



Section 2 Environmental Measures, Global and Domestic Economies

A global movement is spreading to seek environmental measures as a key to overcome the recession, under the global recession since the latter half of 2008, instead of prioritizing economic recovery. This is so called policy “Green New Deals.” In this section we will grasp the recent trends of the international organizations and each country towards environmental measures, and consider the close relationship between Japan and other countries through cooperation on transnational material flows and environmental measures.

1 Global Economies Driven by Environmental Measures

(1) Effects on the economy and employment by environmental measures

UNEP, International Labour Organization (ILO) and other international organizations cooperated and drafted a report in September 2008, called “Green Jobs: Towards decent work in a sustainable, low-carbon world” (hereinafter referred to as “Green Jobs”), which conducted analysis on the environment and the economy. The report defines “Green Jobs” as activities that contribute to preserving or restoring environmental quality. The pace of green job creation is likely to accelerate in the years ahead amidst the global transition to a low-carbon and sustainable economy. As an example the report concludes that the global employment in the renewable energy in 2006 was 300,000 workers in wind power, 170,000 in solar photovoltaics (PV) and 1,174,000 in biomass (Table3-2-1).

In addition, UNEP reported in its “Global New Deal” in February 2009 that each high-income OECD country should invest at least 1% of GDP over the next two years on various actions to reduce carbon dependence. The report also compiled 10 items which the international society should approach. UNEP launched the “Green Economy Initiative” with global economists, beside this, and will make recommendations to each country based on various researches over the next two years or so. Japan is also required to advance the consideration on greening of the economy, including economic assessment on environmental value and the relationship between environmental measures and employment.

(2) Integrated promotion of each nation’s environmental and economic measures

In the United States, President Barack Obama has taken office and has taken a proactive stance on environmental measures. The policy related to the clean economy, incorporated in the Budget Message of the President, announced in February 2009 indicates the intention of investing 150 billion dollars in the clean energy field over the next decade and to increase the ratio of renewable energy derived electricity to 25% by 2025. The United States will also introduce nationwide cap-and-trade system by 14% compared to 2005 by 2020 and 83% compared to 2005 by 2050. These policies are embodied in the American Recovery

Table3-2-1 Global Estimated Employment in the Renewable Energy Sector

Renewable energy source	World	Selected Countries	
Wind	300,000	Germany United States Spain China Denmark India	82,100 36,800 35,000 22,200 21,000 10,000
Solar PV	170,000	China Germany Spain United States	55,000 35,000 26,449 15,700
Solar thermal	624,000 -plus	China Germany Spain United States	600,000 13,300 9,142 1,900
Biomass	1,174,000	Brazil United States China Germany Spain	500,000 312,200 266,600 95,400 10,349
Hydropower	39,000 -plus	Europe United States	20,000 19,000
Geothermal	25,000	United States Germany	21,000 4,200
Renewables, combined	2,332,000 -plus		

*Countries for which information is available.
Source: UNEP, “Green Jobs: Towards Decent Work in a Sustainable, Low-Carbon World (2008)”

and Reinvestment Act enacted on February 17, 2009. The act indicates policies to implement economic measures by also implementing environmental measures, aiming to create 3.5 million jobs over the next two years. South Korea has also unveiled its economic policy package for the future in January 2009, and will create 960 thousand jobs over four years by implementing public investment of about 50 trillion won (about 3.54 trillion yen, as of January 2009). Many countries, including these countries, are approaching to advance environmental and economic measures at the same time.

2 Japanese Economy Driven by Environmental Measures

(1) “Innovation for Green Economy and Society”

Environment Minister Tetsuo Saito compiled “Innovation for Green Economy and Society” (Table3-2-2) on April 20, 2009 on aspects of coping

with environmental issues we will face and overcoming the economic crisis by implementing drastic environmental measures.

(2) “The Low-Carbon Emission Revolution by the Future Development Strategy”

The “Future Development Strategy” was compiled under the instruction of Prime Minister Taro Aso and was approved at the Council on Economy and Fiscal

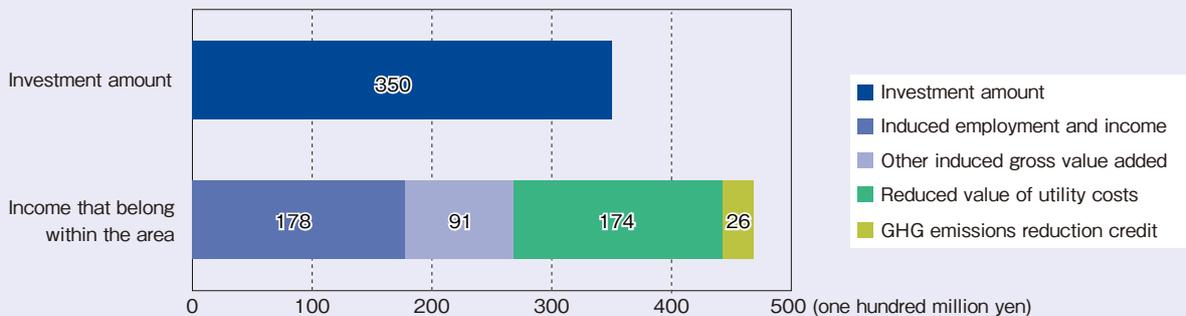
Policy. In addition to “A Healthy Long-Lived Society in which People Feel Secure and Strong” and “Promoting the Attractiveness of Japan,” “Leading the World in the Low-Carbon Emission Revolution” was indicated as a future pillar for which Japan should aim in 2020. These plans include leading the world in solar

