

# **SUSTAINABLE CITIES IN ASIA: DIVERSITY IN APPROACHES AND CHALLENGES**

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# Outline:

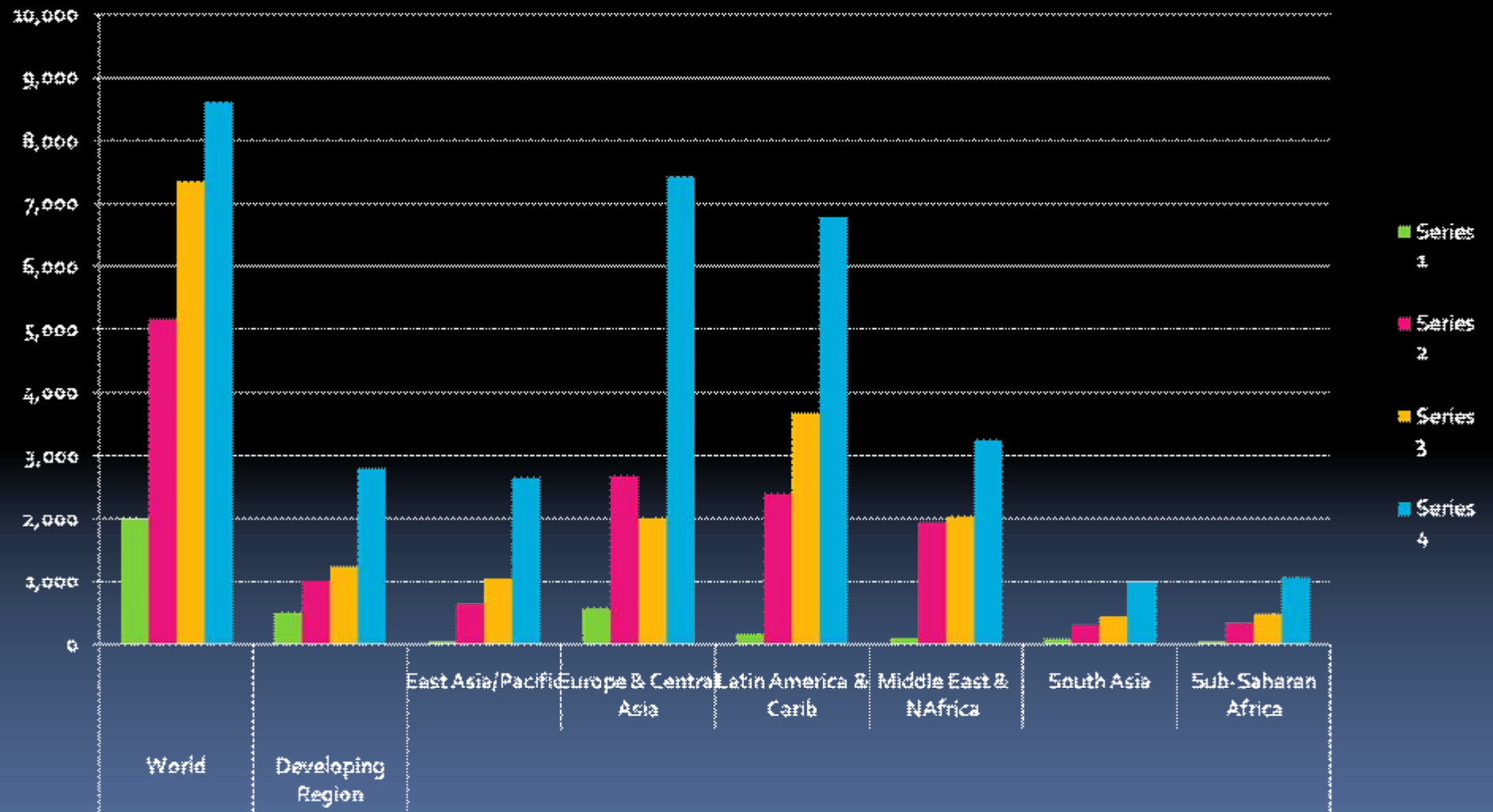
1. Introduction: Rapid Economic Growth and Growing Pace of Urbanization in Asia
2. Environmental Degradation of Urban Areas
3. Local and Central Government Responses to Arrest Further Environmental Degradation
4. Diversity and Challenges in Building Environmental Sustainable Cities (ESCs) and Model Cities (EMCs) in the Asia-Pacific Region

Appendix: A Brief Chronology of the Steps taken by All Stakeholders including the Government of Japan (GoJ) to the East Japan Great Earthquake/Tsunami (EJGET) and the Tokyo Electric Power Company's (TEPCO's) Nuclear Power Plant Explosions, 11-31 MARCH, 2011

# 1.1 Economic, Social, Environmental and Cultural Globalization in the 21<sup>st</sup> Century

- 1) Positive and negative dimensions of globalization within each country: sustained economic growth, higher level of income and employment vs. rapid process of urbanization, growing income gaps and environmental degradation;
- 2) Positive and negative dimensions of globalization across countries: freer flows of finance, technology, goods and services including some professional and technical manpower vs. widening gaps between rich and poor countries and regions, loss of cultural diversities and rising threats to health and other dimensions of human security

# 1.2 Growth of Per Capita GDP and GNI , 1970-2008 (US\$)



World Bank, World Development Reports 1972, 1992, 2002 & 2010  
 Note: Green for 1970, red for 1990, brown for 2000, and blue for 2008.

# 1.4 Demographic and Urbanization Trends in Asia, 1975-2030

	Population (Million)		Annual Growth Rates(%)		Urban Population as % of Total	
	2010	2030	1975-2005	2005-2015	1990	2010
Developing	5,843.4	7,169.0	1.9	1.3	n.a.	n.a.
E. Asia & Pacific	1,974.3	2,204.3	1.3	0.7	28.1	45.3
China	1,354.1	1,462.5	1.2	0.6	26.4	47.0
Indonesia	232.5	271.5	1.7	1.1	30.6	44.3
Malaysia	27.9	35.3	2.5	1.6	49.8	72.2
PNG	6.9	10.1	2.5	1.9	15.0	12.5
Philippines	91.6	124.4	2.3	1.8	48.6	48.9
Singapore	4.8	5.5	2.2	1.1	100.0	100.0
Thailand	68.1	73.5	1.3	0.6	29.4	34.6
Vietnam	89.0	105.4	1.9	1.3	20.3	30.4
South Asia	1,719.1	2,158.2	2.3	1.5	26.5	31.7
Bangladesh	154.4	203.2	2.2	1.6	19.8	28.1
India	1,214.5	1,484.6	1.9	1.3	25.6	30.0
Pakistan	184.8	265.7	2.8	1.9	30.6	35.9
Sri Lanka	20.4	22.2	1.1	0.4	18.6	14.3
Developed*	1,056.0	1,129.6	0.6	0.5	72.0	77.1
Australia	21.5	25.7	1.3	1.0	85.4	89.1
Japan	127.0	117.4	0.5	- 0.1	63.1	66.8
New Zealand	4.3	5.0	0.9	0.8	84.7	86.2
World	6,908.7	8,308.9	1.6	1.1	42.6	50.5

Sources: UNDP, HDR 2007/8, Appendix Table 5, pp.243-246 and HDR 2010, Table 184-187

Note: \* Figures for urban population as % of the total are for OECD countries only.

## 2. Environmental Degradation in Urban Areas in Asia and the Pacific

- 1) Growing slum population in low-cost housing areas, exposing residents to health hazards and disasters;
- 2) High concentration of office and commercial buildings in city centers for micro-level business efficiency, resulting in macro-level inefficiency through traffic congestion, higher environmental, disaster and political risks ;
- 3) Rapid increase of household wastes, far beyond the treatment capacity;
- 4) Increasing urban pollution of air, water, soil and noise due to uncontrolled urban sprawl of residential areas into neighboring farmland and forest area detrimental to biodiversity , inadequate public transportation and traffic congestion;
- 5) Rising heat waves in city centers resulting from inefficient and highly subsidized use of hydrocarbon energy sources, changed lifestyles and under pressures of global warming.



