

## **Is Resource Efficiency a Solution for Sustainability Challenges?<sup>1</sup>**

### **-Japan’s Sustainable Strategy and Resource Productivity Policy in the 1990s to 2000s-**

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### **Introduction**

This paper tries to overview Japan’s strategy for sustainability and environmental management in the 1990s to 2000s. The paper argues that Japan’s sustainable strategy can be characterized from its emphasis in improving resource efficiency and expansion of voluntary approach by comprehending environmental challenges as opportunities for further technical progress, innovation, and industrial competitiveness. Then, the paper tries to further clarify such characteristic of the strategy for sustainability through examination of Japan’s sound material cycle policy in the 1990s to 2000s with particular attention to its eco-town programme and recycling policies based on the concept of Extended Producer Responsibility (EPR). After arguing a limitation of approach of increasing resource productivity in the different national context, the paper overviews and analyzes two recent sustainability strategies developed by Ministry of the Environment of Japan in the 2000s; “Strategy for an Environmental Nation in the 21st Century” in 2007 and “Clean Asia Initiative” in 2008. By doing so, the paper argues that Japan’s sustainable strategy continues to emphasize “increasing efficiency” and “voluntary approaches”. Then, it concludes that it is a time give larger emphasis on total reduction in environmental impact from production and consumption to achieve the next step of sustainability for Japan and elsewhere in the world.

### **Ecological Modernization and Japan**

Japan’s strategy for environmental management and sustainability after the 1990s can be characterized with harmonization of environmental conservation and economic competitiveness through the pursuit of eco-efficiency. This is along the concept of Ecological Modernization, conceptualization of shift in environmental policy and management from the 1980s to 1990s in Western Europe and Japan. There are several attempts to explain the characteristics of Japan’s environmental policy and sustainable strategy after the 1990s through the concept of Ecological

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<sup>1</sup> This paper is partially based on a draft manuscript developed for a chapter submitted to Christian N. Madu and Chu-hua Kuei, eds. (forthcoming), *Handbook of Sustainable Management* but with extensive modification and additional contents.

Modernization such as Barrett ed. 2005 and Hotta 2004.

Ecological Modernization provides the idea that economic growth and environmental protection are essentially complementary (Dryzek 1997: 15). In ecological modernization discourse, environmental problems are considered as opportunities rather than troubles to “a restructuring of the capitalist political economy along more environmentally sound lines.” (Dryzek 1997: 141)

The concept of efficiency is a crucial and most significant notion for businesses and advocates of EM-type policy discourse. Robert Ayers, one of the earlier developers of the concept of eco-efficiency, defined eco-efficiency as “the objective of maximizing value added per unit resource input” (Ayers 1997: 6). The logic of eco-efficiency leads environmental policy and strategies to combine with other logics, including that of ‘voluntary approach’. ‘Voluntary approach’ revolves around the idea that governmental regulation are often inefficient in implementing appropriate measures for environmental problems compared to self regulation by business and industries. Under the logic of ‘voluntary approach’, governmental regulation is interpreted as the method of encouraging the increase of eco-efficiency.

Japan’s environmental policy and sustainable strategy in the 1990s and 2000s can be characterized from pursuit of eco-efficiency and voluntary approach mentioned above. However, this is not a trend arose suddenly but based on a lesson learnt through pollution prevention activities in the 1970s in Japan.

Indeed, through the 1970s and the 1980s, energy-saving and technological innovation in each manufacturer had developed the conditions for ecological modernization in Japan. Historically, the response to the energy crisis, for example, seen in the Japanese automobile industry was a successful story of combining energy and resource concerns (thus later found as an environmental benefit) with competitiveness in global market. As Jänicke et. al (2000) suggested, such a shift in the industrial structure with less environmental impact per unit (importantly not overall but “per unit”) was mainly “caused by (primarily technological) changes taking place within sectors and enterprises (intrasectoral change....seem for the most part to be autonomous, triggered especially by alternations in price patterns [of energy and resources]” (Jänicke et.al. 2000: 148). Thus, the story of energy crisis and saving in 1970s and 1980s has contributed to the idea of eco-efficiency and voluntary act as an efficient strategy to tackle global environmental issues.

