UN, but because agencies and UN bodies themselves have gradually mainstreamed environment in the system. It may therefore be that a new UNEP as specialized agency should not even be primarily concerned with the UN response to environment, but should focus more on serious problems related to persistent implementation gap of environmental agreements on national and local levels, regional and national capacity building etc. Therefore, elevating UNEP to a specialized agency on environment is not so much about effectively mainstreaming environment throughout the UN system but more about the need for a stronger institution to position environment issues better on the global political agenda and create a body with the mandate to respond to demands on regional and national levels. Strengthening of UNEP only at the international level would not be sufficient. Asia, which has become the world's production center, should have much stronger regional environmental institutions to better deal with increasing environmental issues. A stronger regional representation could in turn strengthen

the environmental work of regional and sub-regional bodies, including Tripartite Environment Ministers Meeting (TEMM) in North-east Asia, or the environmental programmes of the Association of Southeast Asian Nations (ASEAN).

Interviews with current and former UN staff identified one of the main reasons for UNEP's failure to coordinate environment within the UN system as being rooted in the fact that the programme, with its relative legal weakness, has been unable to sufficiently leverage and influence many of the larger programmes and agencies within the UN (UN 2011).<sup>13</sup> And as mentioned, the mainstreaming task is already happening to a large extent, throughout UN bodies and their initiatives. However, the 44 existing environment divisions and UN initiatives indicate that fragmentation and overlap is still a problem that needs to be addressed both inside the UN system and on country level. In this regard, expanding the "One-UN Initiative" would be beneficial as would clustering MEAs. This might also enhance the UN's level of credibility and also support from member States both to the UN at large and to broader reform options as those discussed in this paper. While larger efforts are needed to address fragmentation and overlap, initial steps would include signing of Memorandums of Understanding (MoUs) between UNEP and the respective agency or institution aimed at effectively harmonizing the environmental work among the institutions.<sup>14</sup>

Finally, if UNEP were to become an agency it would also be better positioned to suggest and debate legal instruments in its plenary forum (GC/GMEF) as well as adopting them in its own General Assembly. Even though a specialized agency would not be as closely related to the UN as a programme is, provisions could be made so that the Agency remained a central member of the UN's Chief Executives Board for Coordination (CEB).<sup>15</sup> Doing so would be important to ensure that, also in the future, it would remain central to coherence and cohesion of environmental work within the UN and its related specialized agencies.<sup>16</sup>

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### 3.9 IN SUM

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The discussion on programme vs. specialized agency has been tabled at many intergovernmental discussions, and while on several occasions many UN member States have supported the upgrading of UNEP to a specialized agency - there has never been sufficient impetus for the establishment of a specialized agency on environment.<sup>17</sup> However, Rio 2012 can create sufficient momentum and support from governments to agree on a Roadmap that can determine the direction as well as milestones to strengthen IEG, and perhaps consider the possibilities for establishing a specialized agency on environment. The following table sums up some of the points made in the text above:

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<sup>13</sup> Personal communication; Nairobi and Bangkok (2011).

<sup>14</sup> Member states could initiate this development by submitting a request for a UN GA resolution.

<sup>15</sup> Additionally, a previous paragraph also summarized Article 63 of the UN Charter, which provides options for legal affiliation between the UN and a specialized agency.

<sup>16</sup> <http://www.unsceb.org/ceb/home>

<sup>17</sup> Biermann (2007) states that, over time 50 countries have supported the creation of a Specialized Agency.