## 2.1a Congested Urban Residential Areas in Asia, 2010



Ahmedabad, Gujarat, India, by courtesy of R & K Associate, 01112010



## 2. 1b Combined Urban Residential / Commercial Zones in Asia, 2011



City of Hanoi, Vietnam, by courtesy of R & K Associate, 25022011



## 2.1C Urban Commercial cum Residential Area in Asia



City of Jakarta, by R&K Associate, 03032010

## 2.1d Unregulated Urban Residential Zones in Asia, 2011



City of Kathmandu, Nepal, by courtesy of R & K Associate, 06022011



## 2.2 High Concentration of Population in Metropolitan Areas in Asia

Cities	1975	2007	2025	1975-2007	1975-2005*
Tokyo-Yokohama	26.6	35.7	36.4	0.9	0.5
Mumbai	7.1	19.0	26.4	3.1	2.0
New Delhi	4.4	15.9	22.5	4.0	2.0
Shanghai	7.3	15.0	19.4	2.2	1.2
Kolkata	7.9	14.8	20.6	1.9	2.0
Dhaka	2.2	13.5	22.0	5.6	2.2
Karachi	4.0	12.1	19.1	3.5	2.8
Osaka-Kobe	9.8	11.3	11.4	0.4	0.5
Beijing	6.0	11.1	14.5	1.9	1.2
Manila	5.0	11.1	14.8	2.5	2.3

Source: UNESCAP, Statistical Yearbook for Asia and the Pacific 2010;  
UNDP, Human Development Report 2007/08

Note: \* Annual rate of population growth for the country as a whole.

## 2. 2a High Concentration of Office and Commercial Buildings in Traditional Cities in Asia, 2009



City of Dalian, China, by courtesy of R & K Associate, 22102009



## 2.2b Office, Commercial and Residential Quarters Joined Together in Modern Cities in Asia and the Pacific, 2010



Honolulu, Hawaii, by courtesy of R & K Associate , 01012010

## 2.2c Office, Commercial and Residential Quarters Joined Together in Modern Cities in Asia and the Pacific, 2010



City of Incheon , ROK, by courtesy of R & K Associate , 08112010



## 2.2d High Concentration of Office and Commercial Buildings in Traditional Cities in the West, 2011



City of New York, USA, by courtesy of R & K Associate , 17022011

## 2.2e Office, Commercial and Residential Quarters Joined Together in Modern Cities in Asia and the Pacific, 2010



City of Osaka, Japan by courtesy of R & K Associate, 11022011



## 2.2f High Concentration of Office and Commercial Buildings in Major Cities in Asia and the Pacific, 2010



City of Singapore, by courtesy of R & K Associate, 30062010

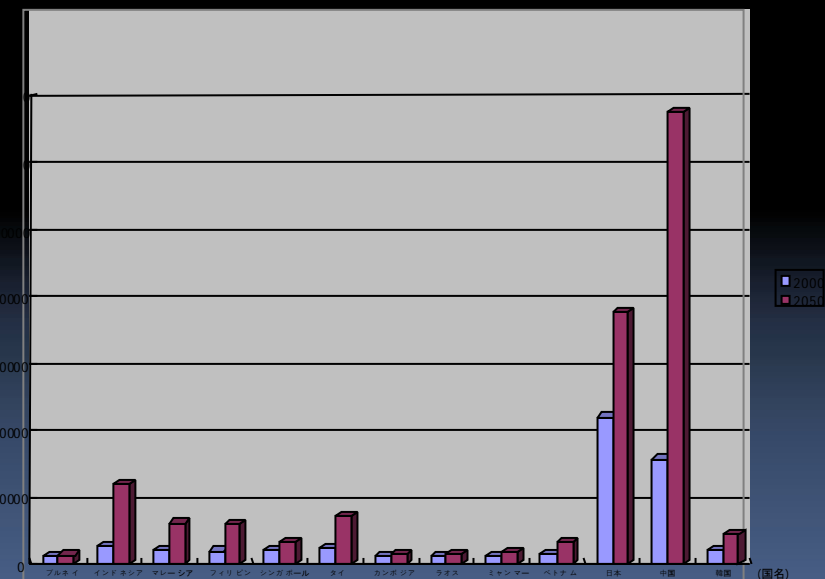
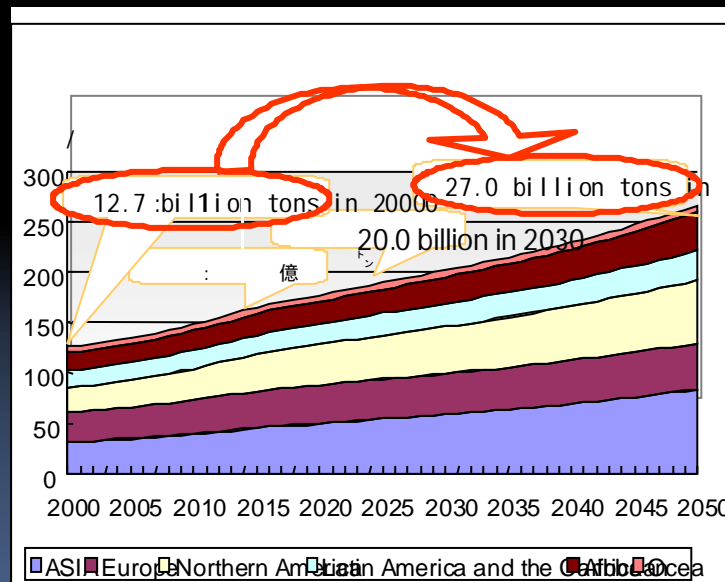
## 2.2g High Concentration of Office and Commercial Buildings in Major Cities in Asia and the Pacific, 2011



City of Tokyo, Japan , by courtesy of R & K Associate, 29032011

## 2.3b Growth of Urban Solid Wastes, 2000-2050

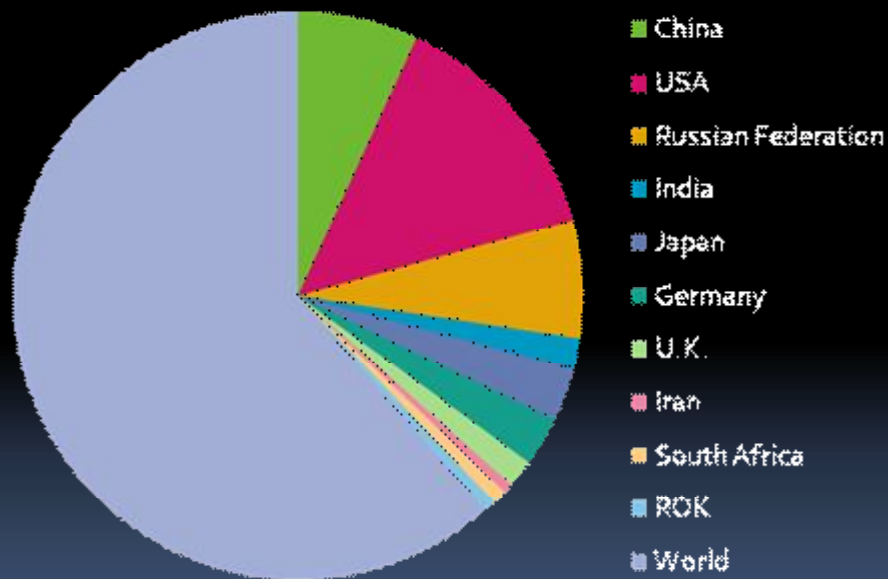
Urban household wastes will expand rapidly, as per capita income in developing countries rises. Solid wastes of the world will expand annually from 12.7 billion tons to 27.0 billion tons between 2000 and 2050.