### **Japan’s Sound Material Cycle Society Policy for Improving National Resource Efficiency**

In the 1990s, Japanese society experienced several waste-related social problems. These include the high amount of waste generated every year, difficulty in securing final disposal sites due to increasing opposition of citizens, and an increase in cases of illegal dumping due to increasing disposal costs and concerns about dioxin emissions from waste incineration facilities.

Thus, the Japanese government has realized that the waste issue involves difficult socio-economic structural challenges. Japan has developed a comprehensive set of waste minimization and recycling policy and mechanisms. Examples of these measures include:

- Increased responsibility of waste emitters
- Introduction of the EPR (Extended Producers Responsibility) principle
- Eco-town policy to promote clustering of recycling industries (1997)
- Laws for recycling certain designated materials and products

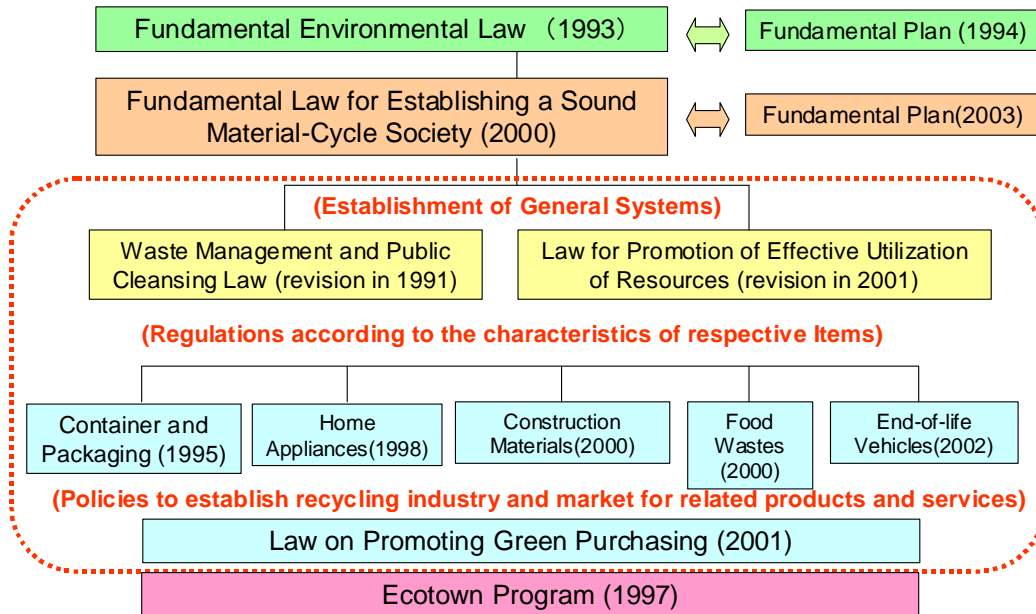
For example: Law for Promotion of Sorted Collection and Recycling of Containers and Packaging (1995), Law for the Recycling of Specified Kinds of Home Appliances (1998), Law for the Recycling of Construction Materials (2000), Law for the Recycling of Food Waste (2000), Law for the Recycling of End-of-Life Vehicles (2002)

When the Environmental Agency was upgraded to a ministry (Ministry of the Environment (MOEJ)) in 2000, the focus of its waste management and recycling policy shifted from sanitation and disposal to resource utilization. A variety of existing and new measures have been placed under the framework of the “Fundamental Law for Establishing a Sound Material Cycle Society” (2000). Also, the Fundamental Plan for Establishing a Sound Material Cycle Society (2003) sets numerical targets, designates particular roles for stakeholders, and gives directions for individual efforts to be coherent under the national goal of establishing a “Sound Material Cycle Society”.

Sound Material Cycle Society is defined under Fundamental Law for Sound Material Cycle Society as “a society where the consumption of natural resources is minimized and the environmental load is reduced as much as possible, by restraining products, etc. from becoming wastes, etc., promoting appropriate recycling of products, etc. when they have become recyclable resources, and securing appropriate disposal of the recyclable resources not recycled, which means the disposal as wastes.”

Chart 1 below shows the overall framework of Japan’s major laws, regulations and programme on waste management and recycling.