Table3-2-2 Contents of “The Innovation for Green Economy and Society” Policy

Policy measures	Contents
Innovation toward green social capital	<ul style="list-style-type: none"> Eco-reform across the nation starting with public facilities such as schools (eco-reform in schools, public and local government’s facilities) Eco-reform in cities and transportation (①Develop eco and human friendly compact cities ②Develop eco-friendly transportation infrastructure ③Create water infrastructure that is eco-friendly and secures human health) Clean up our land (①Disposal of illegally dumped waste ②Disposal of marine litter ③Measures against PCB and Asbestos) Beautiful nature and waterside (①Securing beautiful nature ②Securing beautiful waterside and water environment) Measures to adopt climate change caused by global warming
Innovation toward green local communities	<ul style="list-style-type: none"> Support for local government centralized environmental conservation approaches (①Development of eco-friendly regions ②Development of eco-friendly transportation system ③Prevention of pollution including atmospheric and water environment) Support for local communities approaches (①Development of active local regions by conservation and utilization of the natural environment ②Development of active local regions by eco-specialist training and various entities) Development of healthy forests, farms and fishing villages (①Maintenance and preservation of forests by also utilizing urban power ②Environmentally-friendly agriculture, forestry and fisheries) Development of a sound material-cycle society in towns and regions (①Revitalizing sound material-cycle community ②Promotion of reduce and reuse ③Cyclical utilization of biomass resources ④Promotion of circulatory use of water ⑤Circulatory use of nitrogen and phosphorus)
Innovation toward green consumption	<ul style="list-style-type: none"> Promotion of purchasing energy-saving household electric appliances simultaneously (①Explosive popularization of energy-saving home appliances ②Promotion of Green purchasing and contracting) Dissemination of the next generation energy-saving houses and buildings (①Dissemination and expansion of houses and buildings with high environmental performance ②Eco-friendly renovation and life prolongation of existing houses and buildings) Approaches toward dissemination of the next generation vehicles (①Promotion of the next generation vehicles ②Installation of necessary facilities for supplying biofuels and quick charging equipment ③Promotion of the introduction of bio fuels ④Introduction of next generation vehicles initiated by the State and other entities)
Innovation toward green investment	<ul style="list-style-type: none"> Systems to integrate environmental conscious into economic activities (①Emission trading system ②Greening of the tax system ③Dissemination of carbon offset) Finance fostering green investment (①Expansion of loans for promoting environmental capital investment ②Promotion of loans on eco-friendly companies and the environmental industry) Promotion of environment-friendly operations Promotion of information greening Promotion of sound material-cycle business (①Sophistication of recycling systems and technologies ②Improvement of liability and transparency of sound material-cycle society businesses ③Promotion of low-carbonized waste disposal) Greening the energy industry (①Approaches to become a major renewable energy power ②Approaches to utilize local resources ③Safe and secure nuclear power generation)
Innovation toward green technology	<ul style="list-style-type: none"> Basic research for improving and developing both the environment and the economy (①Promotion of the research on environmental economics and policy studies ②Mid and long-term target achievement policy research roadmap for developing low-carbon society) Long-term technological development targeting at 2050 Technological development considering practical use and dissemination in 10 to 20 years Dissemination and utilization of environmental technologies (①Dissemination of cutting-edge environmental technologies and utilization of existing technologies ②Environmental technology development and support in regions) Adaptation measures to climate change caused by global warming (①Implementation of global warming forecast at regional level ②Research and development on adaptation measures) Promotion of environmental monitoring, environmental management and information collection and provision (①Environmental monitoring and promotion of environment management ②Collection, analysis and provision of information toward the 10th Conference of the Parties to the Convention on Biological Diversity)
Contribution for Green Asia	<ul style="list-style-type: none"> Strategic and systematic deployment of environmental cooperation through locations Development of environmental model cities in Asia Promotion of Co-benefit Approach Support for formulating sound water cycle Developing a sound material-cycle society at Asian level Develop society in harmony with nature in Asia Measures against trans-boundary pollution

Source: Ministry of the Environment

Figure3-2-1 Effects of Global Warming Measures on the Regional Economy



Note 1: The trial calculation is based on Kochi Prefecture’s input-output table, regarding economic ripple effects if about 35 billion yen were invested.
 Note 2: A trial calculation was made on the induced effect of the value-added—not the effect of the induced product, in order to grasp the effect of the income improvement within the region. Although ripple effects outside the region are substantially considered, due to product delivery in actuality, trial calculation has not been made this time.
 Note 3: Reduced value of utility costs on global warming measures is the value subtracting the margin earned by gas stations and decrease of sales from global warming measures, including electric power which has originally been procured within the region.
 Note 4: GHG emissions reduction credit is under the assumption that 5% were sold without the border (20,000 yen/ ton - CO₂ equivalent).
 Source: Ministry of the Environment, a conference report on “Global warming measures and regional economic cycle” (March, 2009)

power and energy saving, the first nation to popularize eco-friendly cars, low-carbon transport and urban revolution and for Japan to become a major power in renewable resources and their use.

(3) Local Economies Revitalized by Environmental Measures

A Economic and employment effects that environmental measures bring on local economies

The Ministry of the Environment calculated the ripple effect on local economies if measures such as dissemination of solar power generation and promotion of public transportation usage were implemented, under the assumption that the GHG emissions will reduce by about 30% by 2020, with Kochi prefecture as an example. The trial calculation showed that the economic effects were much higher than the investment amount (Figure3-2-1).

Chiyoda Ward in Tokyo makes to support rural large-scale wind turbine projects invested by citizens to combine low-carbon urban centers with local activation in the Environmental Model City Action Plans. Such approaches have been implemented by the Chiyoda Ward since the Tokyo metropolitan government introduced an Emissions Trading System on large-scale establishments, and permitted the utilization of green energy as an implementation measure for reducing obligation. Measures to prevent global warming will advance in this way, with cities and local areas collaborating, and is thought to encourage wealth transfer from cities to local areas.

B Estimates of the ripple effect on the economy by measures on energy demand sectors

CO₂ emissions in commercial and other sectors and the residential sector have been growing significantly in recent years, and energy saving measures from the energy demand side is strongly demanded to achieve the reduction target of the first commitment period. As a specific example of such measures, if we look at the case of introducing high efficiency air conditioning units, which is an energy saving household electrical appliance; equipment of 2008 can reduce 260kg of CO₂ annually from those of 1997, also saving electricity expense of 19,080 yen (Figure3-2-2). If we simply average the emissions of the residential sector of 180 million tons (FY2007) per household, the emission volume would be 3.4t annually, and the 260kg is equivalent to 7.6% of this volume.