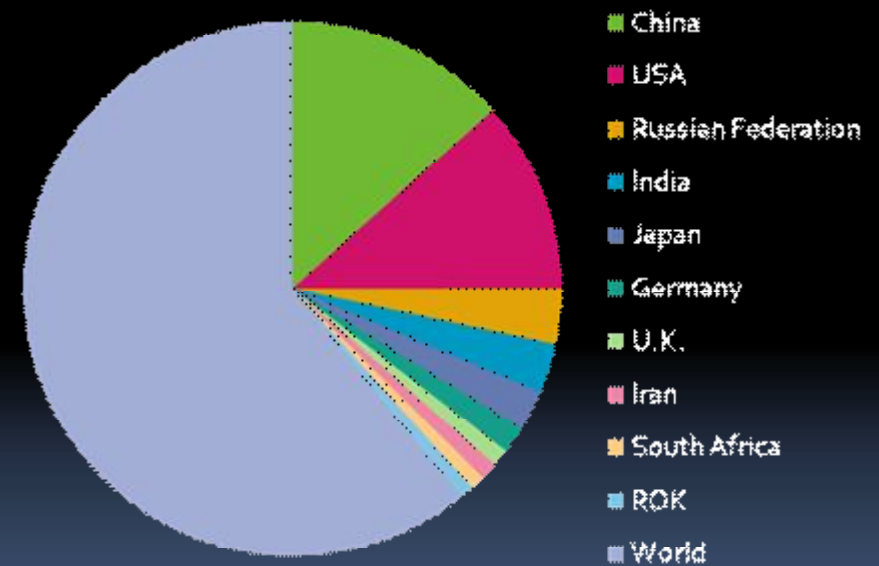
Source: Saeko Yoshizawa & Suguru Tanaka, 2007, Background and Forecast Volume of Solid Wastes of the World.

## 2. 4a Major CO<sub>2</sub> Emitting Countries, 1990 & 2008

World total 1990: 21,523.4 m. tons

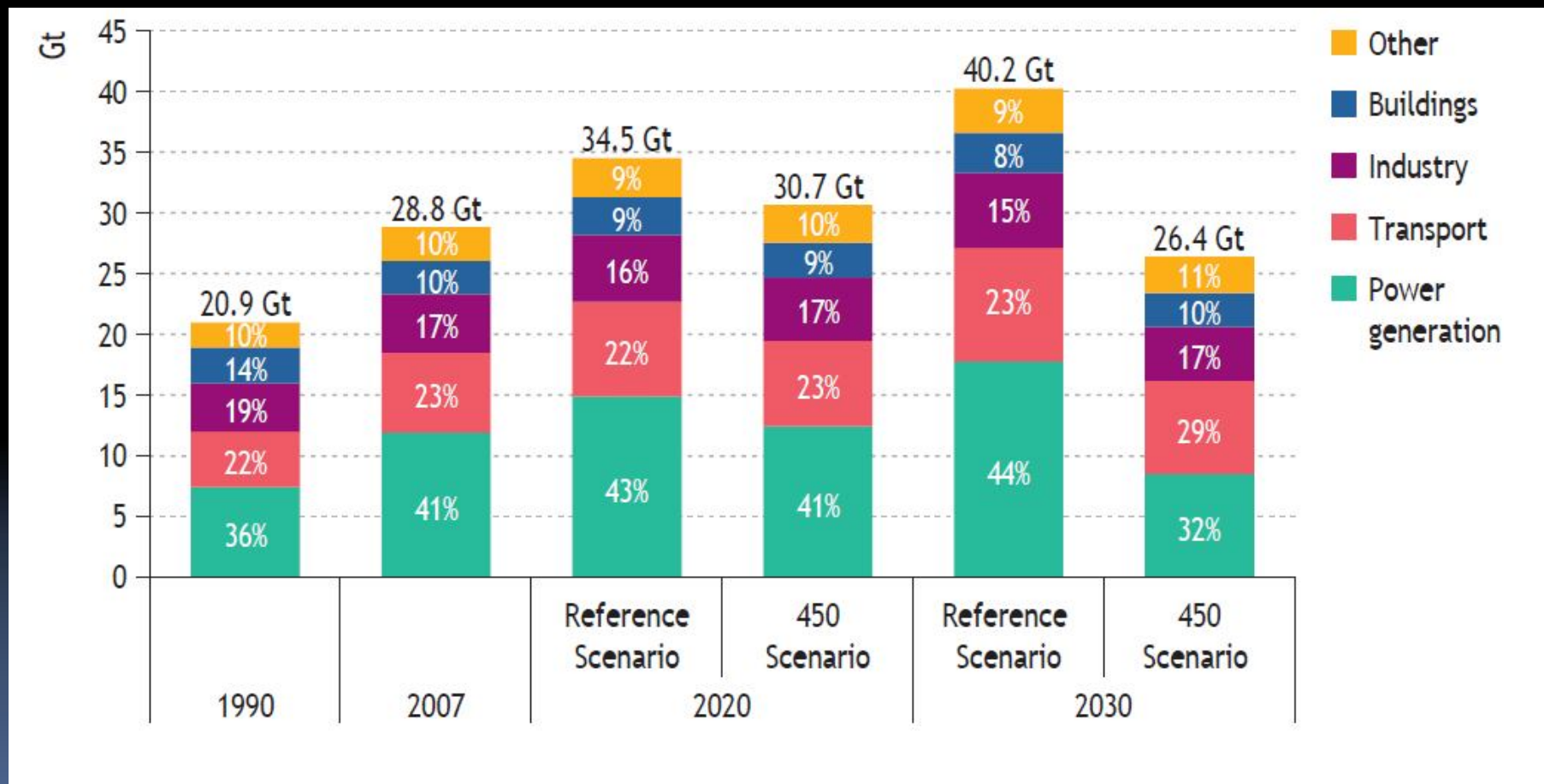


World total 2008: 29,938.6 m.tons





## 2.4b Changing Sources of CO<sub>2</sub> Emission in Asian and the Pacific Region, 1990-2030



## 2. 4c Air Pollution in Major Asian Cities, 2000-2010

	Seoul	Pusan	Kwgzh	Dalian	Shghai	Bkk	Manila	Jakarta
A	84	94	295	185	246	223	200	271
B	44	60	57	61	53	11	33	n.a.
C	1.5	1.6	2.5	1.9	n.a.	>30	>30	23
D	60	51	136	100	73	23	n.a.	71

Source: World Bank, WDR 2002.

Notes: A-Particulate matter ( $\mu\text{g}/\text{m}^3$ ) ; B-SO<sub>2</sub> ( $\mu\text{g}/\text{m}^3$ ) ; C-CO (ppm) ; D-NO<sub>2</sub> ( $\mu\text{g}/\text{m}^3$ )