**Chart-1 Japan’s Policy Framework for Sound Material Cycle Society**

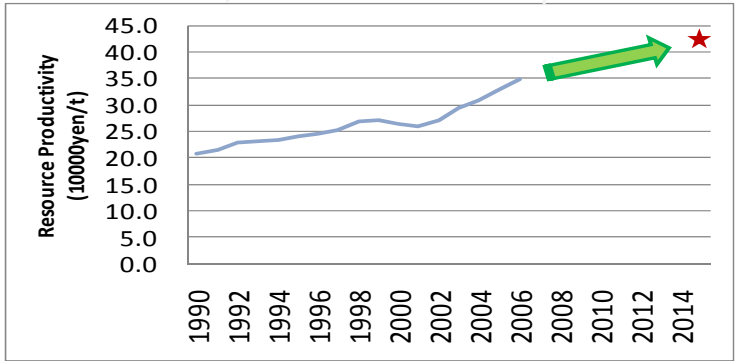


Source: Reprint from Y. Moriguchi(2006), “Establishing a Sound Material Cycle Society in Asia” a presentation at Asia 3R Conference, October 30th –November 1st, 2006, Tokyo, Japan, Ecotown Program and years of establishment of each law was added by authors.

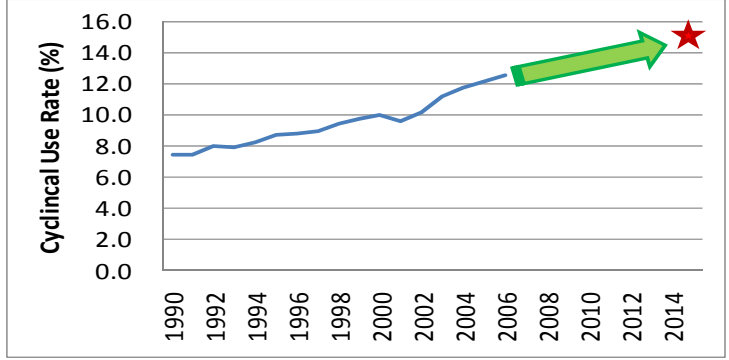
To monitor the progress in implementation of sound material cycle society policy as a pursuit for national resource efficiency, Japan introduced MFA (Material Flow Accounting)-based indicators and policy targets for 2010 in 2003. Based on the progress, Japan revised fundamental plan in 2008 and set new targets for 2015. For the progress of national resource efficiency and its targets for 2015, see chart 2 below

**Chart-2 Progress of Japan’s Resource Productivity**

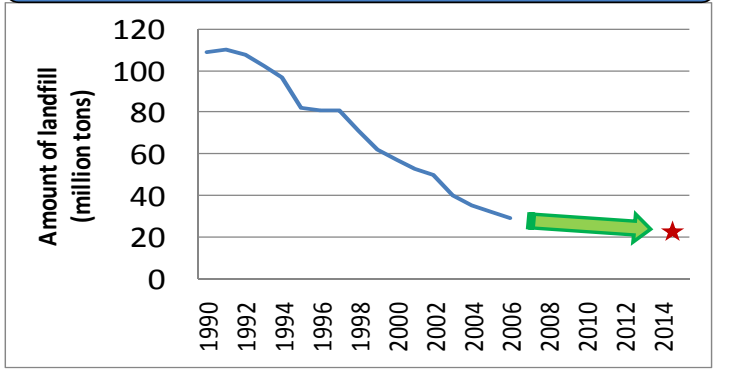
**“INPUT”: Resource Productivity**  
 GDP/natural resource input



**“CIRCULATION”: Cyclical Use Rate**  
 Cyclical use amount/ cyclical use amount + natural resource input



**“OUTPUT”: Final treatment of waste**



### **Effects of Japan’s Sound Material Cycle Society Policy: Cases of Eco-town Programme and EPR-based Recycling Policies**

As discussed earlier, Japan’s approach to sustainability in the 1990s to 2000s can be characterized by emphasis in compatibility of environmental conservation and economic competitiveness through the pursuit of efficiency. This is not exception for Japan’s sound material cycle society. The following section overviews, evaluates, and tries to extract general lessons from two of the prominent approaches for sound material cycle society in Japan: “eco-town programme” and “EPR-based legislation” introduced in the 1990s to early 2000s.