Photovoltaic power generation is expected to have the same kind of effect. Japan's accumulated volume of photovoltaic power generation installation was 1,919MW as of 2007. Germany possesses 3,862MW, and Japan has been left behind since Germany overtook Japan in 2005 (Figure3-2-3). The Action Plan for Achieving a Low-carbon Society also aims to increase photovoltaic power generation by 10 times by 2020 and 40 times by 2030 as a dissemination of existing advanced technologies. In order to achieve these targets, Japan has to produce approximately 12,100MW of photovoltaic power generation in about 10 years. If

approximately 12,100MW of solar battery panels were to be installed, an annual power generation volume of 12.1 billion kWh would be obtained, calculated from the average availability factor. This volume is equivalent to the annual electric power consumption of approximately 3.4 million households and would reduce by about 4% of the total CO₂ emissions in the residential sector of 180 million tons (FY2007). (※ Electricity emissions intensity was calculated at 0.453kg-CO₂/kWh).

The future development strategy, based on Prime Minister Aso's speech in April 2009 entitled "Japan's Future Development Strategy and Growth Initiative towards Doubling the Size of Asia's Economy," aimed to expand the photovoltaic power generation scale by about 20 times from the current level by around 2020. Japan will introduce photovoltaic power generation in the public sector in order to realize this target, while introducing a new system for electric power companies to purchase photovoltaic power.

C Expectation on local governments tackling global environmental issues

The Act on Promotion of Global Warming Countermeasures states that accessible local governments (mandatory for about 100 local governments positioned as a specially designated city or higher) should formulate Local Governmental Action Plans in order to curb GHG emissions in their areas. Each local government will promote its own GHG emissions reduction based on the plans.

Let's look at an example, where these measures are producing positive effects on job creation and the local economy. Shibechea Town in Hokkaido produced a concept called "Regional Zero Emission" in which the citizens and the town office officials established a new industry in the local area, using waste as resources, while obtaining knowledge of the local universities. They have advanced development and production of wood composites made of thinned wood and waste plastic, and established and operated a limited company since 2002. The company is still continuing operation in resource recycling in the local area and is maintaining the employment of 15 people in the town whose population is 8,500.

(4) Technology that contributes to developing a low-carbon society

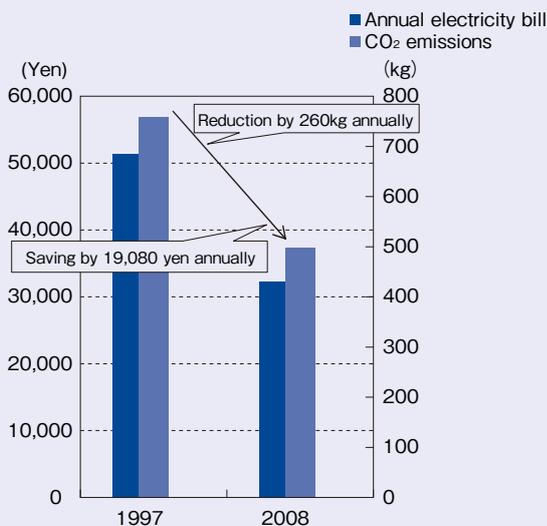
Substantial reduction of GHG emissions can not be achieved only by dissemination of existing technologies or the extension of those technologies; innovative technological development is necessary. The Action Plan for Achieving a Low-carbon Society incorporated the development of innovative technologies, as indicated in the "Environmental Energy Technology Innovation Plan." Furthermore, the Council for Science and Technology Policy stated the necessity of advancing innovation policies with long-term perspectives on the global financial crisis and global warming issues, while compiling the "Important Issues for Science and Technology Policy in 2009" in February 2009. The policy states that about 30 billion dollars will be

injected over the next 5 years to implement the Technology Road Map and other measures indicated in the “Environmental Energy Technology Innovation Plan.” As part of the investment, development will be carried out with securing the necessary budget, focusing on energy innovation technologies including innovative solar power generation, hybrid and electric vehicles, innovative iron making process, advanced nuclear power generation technology, fuel cell technology and super high efficiency heat pump. The plan also incorporates sophisticated use of coal, eventually aimed at zero emissions coal-fired generation by combining carbon capture and storage (CCS). Global demands on these technologies are all expected to be huge in the future, and are expected to be Japan’s international strategic products and technologies, if successful in the development of these technologies.

(5) Technologies that contribute the improving resource productivity

Cyclical use of resources, where economic development and environmental conservation can coexist, is in the global limelight as economic development by utilizing abundant natural resources has now become problematic. The process of global economic growth on a base without excessive dependency on resources can be regarded as an opportunity for disseminating Japan’s advanced technologies and systems for improving resource productivity. Technologies and systems such as the Table3-2-3 (Typical 3R technologies in Japan) can contribute to global sustainable development by being utilized for the development of the sound material-cycle society in developing countries including Asia.

Figure3-2-2 Energy Efficiency Upgrading of Air Conditioning



Note 1: Data for 1997 is the average value of the top 11 air conditioning models with COP (Coefficient of Performance)
 2: Data for 2008 is the average value of the top 15 air conditioning and heating models with COP (Coefficient of Performance)
 Source: Compiled by the Ministry of the Environment from The Energy Conservation Center, Japan, Energy Saving Performance Catalogue (1997& Winter 2008)

(6) Maintenance conditions for private investment promotion in the environment field

In order to disseminate such environmental technologies, it is important to maintain conditions where institutional and private investors can proactively get involved in loans and investments in the environmental field, and to facilitate fund-raising for Socially Responsible Investment (SRI) and community funds.

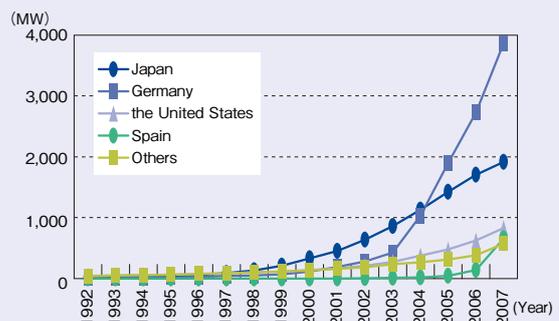
SRI is defined as an investment considering social business approaches, including environmental approaches, compliance (legal compliance) and taking care of staff, besides economic aspects such as financial indicators.