## 2.5a Threats to Human Security in Asia and the Pacific, 2007

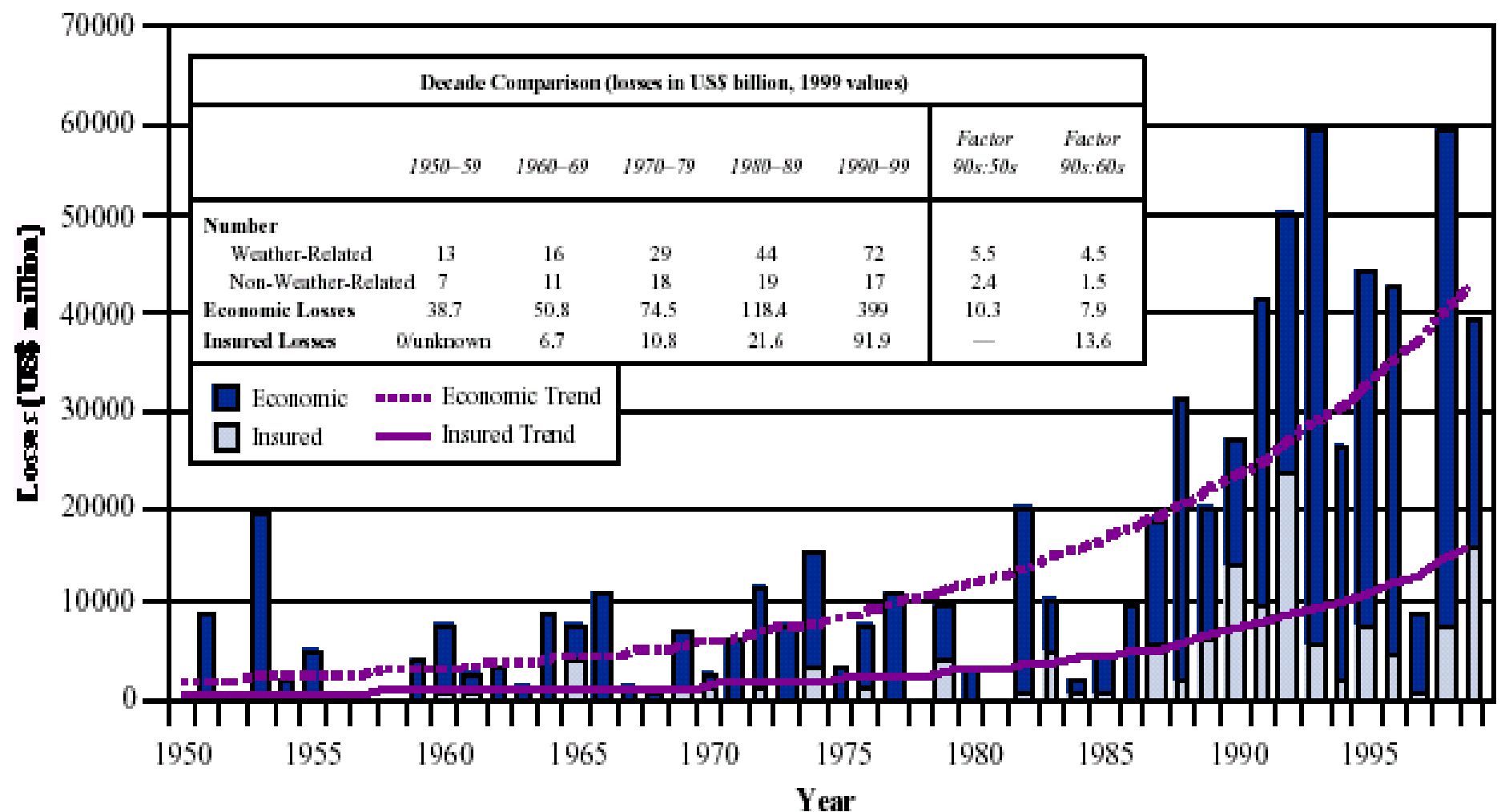
	Low	Moderate	Serious	Very Serious
High energy prices	12 (12)	28 (24)	42 (38)	18 (22)
Water pollution & shortage	28 (17)	35 (27)	30 (37)	6 (15)
Global warming	35 (22)	29 (25)	26 (28)	10 (22)
Failure of the Doha Round	28 (22)	33 (35)	24 (25)	12 (13)
Protectionism	26 (24)	38 (31)	29 (34)	6 ( 8)
Terrorists	21 (27)	33 (31)	26 (26)	8 (11)
Sharp decline in asset markets	31 (22)	37 (39)	23 (24)	6 ( 8)
Natural disaster	34 (30)	34 (32)	24 (24)	5 ( 9)
Current account imbalance	30 (22)	38 (40)	21 (22)	6 ( 7)
Avian flu and other pandemics	33 (30)	32 (27)	17 (20)	6 ( 7)
Proliferation of preferential TA	40 (22)	36 (39)	18 (20)	4 ( 5)

Source: PECC, *State of the Region 2007-08*, Table 2, pp.45-46.

Notes: Respondents to the above survey taken in 2007 were: 107 businessmen, 68 government officials, 166 academics and researchers, 14 media persons, 5 civil society representatives and 22 others. Of these 382 respondents, 228 are from Asia.

Figures are for the next 1-2 years, whereas those in brackets for 3-5 years or longer.

## 2.5f Natural Disasters around the World, 1950-1999



Source: IPCC, 2007, AR4.



### 3. Central and Local Government Responses to Urban Environmental Degradation in Asia and the Pacific, 1960-2011

#### 1) Central Government Responses

- a. Legislative measures
- b. Administrative measures, including call for all stakeholders such as local governments, private sector and NGOs to mainstream environmental sustainability in their respective activities

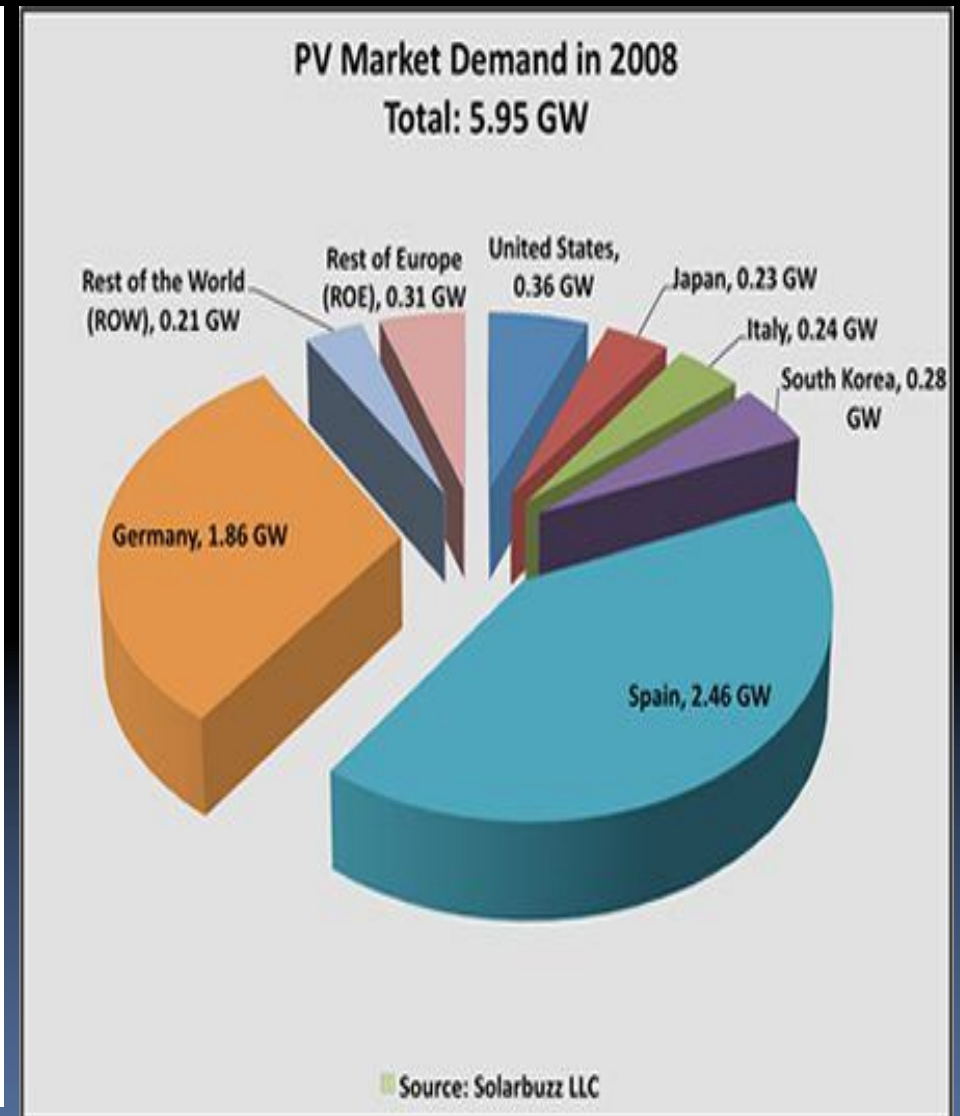
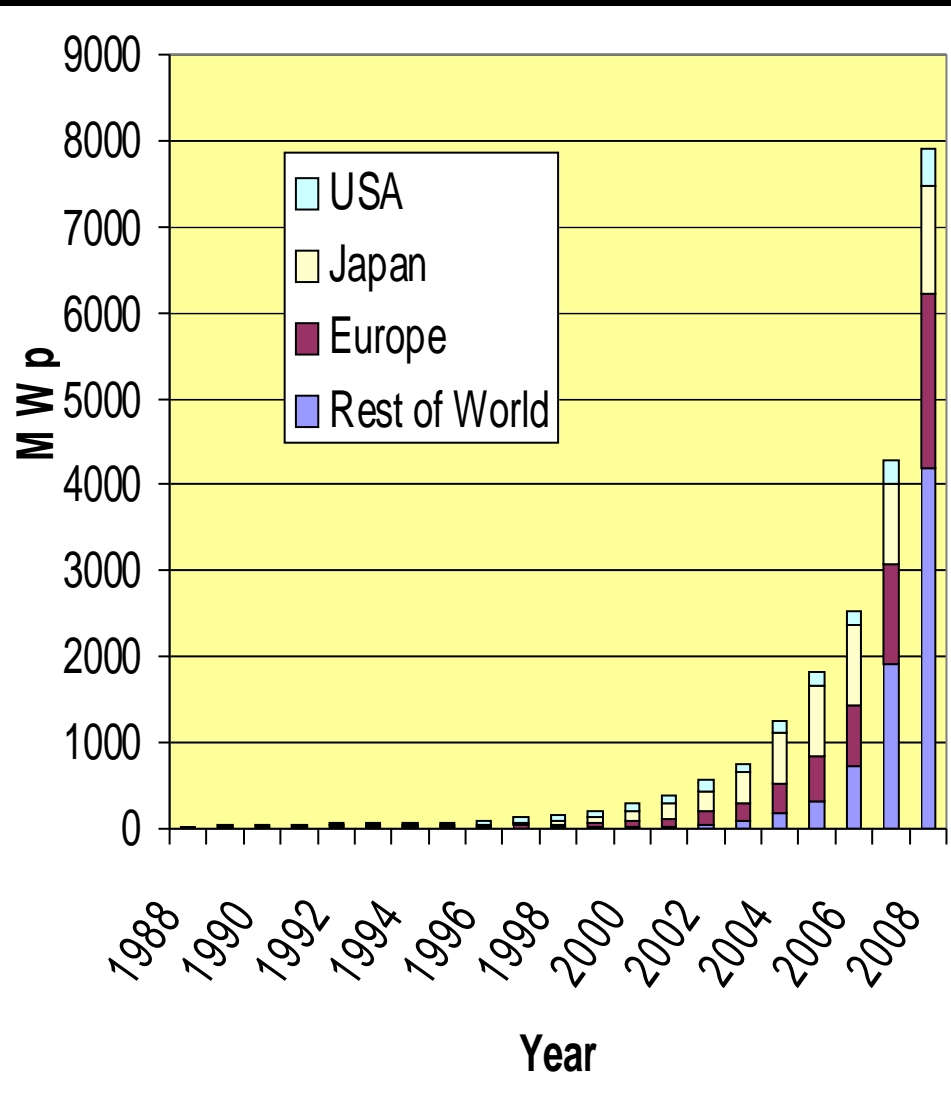
#### 2) Local Government Responses