#### *Eco-town Programme*

The eco-town programme was established in Japan in 1997 to create synergies between urban waste management and the promotion of recycling industries. One of its main goals was to realize “zero emissions,” which means to minimize waste by recycling all the waste and by-products into materials and using those in other industries. Another goal was to help revitalize the economies of local areas. Aiming at environmentally sustainable local development, Ministry of Economy, Trade and Industry (METI) claimed that this program would promote environmental industry, industrial and technological accumulation, and an environmentally harmonized social system. The eco-town programme sought to promote competition among local governments to promote environmental management projects. Under the plan, local governments would develop plans in conjunction with other stakeholders and apply for recognition as an eco-town. The accepted plans would be subsidized jointly by METI and MOEJ. The eco-town project subsidized both “hardware” projects, such as product recycling or renewable energy facilities, and “software” projects, such as feasibility studies and awareness building. Although the applicant should be a local government, the proposals of the projects would not be approved unless they included cooperation between business and local government. The 26 eco-town projects (1997 to 2007) include Kawasaki City and Kita-Kyushu City, which were approved in 1997.

According to METI’s ex post facto evaluation of eco-town programme in March 2006, the total cost for Japanese government to implement this policy was 94.75 billion yen (about 1.1 billion US dollar). METI estimated that 5.89 million tons in recycling capacity was generated by the eco-town programme (subsidies between 1997-2004 plus tax reduction and policy finance between 2000-2004). Also, METI estimates this policy contributed around 20% of the average annual increase in national recycling capacity. For an individual case, Kitakyushu city calculates the costs and effects of eco-town programme in Kitakyushu city as follow; 45 recycling and research facilities was established over 6 years with total investment in 650 million US dollars

(city: 59 million, central government: 257 million, and private sector: 340 million). Kitakyushu estimates economic spillover effect was 1100 million US dollars and 6470 employments were generated.

Overall, this policy can be evaluated that it was not very successful as a response to decline of base materials industry and revitalization of local economy, but was very successful in developing nation-wide role sharing for wide area recycling to respond reform of waste management and recycling policy<sup>2</sup>.

This policy could be an important step for developing national recycling capabilities along with 3R-related national policies and legislation. In Japan’s case, the eco-town project succeeded in increasing recycling capability and efficiency through clustering recycling facilities and business actors in the same area. A subsidy system contributed to the reduction of the financial burden for many stakeholders and encouraged collaboration between the central government, local governments, and the business sector. In addition, many of Japan’s eco-towns are located in coastal industrial zones with ports.

National eco-town policies can be expected to contribute to the establishment of proper recycling capacity by constructing recycling facilities and to provide a solution for the shortage of recyclables by promoting networks of recyclers. However, they do not address the need for economic incentives to shift the flow of recyclables from the small-scale informal sector to more proper recycling facilities, because recycling facilities at eco-towns can be more costly than informal recycling. Higher costs are not only due to the direct operational costs of formal facilities but also because of the costs of collection mechanisms and transportation of the recyclable materials. Moreover, eco-towns cannot achieve reductions in hazardous substances in products, because eco-towns are generally concerned with end-of-life products and are not concerned with the initial design and production process. Thus, a major challenge for realizing this policy idea is how to establish legislative and financial mechanisms to encourage proper recycling and promote local awareness and cooperation among stakeholders, especially in relation to source separation. Also, in Japan, the eco-town/eco-industrial park policy was developed on the basis of infrastructure and technology developed by its heavy industries, which are important as both sources and users of recyclable materials.

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<sup>2</sup> Personal communication with Mr. Hideto Yoshida, Former Director General of Waste Management and Recycling Bureau, Ministry of the Environment of Japan (July 2006).