SRI in western countries started from the concept of emphasizing moral values, derived from philosophies such as religious and ethical views, and western institutional investors—including pension funds have been proactively investing compared to those of Japan. On the other hand, SRI in Japan started in 1999, as an eco-fund was set up as a mutual fund product—due to emerging concern on environmental issues. New stance overall investment in Japan is lower than those of other countries since majority of them is targeted at individual investors. According to the European SRI Study 2008, the total assets in SRI managed funds in Japan, the United States and the European nations as of the end of September 2007 was about 840 billion, 292.82 trillion and 407.8 trillion yen respectively.

In order to expand loans and investments in the environment in Japan, such as SRI, strategies that contribute to institutional investor’s investment decisions through examination of the dissemination of proper and adequate information on SRI in western countries, establishment of an information disclosure system that matches the actual condition and structures to secure accuracy are necessary.

Approaches to community funds are growing, due to the emerging concern of the citizens on the environmental conservation. These approaches include investments in businesses—installing wind power and photovoltaic generation through funds raised by citizens—and loans and investments in profitable social businesses (Community Businesses), such as the operation of recycled goods shops. The Japanese government also needs to examine structures to promote these approaches.

Figure3-2-3 Changes in Cumulative Installed PV Capacity



Source: Compiled by the Ministry of the Environment from the data of IEA, TRENDS IN PHOTOVOLTAIC APPLICATIONS Survey report of selected IEA counties between 1992 and 2007 (2008)

Improvement of Carbon Productivity

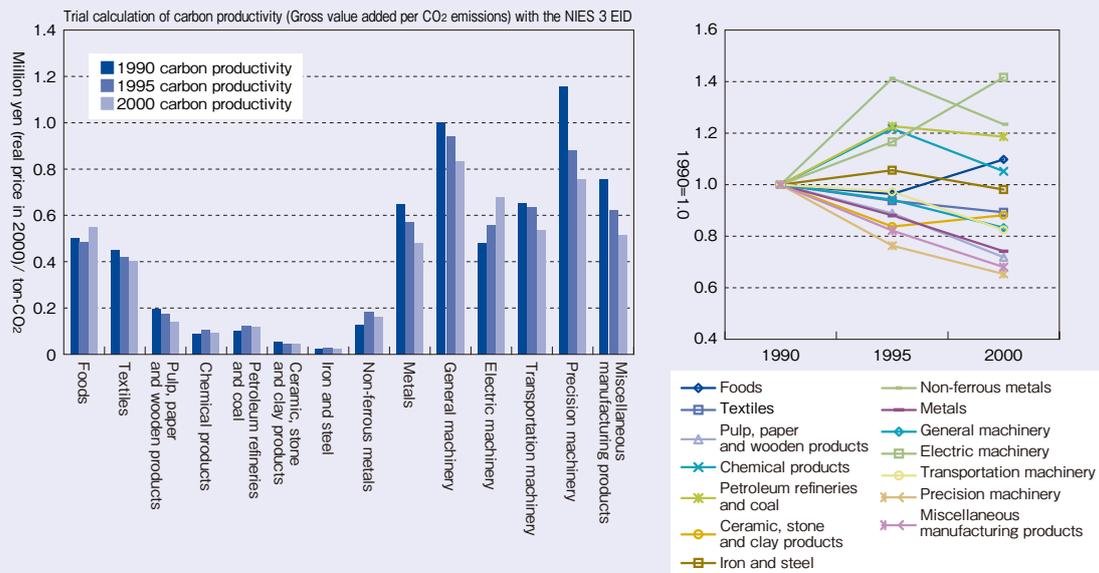
Upon building a Low-carbon Society, reviewing the current state of the socio-economy from the assumption of mass production, mass consumption and mass disposal, and decoupling that reduces energy consumption which maintaining the same value added must be achieved.

The McKinsey Global Institute's analysis report "The carbon productivity change: Curbing climate change and sustaining economic growth," announced in June 2008, states in its report that to meet the reduction scenario that has been discussed so far, global carbon productivity must increase from approximately 740 dollars GDP per ton of CO₂ equivalent today to 7,300 dollars GDP per ton of CO₂ equivalent by 2050—about a tenfold increase. Regarding its economic impact, the report states that the impact will depend on how new low-carbon infrastructures will be financed, but GDP is expected to increase in many countries. On that basis, the report mentions five challenges to promote reform towards low-carbon as follows; 1) utilize opportunities to enhance energy efficiency in a cost effective way; 2) decarbonize energy sources—especially in the fields of electricity, petroleum

and gas; 3) accelerate the development and dissemination of new low-carbon technologies; 4) change the behavior of businesses and consumers; 5) conserve and expand the world's carbon sink, especially its forests.

Now, let's move on to carbon productivity in Japan's manufacturing industries. A big gap can be seen among industries' CO₂ emissions per gross value added (million yen - real price based on 2000), based on the National Institute for Environmental Studies "Embodied Energy and Emission Intensity Data for Japan Using Input-Output Tables (3EID)" that calculated the environmental burden of the basic unit targeting CO₂. Improvement degrees on each industry's improvement showed a big gap, comparing three years at the time of 1990—counting as 1.0, 1995 and 2000. Although the sectors of foods, chemical products, petroleum refineries and coal, non-ferrous metals and electric machinery are increasing carbon productivity, other sectors are rather deteriorating, and are expected to make special efforts to improve carbon productivity.