- a. Local assembly ordinances
- b. Local administration measures, including call for all community stakeholders to take individual and joint actions in promoting environmentally sustainable production and consumption

### 3.1b Administrative Measures in Asia-Pacific Countries, 1960-2011

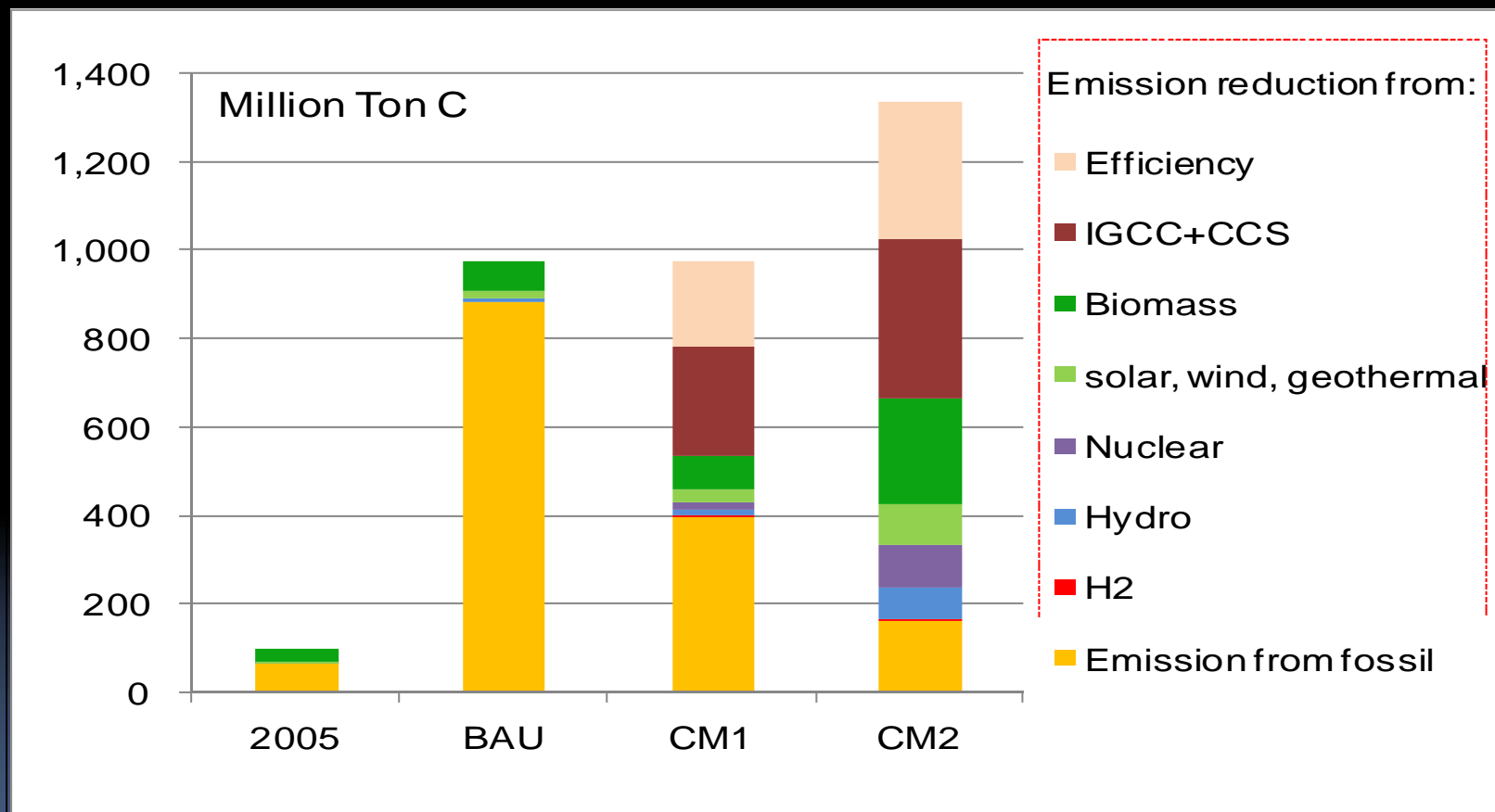
- i) Depending upon the socio-political environments specific to countries and sub-national regions, either top-down or bottom-up, or both approaches have been taken, all with a view to implementing effectively the legislative measures, with their effectiveness varying among different countries and sub-national regions, depending on their own capacity;
- ii) Common across many countries of Asia and the Pacific region are: inadequate financial, human and institutional capacity, insufficient awareness not only among policy makers (politicians) but also among the people on the street of the current and future threat to environmental sustainability, and further more an inadequate support of the international community including, as being observed, repeated failures at COP meetings of reaching a consensus on the post-Kyoto international arrangements on climate change after 2012, in spite of urgency demonstrated by small island countries.

### 3.1c Booming Photovoltaic Development around the World, 1988-2008



R. Corkish, Australia-based Education and Training for Photovoltaics Industry Expansion in the Asia-Pacific Region

### 3.1d Possibilities of CO<sub>2</sub> Emission Reduction through Different Policy Measures, 2005-2050



Source: Dewi, Matsuoka, Gomi, Ehara, Kainuma and Fujino, Scenario Study on Low Carbon Society Indonesia 2050, 2009.

Note: CM1 under the assumption of 22 times of 2005, annual 6.9% economic growth rate, while CM2 under that of 38 times of 2005 at 8.4% growth rate.