<p><b>Expected benefits</b></p> <ul style="list-style-type: none"> <li>• Placing environmental decision-making with GC/GMEF could allow ECOSOC/GA to better focus on overarching economic and political governance issues;</li> <li>• Would be well positioned to debate legal instruments in its plenary forum (GC/GMEF) as well as adopting them in its own General Assembly;</li> <li>• Increased efficiency of environmental decision-making;</li> <li>• Increased clout of environmental ministries could enhance agenda setting and negotiation power in national policy formulation and lead to more effective environmental policy making;</li> <li>• Better agenda setting in national policy making process, stronger legal and regulatory purview, and the ability to veto the agenda of other environmentally harmful policy proposals;</li> </ul>	<p><b>Potential challenges</b></p> <ul style="list-style-type: none"> <li>• Removes some of the environmental decision-making power from the GA and ECOSOC;</li> <li>• Ingrained belief that an environment programme by its very definition is nimble, and flexible and therefore better able to mainstream environment throughout decision-making than an agency;</li> <li>• Widespread (but erroneous) belief that a specialized agency would no longer be affiliated to the UN (UN Charter, Article 63);</li> <li>• Demands great political commitment from the international community;</li> <li>• The requirement for more and predictable funding to position environment higher on the agenda may deter countries from supporting this reform option;</li> <li>• Merely establishing a specialized agency without also making inroads on funding issues would be a recipe for disaster. It therefore would require that details be determined with regards to how the agency should respond to requirements set forth in its mandate, including concrete budget lines for implementation activities.</li> </ul>
<p><b>Required input</b></p> <ul style="list-style-type: none"> <li>• Political commitment from international community;</li> <li>• Needs a legally autonomous agency with own decision-making power;</li> <li>• Resolution from UNGA (UN Charter, Article 57);</li> <li>• For political feasibility GC/GMEF should consult decisions of great economic and social importance with the UNGA before making decisions (UN Charter, Article 63);</li> <li>• Could include other constituencies than just governments (example from ILO's structure (industry, labour unions, governments) and representatives from civil society);</li> <li>• More effectiveness of IEG would have to prioritize top-down integration of environmental concerns into planning, policy making and evaluation also on national levels;</li> <li>• Would need more and predictable funding to position environment higher on the agenda;</li> </ul>	<p><b>Expected output</b></p> <ul style="list-style-type: none"> <li>• Autonomous decision-making structure on the international level that could help policy makers translate international decisions into national level environmental policies and implementation;</li> <li>• Environmental concerns would be better and more strongly represented in international as well as national policy formulation agenda;</li> <li>• Environmental dimension of sustainable development receives more attention compared to economic and social dimensions, that traditionally have had higher priority;</li> </ul>

Table 3: Specialized Agency

Source: Author's interpretation

#### 4. CONCLUSION:

By highlighting a number of weaknesses of current IEG, the above sections have argued for a broad reform to UNEP in order to strengthen IEG and to enable a better response to current and anticipated environmental challenges. The paper has argued that reform and strengthening of

IEG is important because 1) environmental challenges have grown in impact and magnitude along with globalization but the architecture has not yet evolved to respond to these emerging challenges; and 2) governance has become multi stakeholder and more participation is needed from all stakeholders in order to ensure coordinated and synergetic governance.

To address the issue of environmental governance reform, the paper has established that incremental reform options, while important, will not suffice to significantly strengthen IEG. Instead it has proposed a phased reform consisting of two broader reform options and summarized key points related to each. The analysis has focused on legal, financial, and structural implications of the reform options, and emphasized possible benefits and drawbacks as summarized in the tables above. The two options have been presented in succession to argue for their relatedness and make a case for how countries could create momentum towards broader reform and strengthening of environmental governance by mobilizing support for introducing universal membership of the UNEP GC/GMEF.

As for the first reform option of universal membership, the paper has argued that it would be possible to accommodate the increased complexity of universally voting members by adopting a qualified majority voting system to improve efficiency of decision-making. The feasibility of the decision-making was exemplified by the EU, which has gradually adopted qualified majority voting to accommodate increasing members. Apart from empowering global environment ministers by creating such universal membership, the paper has also shown how it could become a decision-making umbrella for MEAs, thereby clustering debate and decision-making of those of the treaties that already have a close relation to UNEP written in their legal texts. This would benefit both coherence and efficiency of IEG.

Apart from being the first phase of a broader reform of UNEP, it is of course true that universal membership can be viewed as a reform option in itself and without connection to other reform options. It is conceivable that it could be introduced primarily for the benefits of global representation and better decision-making on IEG issues, arguably these benefits are significant and sufficient to justify it. If the UNGA were to provide the GC/GMEF with universal membership and decision-making power, it is very likely that it would significantly empower the ministers at the GC/GMEF to make strong environmental decisions, because conversely to the GA, the GC would be a forum especially mandated for environmental issues. This would give a different priority to environmental decision-making when compared to the GA, where other issues have had higher priority.