Changes in Carbon Productivity of Manufacturing Industries in Japan



Note: The productivity of the overall manufacturing industry was 0.18 million yen/ton-CO₂

Source: Compiled by the Ministry of the Environment, from the data of the National Institute for Environmental Studies (NIES)

Table3-2-3 Typical 3R Technologies in Japan

Reduce resource loading – upstream	<ul style="list-style-type: none"> ○Resource-saving manufacturing process <ul style="list-style-type: none"> • Technologies to reduce consumption of each rare metals in manufacturing processes (W, In, Nd, Dy etc.) ○Alternative materials, etc. (※1) <ul style="list-style-type: none"> • IT key components, utilization of new materials (lightening, high functional materials, biomass plastics, etc.) ○Comprehensive design for life cycle <ul style="list-style-type: none"> • Lightening, downsized design and life extension design • Evaluation methods to clarify environmental burden of products to consumers (carbon footprint, etc.) ○Social capital stock management <ul style="list-style-type: none"> • Ultra long life houses for generation use • Advanced inspection and diagnosis technology 	<ul style="list-style-type: none"> ○Optimization of energy saving and resource saving in several manufacturing processes <ul style="list-style-type: none"> • Chemical manufacturing process technology of material and energy regeneration (co-production technology) ○Alternative materials, etc. (※1) <ul style="list-style-type: none"> • Alternative material manufacturing technology without using rare metals • Self-healing plastics ○Comprehensive design for life cycle <ul style="list-style-type: none"> • Optimization design technology for comprehensive 3R life cycle • Evaluation methods to enhance resource recycling efficiency in regions ○Social capital stock management <ul style="list-style-type: none"> • Remaining life management and maintenance technology of buildings, etc. • Conversion and renovation methods for buildings
	Increase cyclical use of waste materials (reduce final disposal, etc.) – downstream	<ul style="list-style-type: none"> ○Cyclical use design technology <ul style="list-style-type: none"> • Degradable design technology ○3R of construction materials <ul style="list-style-type: none"> • New cement manufacturing technology (mainly cement manufacturing technology using waste as raw materials) ○3R of metal resources <ul style="list-style-type: none"> • Recycling of rare metals from used compact appliances • Recycling technology of flat panel displays • Recovering technology of rare earth elements (low cost recycling technology) • Recovering technology of iron and zinc from by-products (slag, dust, etc.) produced during steel manufacturing process ○Conversion and usage of unused biomass <ul style="list-style-type: none"> • High efficiency ethanol fermentation technology and high efficiency methane fermentation technology (elemental technology) • Low cost energy manufacturing technology from wood biomass, crop resources and unused biomass (practical technology) • Hydrogen fermentation technology

Short-term measures (※2)

Mid and long-term measures (※2)

※1 : Since alternative materials themselves are also resources, their usage volume needs to be reduced.

※2 : The assumption is made that development periods of practical technology for short-term measures are set around 2010-2015, and around 2015-2030 for mid and long-term technology. However, basic research for some mid and long-term measures will start before 2015.

Source: Compiled by the Ministry of the Environment



Internalization of environmental liability into business accounting

In order to extend environmental conscious business activities while realizing sound economic development in the future, promoting the improvement of accounting standards related to the environment are important in business accounting.

A new accounting system related to this issue will start from FY2010 and will be applied to all listed companies. Listed companies will be obliged to post fixed assets, such as land and buildings they possess into their accounts upon the removal of their tangible fixed assets in the future, according to the “Accounting Standards for Asset Retirement Obligations”(ASBJ Statement No.18) announced on March 31, 2008 by the Accounting Standards Board of Japan, and its implementation. Asset Retirement Obligation (ARO) includes costs of removal and disposal of pollution that generated from past business activities before fixed assets were removed. That means companies will account the ARO, including environmental costs for the future (the so called “Environmental Liability”), in their financial reports in advance, in order to understand the total cost in the future and to allocate these as a depreciation expense in each quarter.

Therefore, the system functions to urge environmental conscious business activities, such as preventing environmental pollution beforehand, when companies set their major management policies. The introduction of the system is expected to promote preventive measures against pollution and early appropriate management, and will lead to curb unnecessary works in each company by recognizing the environmental burden as costs.

This ARO is closely related to concrete legal systems in the environmental sector, including measures such as handling and disposal of asbestos materials—stipulated in the prevention of health impairment due to asbestos, based on the provision of the Industrial Safety and Health Act (Act No.57 of 1972) and the Enforcement Order of the Industrial Safety and Health Act (Cabinet Order No.318 of 1972), the proper disposal of polychlorinated biphenyl (PCB) stipulated in the

Law concerning Special Measures for Promotion of Proper Treatment of PCB Wastes (Law No.65 of 2001, hereinafter referred to as “PCB Special Measures Law”) and the examination of the specific facilities at the abolished time—stipulated in the Soil Contamination Countermeasures Law. As removal or containment of Japan’s environmental pollution on fixed assets is considered to be in the range of several tens of trillion yen in total, changes of the accounting system that will order companies to register partial costs of removing such pollution in the balance sheets will greatly impact the economy and business activities.

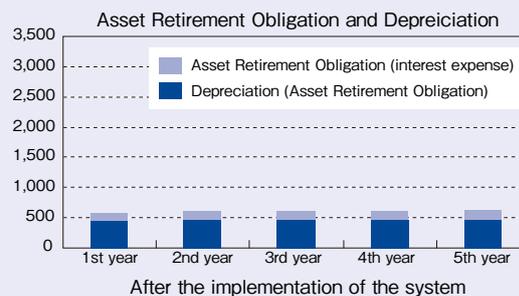
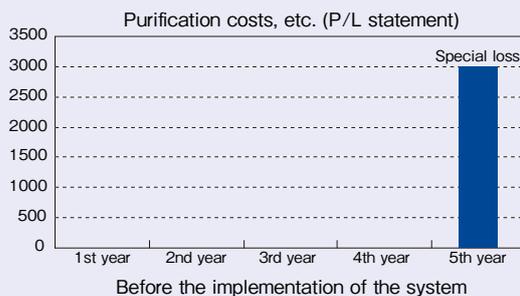
One of the points to be noted for promoting companies environmental measures, under this systemic revision, is that not all of the costs on environmental measures will be posted as ARO. From such awareness of the issues, the EU for example is advancing consideration toward describing environmental liabilities in detail. Some advanced companies in Japan as well, are in the trend of recognizing overall environmental liabilities