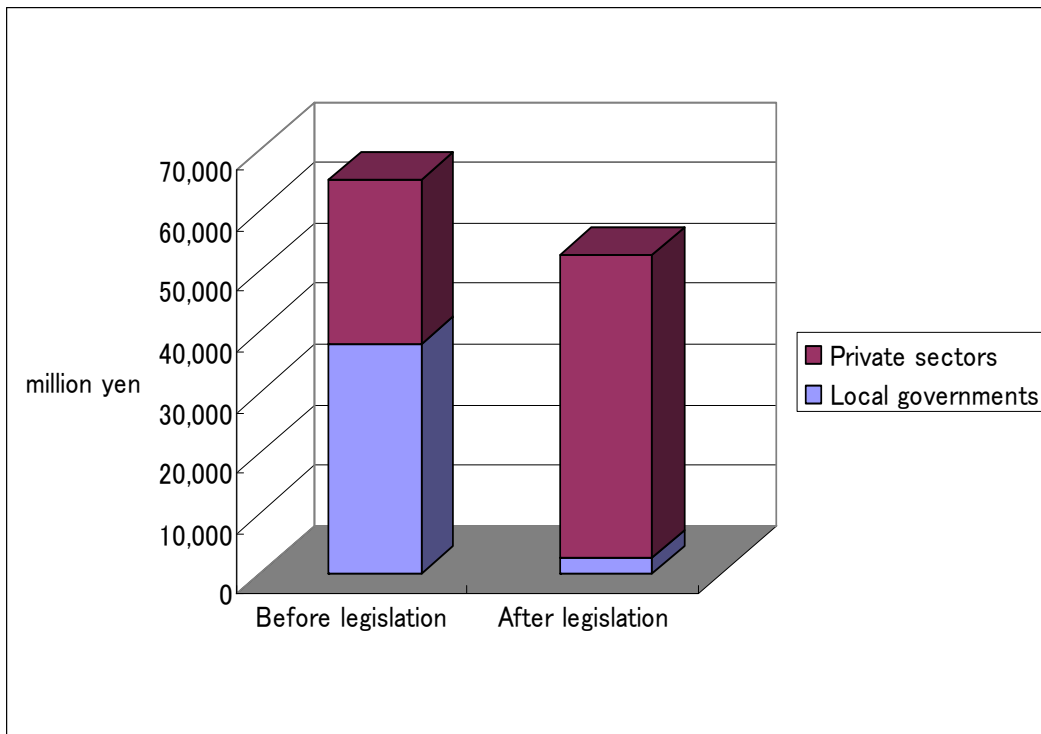
*EPR-based recycling policy*

One of the most important principles behind policies for establishing a sound material cycle society is to incorporate the Extended Producer Responsibility (EPR) into environmental policy on waste issues. Extended Producer Responsibility is the policy principle for reducing waste and increasing resource productivity in response to the lack of land fill. EPR is to shift the responsibility of processing general household waste from local governments to producers of products. For example, the Home Appliances Recycle Law asserts the responsibility of taking back and recycling four home appliances - wasted fridges, washing machines, televisions and air conditioners - to those of the makers of these products and away from local autonomy. Under this law, the consumer has an obligation to pay for waste processing, shops have an obligation for taking back the waste products and delivering or returning them to the producers. Producers have a responsibility for taking back wasted products from shops and to recycle the products. Therefore, the price of recycling will be reflected in the recycle processing cost of the products of producers. And this will give an incentive for producers to reduce the cost of recycle processing and increase the competitiveness by increasing recyclability of the products (Yamaguchi 2000: 129). By securing this shift in responsibility from local autonomy to the producers, it is expected to achieve minimization of waste generation and recyclability of the products. At first glance, it would seem to be a form of command-and-control type of regulation. However, it is much more a regulation expecting to give incentives to “voluntary action” of technological breakthrough to increase “eco-efficiency”.

As shown in Chart 3, Japan’s case of home appliance recycling law suggests EPR-based recycling mechanism is cost effective to promote recycling. Also, the responsibility of cost sharing has shifted from local government to private sector in effective manner. However, PC’s case in Chart 4 shows that secondhand market can be a loophole for domestic recycling resource utilization mechanisms (Hotta et.al. 2009). Also, we should note that EPR does not contribute to prevention of pollution from recycling and needs many supporting mechanisms based on proper waste management legislation and systems.