Subsequent to universal membership of the GC/GMEF, the second broad reform phase of establishing a specialized agency, was also emphasized. In this regard the paper argued that an environmental policy makers' forum with universal membership could propel the creation of a globally representative decision-making forum for international environmental policy. If this could be achieved it would be an obvious next step to negotiate a UN GA Resolution towards establishing a specialized agency with legal independence, but affiliated to the UN. Such a mandate could have a tremendously positive effect on the clout of environmental agenda setting and policy making, internationally and nationally.

#### 4.1 FROM PLEDGE TO ACTION: COOPERATION AMONG STAKEHOLDERS

Since international environmental agreements often fall short on national levels and in the stages of implementation, it will not be sufficient to keep IEG purely on the intergovernmental arena. To address this issue, the paper has argued that benefits for national level environmental policy have to be identified. To do so, more support must be provided to environmental ministries and agencies on national and local levels. Strengthening environmental ministries on national and local levels is a two-way process. For the UN-bodies, it will be necessary that they continue to cooperate and implement cohesively expanding on the “One-UN” initiative and articulate ways of cooperation as well as demarcation between and among the agencies. Environmental governance in this way will fall beyond UNEP as an agency and some tasks will have to be undertaken in cooperation or by representation of other UN agencies, NGOs and national stakeholders, according to which solution is the most effective and efficient. The cooperation could be visualized by means of the following figure:

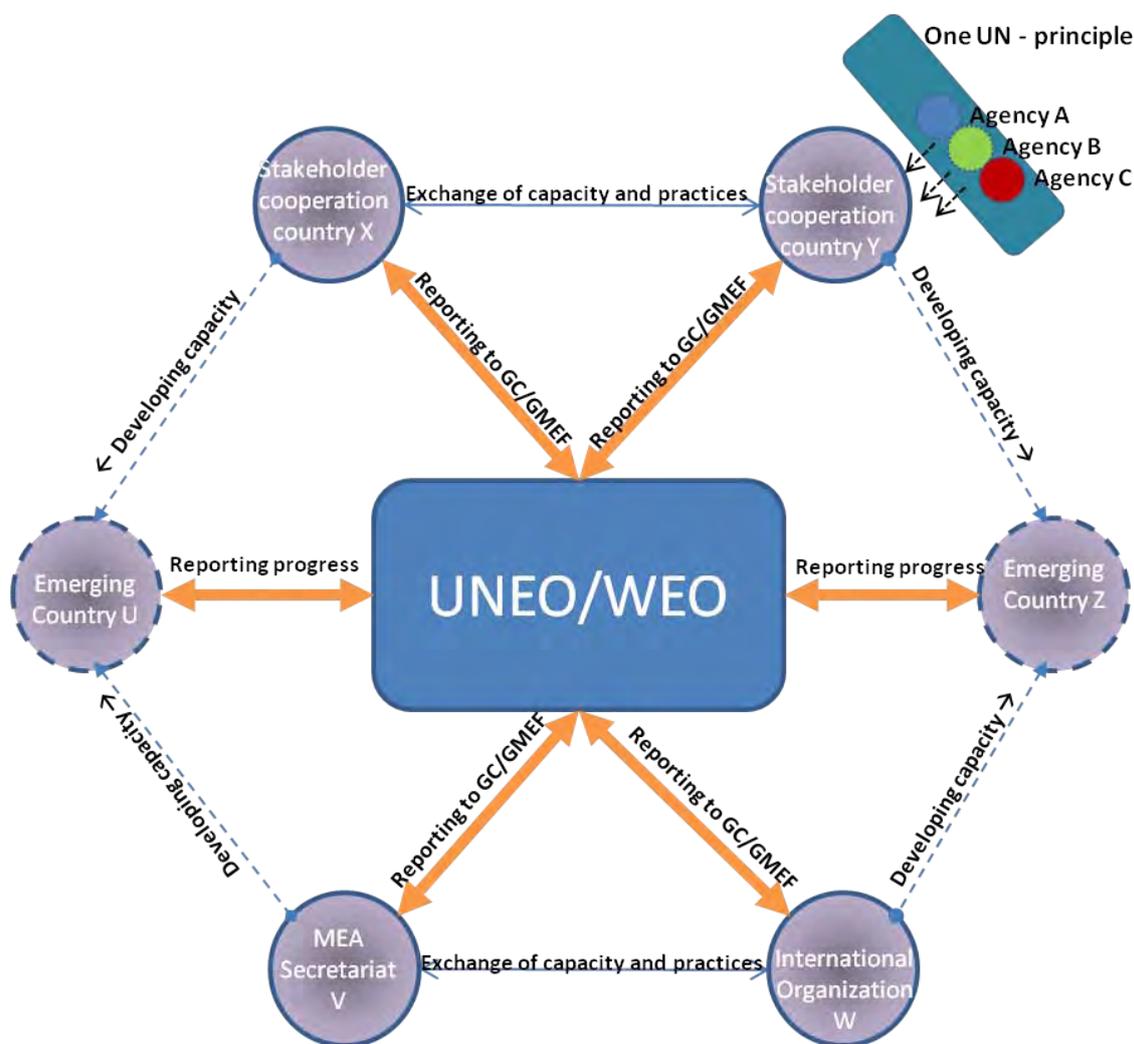


Figure 4: Cooperation on implementation levels

Source: Author’s interpretation

Exchange of knowledge and good practices between countries and sectors is also depicted in the figure, this kind of initiative can take place bilaterally decided and organized by countries

themselves and with the help of agencies. Reporting of progress for least developed countries (LDCs) and reporting on MEA commitments overall could then be done to the plenary forum of the specialized Agency (UNEO/WEO). For national policy makers, the strengthening of the environmental mandate in comparison with other ministries will have to be implemented in national decision-making processes. As was emphasized in the paper, a direct benefit could be harnessed if policy makers were to take advantage of the efficient decision-making in the GC/GMEF and agree on issues to strengthen implementation of environmental agreements on national level. Moreover, a specialized agency could initiate the establishment of domestic '*interlinkages*' committees tasked with identifying thematic links between environment and other important sectors of the economy such as water, energy, transport, etc. In this regard the paper has argued that additional integration of environmental concerns could be achieved politically through enhanced environmental agenda setting, influence on national budgeting or other interventions that may vary according to national circumstances. The paper has argued that doing so would result in better enforcement of MEA commitments, especially if MEA co-decision could become part of the GC/GMEF as decisions could be made more efficiently.

While the two-phased reform proposal establishing universal membership of the GC/GMEF and establishing a specialized agency resemble significant reform options, essentially the improvement of IEG has to be carried forward by decision makers themselves. This implies that the conscientious issues concerning amounts and predictability of the IEG regime's funding need to be addressed along with capacity building for developing countries, better integration of environment issues into decision-making, monitoring and assessing the environment, access to information and environmentally sound technology and other emerging issues.

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#### 4.2 REASONS FOR RESISTANCE AND REASONS FOR SUPPORT

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If universal membership and specialized agency options resemble the way forward, the question still lingers then why governments have not chosen to sufficiently back them up and initiate their implementation long ago. Partly this can be explained by an overall lack of trust in the UN and the multilateral system of negotiation and decision-making as a whole. Countries and their citizens have increasing trouble seeing the relevance of the complex international governance structures. The UN itself should continue to emphasize its internal reform to show that incremental efficiency improvements are being undertaken. Among other measures it will therefore be important to undertake thorough analysis of how the identified options in the Nairobi-Helsinki Outcome will actually improve the functions and tasks identifies as important for IEG. Additionally, it is important that the UN leads by example and shows not only how environmental governance can be effectively mainstreamed in their organization, but also why it should remain a relevant and credible institution for the global community.

National level governments also play a decisive role in determining support or resistance to strengthening environmental governance. On these levels it could be advised to place effort on national awareness campaigns and information dissemination. The public must clearly understand the role of the UN, the links between international environmental governance structures and their lives and how the international environment affects the well-being of local communities.

It is important to make this point; because many states remain convinced that strong international governance would compromise their national sovereignty. In fact, global

governance will not compromise the sovereignty of states. On the contrary, because global environmental impacts can be felt increasingly on the local scale, globalization has extended the reach of nation states' interest. It should therefore be in the interest of sovereign nation states to upgrade and mandate institutions whose purpose is to address global environmental issues to improve the quality of the global and local environments.

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## **Institute for Global Environmental Strategies (IGES)**

2108-11 Kamiyamaguchi, Hayama, Kanagawa, 240- 0115 Japan

TEL: +81-46-855-3700 FAX:+81-46-855-3709 E-mail:iges@iges.or.jp URL:<http://www.iges.or.jp>