Image of a Balance Sheet Incorporating ARO

Assets	Liabilities
Current assets	Current liabilities
	Notes and accounts payable trade
	Short-term loans payable
	Allowance for doubtful accounts
Fixed assets	Asset Retirement Obligation (ARO)
Tangible assets	Others current liabilities
Buildings and structures	
Machinery and tools	Long-term liabilities
Land	Corporate bonds
Accumulated depreciation	Reserve for retirement benefits
	Reserve for special repairs
	Asset Retirement Obligation (ARO)
	Others long-term liabilities
	Shareholders equity
	Total shareholders equity
Total Assets	Total liabilities and shareholders equity

Source: Compiled by the Ministry of the Environment from the Accounting Standards for Asset Retirement Obligations and its Implementation

Comparison of Profits and Losses Calculation around the Implementation of the System



Source: Compiled by the Ministry of the Environment from the Accounting Standards for Asset Retirement Obligations and its Implementation

in the future and to disclose, beyond the scope of which ARO—that requires them to register.

Amidst such approach is expanding, advancement of business activities in environmental conservation

approach and realization of integrated improvement of the environment and economy, at each business activity level, are expected in the future.

Advanced Cases that Grasp and Announce the Entire Environmental Liabilities, including ARO

Category	Costs for the future (before discount)
Asset Retirement Obligation (interest expense)	0.49 Billion Yen
Environmental liabilities (excluding ARO) by laws and contracts	1.24 Billion Yen
Environmental liabilities through voluntary approaches on environmental measures	1.22 Billion Yen

Source: Ricoh's Sustainability Report (Environment), 2008

3 Relationships between the Global Economy and the Japanese Economy on Environmental Measures

Today environmental issues are not something to be dealt within the country, but need to be related with the entire international society and many partner countries beyond the borders. Recognizing the environmental burden of the suppliers of resources and raw materials and approaches bringing global society into view, such as promoting economic activities while considering the burden, are important on environmental measures.

(1) Challenges which accompany the securing of biofuels

The global bio-fuel production has increased from 3.1 million kℓ in 2001 to 6.4 million kℓ in 2007, more than a double increase (Figure3-2-4). Although Japan had produced about 30kℓ of bioethanol from by-products and construction waste materials in the process of making sugar from sugarcane, and about 10 thousand kℓ of biodiesel fuel, a raw material of waste food oil, the production volume is still small compared to other countries (Table3-2-4).

The Kyoto Protocol Target Achievement Plan requires the introduction of 500 thousand kℓ of biofuels, in crude oil equivalent by 2010, and further acceleration of its introduction is required towards its achievement. However, there is concern over environmental issues for development and usage of biofuels that environmental issues, such as the food competition problem and deforestation could be caused, and sustainable use and promotion of development are important. Amidst such a situation, examinations on sustainability standards for biofuels are currently progressing in the international frameworks, such as the EU, the United States and the Global Bioenergy Partnership (GBEP), with the participation of individual countries including Japan. For example, the “Sustainability Standards for Biofuel Products” in the “Directive of the European Parliament and of the Council on the Promotion of the Use of Energy from

Renewable Resources,” that was adopted by the European Union Parliament in December 2008 states that only biofuels that met the GHG emissions reduction rates and the sustainability standards, including the production areas of raw materials can be targeted as the calculating items for introduction.

Japan needs to promote procurement of sustainable biofuels referring to these approaches, as well as developing the next generation of biofuel production technologies.

(2) Environmental measures targeting the entire flow of manufacturing products (supply chain) beyond the sea

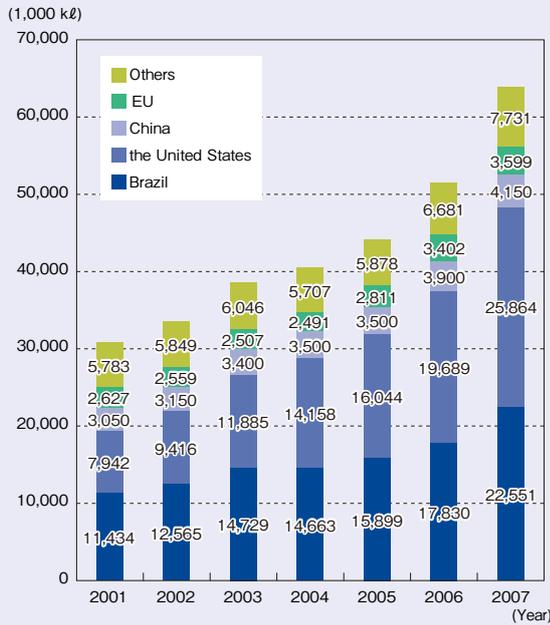
An integrated chemical maker has been making efforts to analyze environmental burdens generated at each stage—resource procurement of each product, manufacturing, transportation, products in use and waste and recycling—and to recognize the environmental burdens at each stage. According to this analysis, CO₂ emission volume turned out to be higher during procurement and processing of resources, including aluminum refining of PS plates for printing machines and structural steel for photocopiers than during the products use (Figure3-2-5). For example, if used PS plates are injected during the manufacturing process for effective use of the resources, CO₂ emissions emitted during the process of refining and manufacturing could be reduced by 74% compared to the process of refining aluminum from raw materials (Figure3-2-6). Therefore, the company is making efforts to reduce the environmental burden in the entire life-cycle of the products from overseas to Japan in the most suitable and rational way.

(3) Procurement mechanisms that will lead to sustainable use

Although forests are important in mitigating climate

change, the area of the world's forests has been decreasing, and carbon stored in forests has been released into the atmosphere with the decrease. Illegal logging has been pointed out as a major obstructive

Figure3-2-4 World Bioethanol Productions



Source: Compiled by the Ministry of the Environment from the data of F.O.Licht's World Ethanol and Biofuels Report, Vol.7, No.4 October 23, 2008 p.75.

factor for forest conservation. Illegal logging includes various types, such as logging without property or logging rights, logging without observing the permitted volume or species and logging in problematic ways from the viewpoint of the traditional rights of indigenous peoples and others or for the safety of logging labor. Illegal logging is causing huge negative impacts on the world's forests, due to forest depletion and destruction in wood producing countries and disruption of import countries sustainable forest management due to distribution of low price illegally logged timber

on the international market. Survey results show that about 50% of logging in Indonesia, from where Japan imports large volumes of timber, and about 20% of that in Russia comes from illegal logging.