## 3.2 Local Government Responses in Asia and the Pacific, 1960-2011

### a) Legislative Ordinances

Closest to the community residents, local governments have in general been ready and quick in responding through ordinances and guidelines to various issues raised in their communities, whether in reducing and eliminating air, water, soil and noise pollution and household and industrial wastes or in expanding greenery, ensuring food and traffic safety and disaster relief and prevention, improving public access to sanitation, health and other social services and promoting education for environment and sustainable development;

### b) Administrative Measures and Implementation

Provincial governors, city mayors and councilmen, when elected directly by community voters, have usually tried their best, unlike their counterparts appointed by central governments, to keep their election campaign promises for making their communities safe, clean and comfortable. Their governance effectiveness, however, has varied, depending on the leadership of these elected policy makers and the degree of mutual confidence and trust between them and community voters which often results from the latter's participation in local government decision-making processes and formal and informal process of consultation among them.

## 3. 2b Administrative Measures in Asian Cities, 1960-2011

- i) City managers have now found that the first step required for building ESCs/EMCs is the collection, analysis and publication of accurate data on various dimensions of the urban environment at a regular interval, which is far from adequate in many cities of Asia and the Pacific not only due to lack of financial, human and institutional capacities but also insufficient recognition among city officials and community residents of the urgency and range of environmental protection;
- ii) Recruitment of scientific and technical staff who have received professional education in the field of the environment and opportunities for training of people engaged in environmentally related jobs are also found as totally inadequate in many cities, requiring immediate attention. This is particularly significant in case of Japan which is now undergoing, immediately following the East Japan Great Earthquake and Tsunami, an unprecedented experience of nuclear power plant explosions one after another, resulting in the steady emission of all sorts of radiation materials exceeding the internationally approved safety standards such as iodine (I) 131 and 132, cesium (Cs) 134, cobalt (Co) 56 and 60, Zirconium (Zr) 95, Lantan (La) 140 and plutonium 238, 239 and 240

iii) Confronted with large fiscal deficits every year and heavy fiscal deficits outstanding, city managers have found it extremely difficult to give priority to environmental protection and ESC/ EMC development which is desirable in the longer term perspectives, but requires reallocation of the current and future city budgets. In spite of such bottlenecks, some municipal majors and provincial governors have taken bold actions to initiate green town concept and found it essential to link with local economic development and employment expansion, to be accepted widely by community residents

iv) City managers have also found that the closest possible cooperation is required from the board of education at municipal and provincial levels to strengthen environmental education at all levels of educational institutions and at the informal level to mobilize the support of community residents to ESC/EMC development;

## 4. Diversity and Challenges in Building Environmentally Sustainable Cities in Asia and the Pacific Region, 2007-2012

- 1) Third Meeting of the East Asian Summit (EAS) in Singapore in November, 2007, issuing Singapore Declaration on Climate Change, Energy and Environment;
- 2) Meeting of the G8 Environmental Ministers' Meeting in Kobe in May, 2008, installing the Low Carbon Society Research Network (LCS-Rnet);
- 3) Meeting of the Network of East Asian Think Tanks (NEAT), Working Group on the Environment on Climate Change in Singapore in June, 2008;
- 4) EAS Environmental Minister's Meeting in Hanoi in October, 2008, setting Environmentally Sustainable Cities as its priority area for intra-EAS/EMM environmental cooperation;
- 5) Meeting of NEAT, WG/Environment on Eco-Cities in Singapore in June, 2009;
- 6) High-Level Panel of the ESCAP Committee on Environment and Development in Bangkok in December, 2009 on Key Challenges, Opportunities and the Way Forward in the Area of Environment and Development : Enhanced Access to Services Towards Socially Inclusive and Sustainable Development on Water, Sanitation, Energy, Transport and Housing;



- 7) First Meeting of the High Level Seminar (HLS) on Environmentally Sustainable Cities (ESCs) in Jakarta in March, 2010;
- 8) Meeting of NEAT, WG/Environment on Water Resources Management in Singapore in June, 2010;
- 9) Meeting in Yokohama in July, 2010 of the International Forum for Sustainable Asia and the Pacific (ISAP) 2010 on Sustainable and Low Carbon Development : Innovative Pathways for Asia-Pacific and IGES/World Bank Meeting on Possible Collaboration Activities for Supporting Country-Based Model Cities Programme in Asia ;
- 10) PECC General Meeting in Tokyo in October , 2010 on New Vision for APEC and Toward Further Regional Economic Cooperation;
- 11) Tokyo Symposium on Low Carbon Asia under LCS-RNet in Tokyo in February, 2011;
- 12) Second Meeting of the HLS on ESCs in in Kitakyushu City in March, 2011;
- 13) PECC Meeting in Perth in April, 2011 on Environmental Sustainability in Urban Centers : Efficiency and New Technologies, Best Practices for the Provision of Public Services for a Better Protection of the Environment;
- 14) Meeting of NEAT, WG/Environment in June, 2011 on Natural Disaster Relief and Preventive Measures in Asia; and
- 15) Third Meeting of the HLS on ESCs in Phnom Penh in March, 2012;

## 4.2 Common Agenda for Promoting Environmentally Sustainable Cities in Asia and the Pacific, 2008-2011

- 1) While paying due attention to differences in socio-economic, ecological and cultural traditions among different countries and communities, environmental model cities in Asia and Pacific region are addressing common agenda on applying their respective expertise and technologies in such areas as: i) urban planning including environmentally sustainable transportation, ii) green building, iii) urban water supply and sewage treatment, iv) urban greenery, urban biodiversity conservation, urban landscape, v) sanitation and waste management, vi) 3Rs and resource efficiency improvement, vii) air, noise, water and soil pollution control, viii) co-benefit approaches to climate change and pollution control, ix) adaptation to climate change in cities, x) urban infrastructure building and xi) reduction of natural disaster risks;
- 2) Seminars and symposia on environmentally sustainable cities (ESCs) and liveable cities have been found as a useful tool for sharing experiences and best practices among all countries and communities interested in building and reinforcing ESCs;
- 3) All the national governments in the region have now launched some ESC programme and projects in collaboration with various stakeholders within and in the international community where political leadership at the top is the key to their initiation and success;

## 4.3 Barriers and Constraints facing Major Cities of Asia in Building ESCs/EMCs

### 1) Lack of Consensus among Community Residents of Building ESCs/EMCs

Most major cities and metropolis in Asia, having large population, covering large space and with emotional attachment to their own residential communities, have found it extremely difficult to reach consensus among community residents on building ESCs/EMCs. Even when eventually agreed upon, specific issues such as when, where and how to start have brought the consensus into sharp dissension, delaying the whole process of building ESCs/EMCs;

### 2) High Cost of Building ESCs/EMCs

Built up over centuries, remodeling of major cities into ESCs/EMCs has been found extremely costly to local governments which are already heavy in fiscal deficits outstanding. Financing by public-private partnership, the only way out for realizing ESCs/EMCs, has often been marred in Asia by corruption and/or extraordinarily excessive charges on account of the lack of good governance, transparency and accountability of both public authorities and private entrepreneurs;

### 3) Inadequate Human and Institutional Capacity for Planning and Implementing Local Development Programmes for Building ESCs/EMCs

With the exception of a few metropolis and major cities in Asia and the Pacific, most are inadequately equipped with appropriate institutional mechanisms and under-manned by appropriate expertise to undertake the remodeling of their ancient cities into ESCs/EMCs. Assistance of foreign expertise, private and public, is urgently required to install proper human and institutional capacity