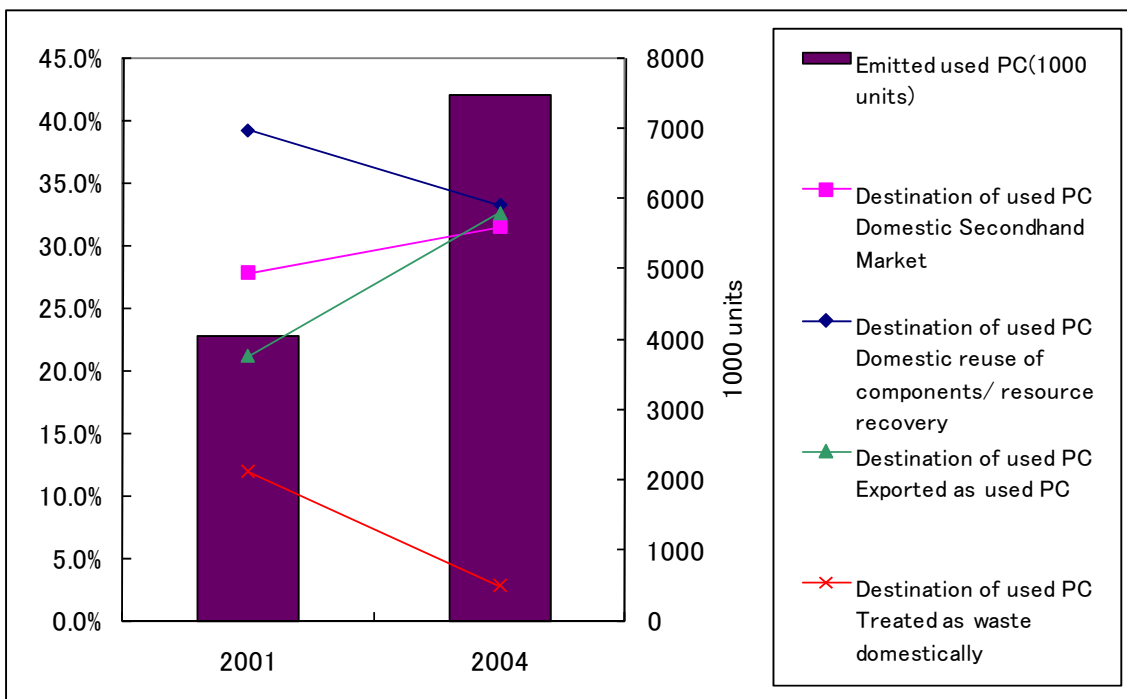
**Chart 3: Shift in cost of recycling after introduction of home appliance recycling law**



Source: Compiled by IGES using data from 2nd working group of waste and recycling small committee, Industrial Structure Committee, September 10, 2001

<http://www.meti.go.jp/kohosys/committee/summary/0000400/0001.html>

**Chart 4: Destination of used PC**

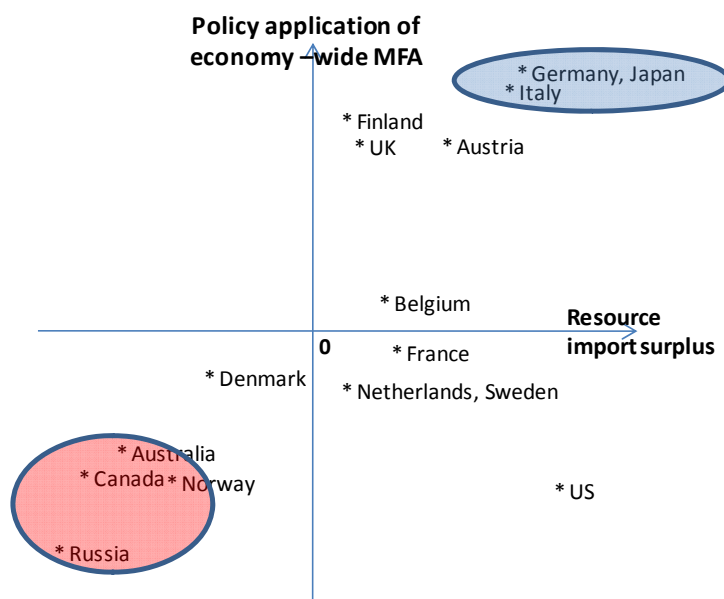


### Resource Productivity Policy in an International Context

At macro-level, what drives governmental interest over resource productivity policy? To answer this question in one way, IGES conducted a comparative study on utilization of MFA indicators and application of resource productivity targets in OECD countries in 2007 to 2008 (IGES 2008).

Chart 5 below shows that countries with high resource import surplus such as Germany, Japan, and Italy tend to apply economy-wide MFA and resource productivity targets. In contrast, the countries with rich natural resources such as Australia and Canada are not so active in resource productivity policy. Also, the chart 6 shows that countries with strong export-oriented manufacturing sector such as Japan, Germany and Italy tend to be active in MFA application and resource productivity policy. Thus, the study concludes that the countries that are especially active in developing MFA and using MFA data for policy development are typically characterized by: (1) high GDP/capita, (2) large trade deficit for natural resources, and (3) large exporting-oriented manufacturing sector. In the study, Germany, Italy and Japan were found to be the three countries with the strongest integration of MFA and resource productivity targets into governmental policies. This study implies that resource productivity may not be a universal policy priority even among OECD countries. The economies with relatively large manufacturing industrial sector are interested in reduction of materials inputs as well as showing clearly the economies’ dependence on resource extracted in other countries.