Japan has been providing technical cooperation and funding by utilizing ODA on the world's forest depletion and destruction and illegal logging issues. Within Japan, the Law Concerning the Promotion of

Procurement of Eco-Friendly Goods and Services by the State and Other Entities (Act No.100 of 2000) stipulates that lumber and wood products with "legality" certificates should be purchased from 2006 as a measure against illegal logging, also stipulating that "sustainability" to be considered. The three following methods are used in accordance with the Forestry Agency's guideline to verify "legality."

1. Method by utilizing forest certification systems
2. Verification method by companies under the authorization of industry groups
3. Verification method by original approaches of each company

Forest certification systems, mentioned in the above methods, are also used for the sustainable use of forests. These are private sector-oriented system that offer options to consumers with purchasing timber, through the process of certification of each forest by third party organizations for appropriate forest management and segment managing and labeling of the lumber produced by the forest. Organizations that conduct forest certification systems include the Programme for the Endorsement of Forest Certification Schemes (PEFC), the Forest Stewardship Council (FSC) and the Sustainable Green Ecosystem Council (SGEC). Although forest certification systems are not yet well recognized in Japan, the area of the certified forests is increasing worldwide, and approaches towards forest certification in wood producing countries are progressing steadily (Figure3-2-7). For example, timber production in Malaysia is mainly concentrated in two areas, the Malay Peninsula and northern Borneo. About 97% of the forests of the Malay Peninsula - exported mainly to Europe (permanent forests posted in the management plan as forests) have been certified, while only 0.9% of the forests in northern Borneo - exported mainly to Japan—have been certified on the other hand. Japan, as one of the world's leading timber importer, is required to contribute to the producing countries biodiversity conservation and sustainable use of wood by utilizing legality certificated timber selectively and proactively.

- (4) Cooperation towards advancing environmental measures in developing countries to overcome environmental pollution, while advancing measures against global warming at the same time (Co-benefit approaches)

Environmental issues, such as air pollution and water

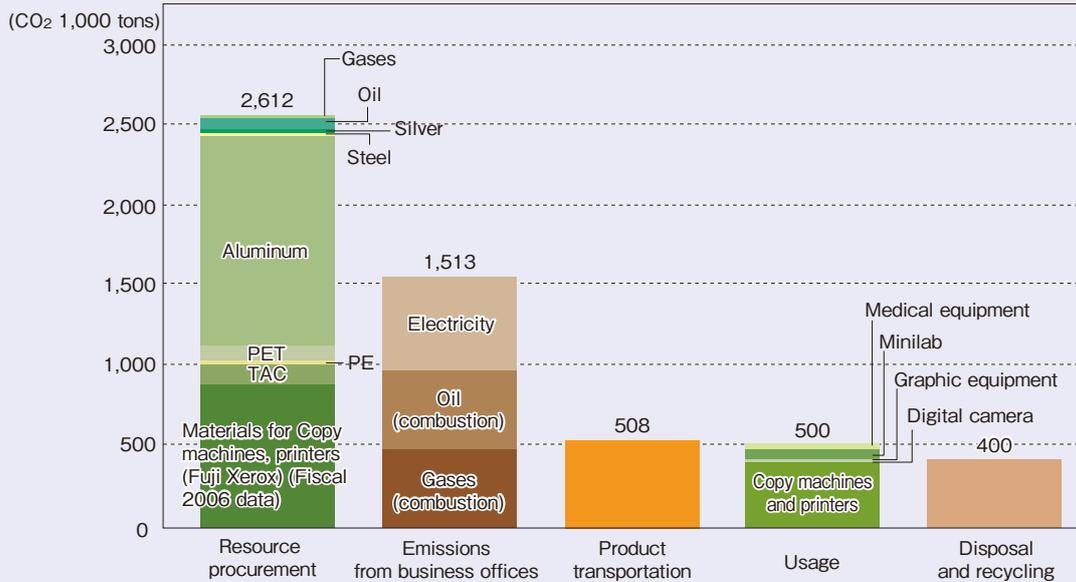
Table3-2-4 World Biofuels Production in 2007

(Unit: 10,000 kℓ)

	the United States	Brazil	France	Germany	Japan
Bioethanol	2,601	2,255	115	70	0.003
	the United States	Brazil	EU		Japan
Biodiesel	170	40	649		1

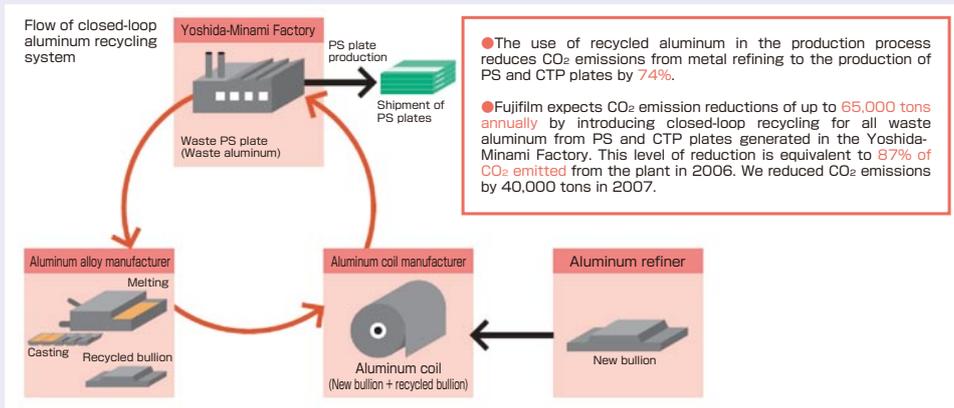
Source: Compiled by the Ministry of the Environment from the data of F.O.Licht's World Ethanol and Biofuels Report, Vol.7, No.4 October 23, 2008 p.75.