## 4.4 Initiatives Taken by Some Metropolitan Leadership in the Asia-Pacific Region, 2000-10

- 1) 60 Environmentally Sustainable Cities (ESCs) under Kitakyushu Initiative for a Clean Environment , associated with ESCAP Ministerial Conference on Environment and Development (MCED), 2000-2010;
  - a) Weihai City, China on sulfur dioxide (SO<sub>2</sub>) emission and chemical oxygen demand (COD) reduction, respectively, by 5 % and 15 % as compared with 2005 levels; b) Surabaya City, Indonesia, Sibu Municipal Council, Malaysia and Bago City, Puerto Princesa and San Fernando City, Philippines on waste reduction respectively by 40%, 10-15%, 60 %, 68% and 28% and promotion of waste segregation at source and household composting; c) Ulsan Metropolitan City, ROK on municipal waste reduction to 0.9 kg per day and achieving a recycling rate of 65 %; d) Kathmandu Metropolitan City, Nepal on overall urban environmental conditions; e) Cebu City, Philippines on municipal waste and plastic use reduction respectively by 50 % and 75 %; f) Bangkok Metropolitan Administration, and Nonthaburi Municipality, Thailand on municipal waste reduction respectively by 30%; g) Muntlupa, Philippines on



cost wise affordable, less energy intensive, less polluting, and less spacious wastewater treatment, with replication in Demaguete and San Fernando Cities in the country as well as Municipality of Korat, Thailand with the use of filter system and grease traps and Pang-Kone Municipality with a clustered approach of constructed wetlands; h) Cities of San Fernando, San Carlos, Metro Clark, Sagay, Calbayog and Davao, all in the Philippines, as well as Sibu City, Malaysia and Kathmandu Metropolitan City, Nepal on sanitary landfill, with gas for electricity generation and a flare system to burn excess and unutilized gas; i) Cities of San Fernando and Puerto Princesa, Philippines on marine sanctuary and reforestation through bio-engineering and zoning of environmentally critical areas;

## 2) Low Carbon Cities under LCS-RNet 2009-2011

a) Japan Scenarios and Actions Towards Low- Carbon Societies; b) Shiga's Scenario Towards the Realization of a Sustainable Society; c) A Roadmap Towards Low Carbon Kyoto; d) Sustainable Low Carbon Development Towards 2030 in Vietnam; e) Low Carbon Society Scenario Towards 2050: Indonesia; f) Scenario Analysis on Low Carbon Economy Development in Jilin City, China; g) Low Carbon Society Vision 2030: Thailand; h) Low Carbon Society Vision 2050: India, i) Low Carbon Society Vision 2035: Ahmedabad; j) Low Carbon City 2025: Sustainable Iskandar, Malaysia; k) Towards Putrajaya Green City 2025, Malaysia;

- 3) ESCs under East Asian Summit Environmental Ministers' Meetings (EAS/EMM) and ASEAN Working Group on ESCs (AWGESC), with each city focusing its sustainable development activities on such issues as: a) Bangkok Metropolitan Area, Thailand **on urban air quality management**; b) Cagayan de Oro City, Philippines **on ESC development**; c) Gwanggyo New Town, Geonggi Province, ROK **on planning for a liveable city**; d) Iloilo City, Philippines **on urban air quality management**; e) Kitakyushu City, Japan **on Eco town development**; f) Luang Prabang, Lao PDR **on waste collection and minimization**; g) North Kuching City, Malaysia **on ESC development**; h) Phnom Penh City, Cambodia **on urban solid waste management**; i) Puerto Princessa City, Philippines **on adaptation to climate change**; j) Singapore, ROS **on urban air quality management**; k) Surabaya City, Indonesia **on urban solid waste management**; l) Tirupati, India **on urban solid waste management**; m) Yichang City, Hubei Province, China **on EMC development**; n) Yokohama City, Japan **on adaptation to climate change**, and many others;

## 4. 4a Some Examples of Environmentally Sustainable Cities in Asia and the Pacific, 2010



Incheon City, ROK, by courtesy of R & K Associate, 08112010



## 4. 4b Low-Level Office and Commercial Buildings in Post-Disaster City



City of Yokkaichi, Japan, by courtesy of R & K Associate, 18022011



## 4.4c Some Examples of Concerted Efforts in Major Cities in Asia and the Pacific, 2010



Singapore Water Front, by courtesy of SIWW on Singapore Water Week, 28062010

## 4.5 Private Sector Initiative: Panasonic, Inc. 2000-2011

a) By stating in its 1991 Environment Charter that “the era of mass-production, mass-consumption and mass-disposal has gone,” and “we pledge ourselves to the prudent, sustainable use of the earth’s resources and the protection of natural environment, while we strive to fulfill our corporate mission of contributing to enhanced prosperity of all,” Panasonic set down its own environmental vision of Coexistence with the Global Environment” which consisted of :i) Striving for green products (GP), ii) Striving for clean factories (CF), iii) Environment and energy business initiatives (EE), iv) Promoting product recycling (PR), v) Environmental communications (EC), vi) Green marketing and distribution (GMD), and vii) Environmental management and human resources development (EM).b) GP aims at making all Panasonic

products and services environmentally friendly by using environment-conscious materials through efficient use of energy and other resources. CF aims at achieving Zero Emission by minimising CO2 emission and waste generation and its Green Plan for 2010 aims at 10% reduction of CO2 emission at all its establishments at home, with its baseline being 1990, exceeding the national target of 7%. The Green Plan sets specific targets for all its visions of environment. The company, responsible for 1.2% of Japan's total CO2 emission and 10% of the corporate emission, was ranked as the fifth most environmentally friendly one in Japan in 2000. CF also strives to develop environmentally friendly production methods and systems; c) EE aims at developing sustainable energy such as fuel cells, while PR aims at expanding product categories for recycling. GMD aims at maximising the conservation of energy and resources in transportation and warehousing. EM contributes to establishing organisational structure to facilitate speedy and autonomous decision-making procedures and installing indicators and evaluations systems for environmental management, as well as cultivating environmental awareness among all levels of Panasonic employees in all countries where the company operates. Finally, EE aims at disseminating Panasonic's environmental activities worldwide and taking up future challenges through enhanced collaboration with like-minded corporations and Governments, central and local.

# APPENDIX

A BRIEF CHRONOLOGY OF THE STEPS  
TAKEN BY ALL STAKEHOLDERS  
INCLUDING THE GOVERNMENT OF JAPAN  
TO EAST JAPAN GREAT  
EARTHQUAKE/TSUNAMI AND TOKYO  
ELECTRIC POWER COMPANY (TEPCO)  
NUCLEAR POWER PLANT EXPLOSIONS  
11 March ~ 9 April, 2011



# A1 East Japan Earthquake/Tsunami : Pacific Coast of Sendai Satellite Photo 12032011



By courtesy of CNN, U.S.A. 12032011



## A2 East Japan Earthquake/Tsunami: North of Sendai Satellite Photo 12032011



By courtesy of CNN, U.S.A. 12032011



# A3 East Japan Earthquake/Tsunami : Iwaki City Satellite Photo 12032011



A4 East Japan Great Earthquake/  
Tsunami : Ri kuzen Takada,  
Mi yagi Prefecture, Photo 14032011





# A5 Tokyo Electric Power Co.'s Nuclear Power Plants, before and after East Japan Earthquake/Tsunami: Satellite Photo 12032011