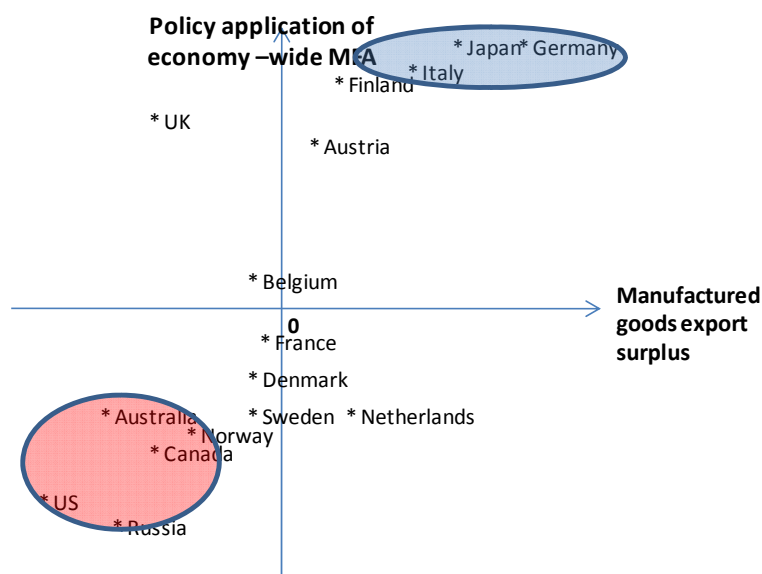
**Chart 5: Resource Import and MFA application**



Source: Literature survey based on a report of OECD (2007) with a combination of on-line data surveys officially available from governmental websites.

Note: This study defined a country as very active on MFA if it conducts EW-MFA at national level on regular basis as governmental activities, and has developed indicators and set target and deadline for policy development purpose.

**Chart 6: Contribution of export-oriented manufacturing industrial sector and MFA application**



Source: Literature survey based on a report of OECD (2007) with a combination of on-line data surveys officially available from governmental websites.

Note: This study defined a country as very active on MFA if it conducts EW-MFA at national level on regular basis as governmental activities, and has developed indicators and set target and deadline for policy development purpose.

### **Challenges and Opportunities for Sustainability for Japan since the 2000s**

Japan has achieved a rapid economic growth since the 1950s. In the 1970s, Japan’s engagement in pollution prevention and oil crisis resulted in a source of industrial competitiveness through accumulation of environmental and energy saving technologies. This experience resulted in the notion behind environmental policy and sustainable strategies in the 1990s and 2000s that improving efficiency and motivating industrial voluntary activities through wise policy intervention could solve challenges for sustainability. On the other hand, it has been widely visible that maintenance of natural environment was in low priority through the excessive pressure of national land development, infrastructure building, and population increase until

very recently. For example, the submergence of the country-side for development of large-scale dam or lost of wet-lands or natural coastal area from large-scale land reclamation projects have been observed all over in Japan. Land reclamation project in Isahaya-bay is a typical of those excessive land development activities. Although they had a certain reason such as flood prevention, this national driving force for land development changed the face of Japanese landscape completely over 50 years. The change in Japanese coastline is one of good examples of such changes. In 1990s, about 44.8 per cent of the mainland Japanese coast line is natural coast and 53.9% of it is covered by artificial or half-artificial coast line. In 1973, about 59.6% of coast line was natural coast. 19.2% was half-natural coast line and 21.2% was artificial coast<sup>3</sup>. Also, in 1990s, 23.5% of river bank is covered by artificial structure such as concrete wall. It was 19.2 % in 1973<sup>4</sup>.

Pursuit of efficiency would minimize the environmental impact at unit-level of production and consumption activities. However, increasing efficiency cannot be an ultimate approach of the breakthrough for reduction in the total impact of industrial/production/consumption activities. Although it is necessary to design a new national vision for socio-economic development based on sustainability concept, the continuous recession makes difficult for the government to design such comprehensive vision and strategy. Is it possible to direct the Japan's national vision for breakthrough towards sustainability by implementing the vision of low carbon society, sound material cycle society, and society with harmony with nature? As an initial attempt, let's look at the Strategy for an Environmental Nation in the 21st Century of Japan.