Figure3-2-5 Overall CO₂ Emissions of an Integrated Chemical Maker



Note: To calculate the equivalent amount of CO₂ emissions, the basic unit of CO₂ emissions was based on an inter-industry relations table
 Source: Fujifilm Holdings Corporation

Figure3-2-6 Flow of Closed-Loop Aluminum Recycling System



Source: Fujifilm Holdings Corporation

pollution, have been serious and urgent challenges for emerging countries, while they have achieved rapid economic growth. Environmental pollution measures can lead to the reduction of the GHG emissions, depending on one's ingenuity and will be useful for environmental pollution measures that developing countries require and climate mitigation measures that the world needs to approach. Japan has been advocating the adoption of a "Co-benefit approach" (Figure3-2-8) as a way to solve two issues at the same time - fixing the environmental issue and to promote measures against global warming - towards the international society as well as developing countries. Two co-benefit CDM projects were adopted in FY2008, and those projects started in Malaysia and Thailand.

(5) Deployment of Japan's experiences and technologies towards establishment of a sound material-cycle society

Waste scattering and chaotic dumping have been taking place in developing countries in Asia, due to rapid urbanization and concentration of population. In some cases, recycling is conducted in an improper way, environmentally and medically, by people called waste pickers (collectors) who make a living from collecting valuables from disposal sites and households (Photo3-2-1). In the urban areas of East Asian countries, where remarkable economic growth is under way, the waste collection and treatment system has been improved while the generation of waste itself is increasing. The treatment and recycling of waste arises from business activities is also insufficient in technology and information, and are conducted in an

improper way in many cases. Suppressing waste generation and strengthening resource recycling and proper disposal have become more important.

Amidst such a situation, Japan has been advancing its cooperation on waste management through the Japan International Cooperation Agency (JICA) since November 2006 with a plan for three years in Hanoi City, where the volume of waste collected is increasing along with its rapidly increasing urbanization in recent years. Some model areas introduced sorted collection and recycling (composting), since raw garbage accounts for about half of municipal solid waste. As a result of outreach activities and environmental education on 3Rs in the model areas, the volume of raw garbage brought in to waste disposal sites was reduced by 59% on wet weight basis.

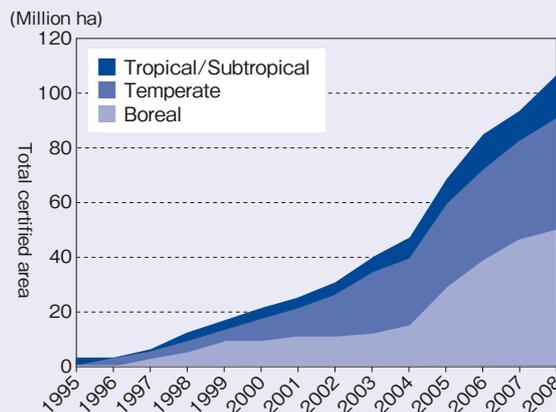
Japan's challenges while deploying projects on waste treatment and recycling in developing countries include institutional issues, such as shortages of human resources and supplies - necessary for maintaining management of funds and facilities - to introduce advanced technologies, lack of awareness of the significance and benefits on proper waste disposal and the establishment of a sound material-cycle society and lack of effective regulations. Other institutional issues are lack of information on waste flow and inadequate protection of intellectual property.

In order to effectively deploy Japan's experiences and technologies, it is important to have people understand the significance and benefits of proper waste disposal and the establishment of a sound material-cycle society, and to provide incentives to change the actions of waste generators.

(6) Development of Policy towards Training of Environmental Personnel

Personnel who can cope with the environmental issues that arise from rapid economic growth and industrialization of Asia, and are capable of building a sustainable society with a long-term view are strongly required. The decade of 2005-2014 has been designated as the "United Nations Decade of Education for Sustainable Development (DESD)," based on

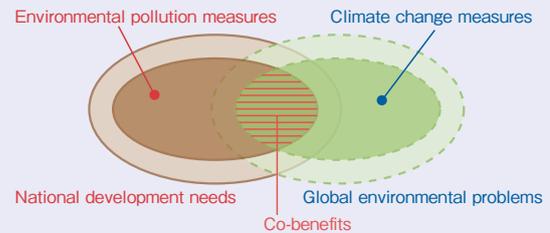
Figure3-2-7 FSC Certified Forest Area Growth



Source: Forest Stewardship Council

Japan's proposal, and human resource development for building sustainable society is being promoted all over the world. The Ministry of the Environment had reviewed necessary measures for the development of environmental leaders "those who look at the importance and urgency of environmental problems in light of their own experience and moral values, are committed to leveraging their area of expertise to realize sustainable development in their professional and private lives and to make actions in Asia including Japan," and formulated the "Vision for Environmental Leadership Initiatives for Asian Sustainability in Higher Education (ELIAS)" in March 2008. Japan has been implementing the "Project to Develop Higher Education Environmental Leadership Training Programs"—working with Japanese universities, companies, government and non-profit organizations, as well as institutions of higher education - since FY2008, entitled the "Environmental Leadership Vision for Asian Sustainability," in order to achieve this.

Figure3-2-8 Concept of Co-Benefit Approaches



Co-benefit-type measures means approaches that can achieve the development needs and the environmental pollution measures of the developing countries, while implementing climate mitigation measures at the same time. Especially the promotions of the environmental pollution measures, which are highly needed by the developing countries, are highly likely to contribute the climate change measures.

Possible target areas of co-benefits

target areas of co-benefits	Remedial activities	Environmental conservation benefits	Climate mitigation benefits
Air pollution	Improvement of combustion	Air pollutant reduction (SOx, NOx and soot and dust)	GHG emissions reduction
	Fuel conversion		
	Transportation measures		
Water pollution	Prevention of GHG emissions from sludge, etc.	Water quality improvement	
Wastes	Proper waste reclamation	Proper waste disposal	
	Utilization of biomass wastes	Waste reduction	

Source: Ministry of the Environment

Photo3-2-1 Waste Pickers Living on Disposal Sites



Source: Japan Industrial Waste Technology Center