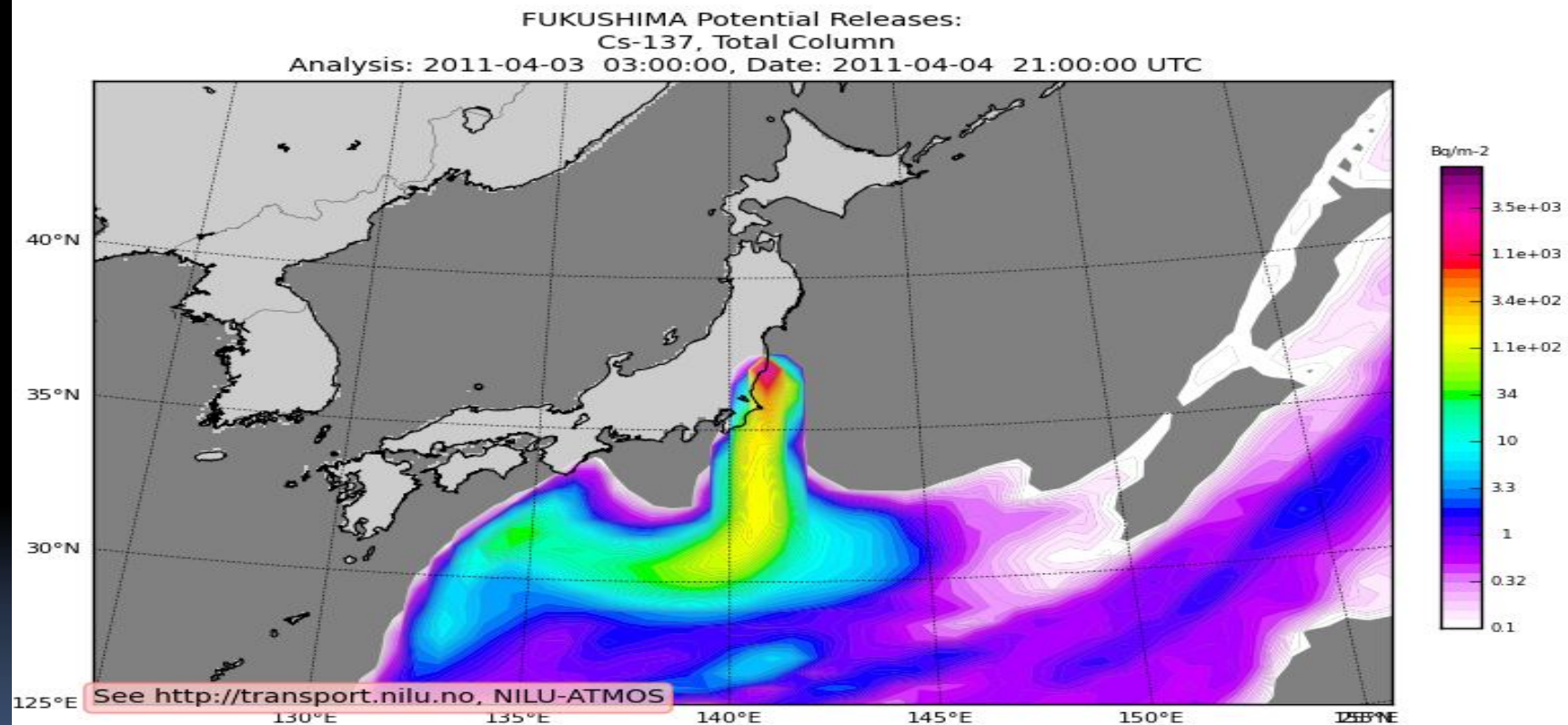
By courtesy of CNN, U.S.A. 12032011

# A6 Tokyo Electric Power Co.'s Nuclear Power Plants, after East Japan Great Earthquake Disaster, 04042011



Aerial Photo Service Co., Niigata : Fukushima Nuclear Power Plants  
Nos. 1-4, taken at 6:54AM on 4 April, 2011

# A7 Potential Release Overseas of Nuclear Radioactive Materials



Source: Norwegian Institute of Radiation Research, Wind Monitoring,  
03042011



## A8 Immediate Steps being Taken by All Stakeholders including the GoJ to EJGET and TEPCO'S NPPE, 11-31 March, 2011

- 1) Mobilization of Japan Self-Defense Forces, National Fire Fighting Brigade, National Police Agency Forces to the Region affected by EJGET and NPPE;
- 2) Spontaneous dispatching of volunteers by all stakeholder groups and collection and remittance of cash relief contribution (already amounting to US\$800 million during the first two weeks from 11<sup>th</sup> to 23<sup>rd</sup> March) and in-kind relief materials (foodstuff, drugs, blankets, quilt, clothing, batteries, kerosene, gasoline, stoves, etc.) to the areas affected by EJGET and NPPE and the formation of National EJGET Volunteer Group to coordinate NGO and NPO assistance to the people in the affected Region;
- 3) Establishment of Joint GoJ/TEPCO Task Force at TEPCO to analyze, evaluate and monitor all developments related to NPPE and inform the public on a regular interval (3-4 times a day) with the assistance of Nuclear Safety Protection Agency under Ministry of Economy, Trade and Industry (METI) and Nuclear Safety Commission under Prime Minister's Office (PMO);



- 4) Installation under PMO of Emergency Task Force on Relief to the Areas affected by EJGET and Call for all stakeholders to assist those suffering from the Disaster ;
- 5) Emergency evacuation decree by Emergency Task Force under PMO to those living within 20km diameter from NPPE to evacuate to distant areas not yet affected and Call for all local governments elsewhere to assist those requiring evacuation ;
- 6) GoJ recommendation to those living within the neighborhood of 20-30 km diameter from the site of NPPE to stay indoor for the time being;
- 7) Invitation by local governments all over Japan including those within Fukushima Prefecture to accommodate all evacuees from the NPPE and neighboring areas;
- 8) Appeals by National Provincial Governors and Mayors' Councils to all the member local governments to send necessary professional staff to their counterparts in the affected areas to deal with those now residing in temporary shelters (over 150,000 persons) and those evacuees;
- 9) Request by GoJ to the international community to prevent further NPPE, including the establishment of Emergency Joint Japan-U.S. Task Force to arrest and prepare for the meltdown of TEPCO 's nuclear power plants in Fukushima Prefecture and contain its unforeseen adverse impact on the health of people working at NPPE site and living in the neighboring areas;

- 10) Tabloid papers at all temporary relief and evacuation centers of all the government announcement on actions already taken and to be taken within a week or two , as part of government efforts to held reducing mental stress of those suffering from EJGET and NPPE;
- 11) Review by Nuclear Safety and Protection Agency (NSPA) under METI of the current nuclear power plant safety regulations and guidelines, including its special request to all the Japanese power companies operating nuclear power plants in the country to inspect their safety measures ;
- 12) Installation of National Rehabilitation & Reconstruction Agency (NRRRA) under PMO;
- 13) Accelerating government reform measures including the separation of NSPA from METI, promoter of nuclear power generation and its merger with NSC and the reallocation of the approved budget including the partial suspension of child allowance increment and reduced turnpike toll collection to generate public finance essential to emergency relief and rehabilitation estimated to amount to \$42 billion;
- 14) Prohibition of shipment of certain vegetables and fish in certain affected areas ;
- 15) Partial cash grant and compensation to those affected by TEPCO's NPPE;
- 16) Drafting of necessary legislation and special supplementary budgetary revenues and expenditures at the national level , including consumption tax increase from 5 % to 10% and temporary suspension of individual and corporate income tax relief and exemption measures for the relief, rehabilitation and reconstruction of the affected region reported to be amounting to excess of US\$300-400 billion.

# A9 American Assistance on EJGED: USS Ronald Reagan 1603-08042011



Source: <http://www.mofa.go.jp/mofaj/saigai/index2.html>

# A10 Facts and Figures on EJGET and TOPCO's NPPE, 1103-08042011

- 1) Human suffering:  
Loss of life: 12,690 persons  
Missing persons: 14,736  
Persons left homeless and being housed at temporary shelters: 150,760 persons  
No. of evacuees from the TEPCO's NUPED site: 68,032 persons + ?
- 2) Direct relief required for the affected people: US\$50~60 billion;
- 3) Cash donation to Japan Red Cross and Community Chest: \$1.4 billion and in-kind voluntary assistance; \$5 billion;
- 4) Financial value tentatively estimated by GoJ for rehabilitation and reconstruction of the adversely affected region: \$250~300 billion over the next 5 years;
- 5) Loss of GDP tentatively estimated by GoJ in 2011: \$200~300 billion;
- 6) International assistance to those people affected by EJGET and TEPCO's NPPE: 134 countries and 39 international organizations, including that of the U.S. Armed Forces totaling 20,000 men, 20 naval ships and 160 aircrafts.



# A11 Many Thanks for Sympathy and Encouragement from Overseas



Source: <http://www.mofa.go.jp/mofaj/saigai/index2.html>

# Supplementary Statistical Data

1. Growth Rates of GDP, by Regions
2. Major Economies in 2025 and 2050
3. Changing Economic Structure in Asia/Pacific
4. Demonstration Effects in Asia-Pacific
5. Population Composition and others in A/P
6. Growing Household and Industrial Wastes
7. Global CO<sub>2</sub> Emission, by Region, 1990 & 2004
8. CO<sub>2</sub> Emissions of Asian and Pacific Countries, 1980-2007
9. ODS, Nox and Particulate Matter in A/P, 1990-2007
10. Life Years Lost due to Premature Death, Caused by Environmental Risks in A/P, 1990s

Thank you for your  
kind attention !

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