### ***A New Policy Trend for Sustainability: A Case of Strategy for an Environmental Nation in the 21st Century of Japan***

Strategy for an Environmental Nation in the 21<sup>st</sup> Century of Japan is a document launched and approved by the Cabinet Meeting in June 2007 to be a guideline of environmental policy for both domestically and internationally in the near future as well as a guidance for Japan's contribution to international efforts to sustainability.

This strategy aims to establish sustainable society which can overcome global environmental challenges through integration of activities for low carbon society, sound material cycle society,

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<sup>3</sup> These figures on coast line in 1990s are based on the 4th national natural environment conservation basic research conducted by Environmental Agency in 1990-1992. See Ministry of the Environment of Japan 2003. For the figures in 1973, see Environment Agency Japan 1973.

<sup>4</sup> The figures on river bank are based on researches on river done by Ministry of the Environment in 1979 and 1998. See [http://www.biodic.go.jp/kiso/23/23\\_kasen.html](http://www.biodic.go.jp/kiso/23/23_kasen.html)

and society in harmony with nature. Also, it emphasizes “international leadership to overcome climate change challenges”, “inherit of natural services by protecting bio-diversity”, “sustainable resource circulation through the 3Rs”.

Although there are eight other emphasis in the strategy, the characteristics is embodied in the integrated approach of constructing low carbon society, sound material cycle society, and society in harmony with nature. The current Japan’s strategy for sustainability at least that of Ministry of the Environment of Japan is along this line.

#### *Low carbon society*

In the strategy, Japanese government describes low carbon society as “a society with realization of an affluent lifestyle with reduction in CO<sub>2</sub> emission. With widespread environmental consciousness and technologies in the whole society, through dissemination of conventional as well as new innovative technologies, this concept aims to achieve rich lifestyle and economic growth in harmony with environmental conservation. In concrete, it is a reform in lifestyle and social system such as life in harmony with nature such as forest, efficient transportation system such as public transport, or compact city.”

This concept emphasizes social reform through techno-centric solution and continues economic growth rather than redefining prosperity. The concept reflects the emphasis in high-energy efficiency of each product such as hybrid-car, efficient air conditioning systems, or LED lamps in Japan as well as voluntary approach and technical solution by industrial sector. Therefore, the strategy has a limited strength as a vision due to lack in clear budget allocation, the role-setting for stakeholders, and clear target-setting.

#### *Sound Material Cycle Society*

As discussed earlier, this policy direction of Japan was relatively given more concrete visions such as the role of stakeholders, interaction of legislation and strategies, concrete quantitative targets to be achieved, and constant follow-up process under the Fundamental Plan for Sound Material Cycle Society launched in 2003 and revised in 2008.

In the late 2000s, Japan pushed this strategy forward as an international initiative under the 3R Initiative. The 3R Initiative is a Japan’s initiative to promote the "3Rs" (reduce, reuse and recycle) globally so as to build a sound-material-cycle society through the effective use of resources and materials. It was agreed upon at the G8 Sea Island Summit in June 2004 as a new G8 initiative and agreed G8’s action plan to promote the 3R policy: *Kobe 3R Action Plan* at G8

Environmental Ministers Meeting in May 2008 in Kobe, Japan.

Japan seems to be confident in their achievements in sound material cycle society and shows its ambition of becoming the center of 3R promotion in Asia. The Strategy for an Environmental Nation in the 21st Century of Japan declares to promote the vision of sound material cycle society in accordance with different challenges faced by Asian countries by transferring institutional mechanisms, technological systems, and experience in multi-stakeholders collaborations on the 3Rs and waste management through supporting national strategy development and city development.

#### *Society in Harmony with Nature*

The Strategy defines society in harmony with nature as “a society which enjoys the benefits of nature for the current generation and the coming generations with proper conservation of biodiversity, socio-economic activities in harmony with nature such as sustainable agriculture, forestry, and fishery, and enjoying natural environments.” This concept is linked with biodiversity conservation and natural landscape conservation including country-side lifestyle and landscape. Since this part of the strategy needs a close collaboration among central governmental agencies as well as with local governments, the strategy is not so clear in policy goals to achieve other than at idea/philosophical level.

#### *Limitation*

Strategy for an Environmental Nation in the 21st Century of Japan can be evaluated as an attempt to show each different component of Japan’s sustainable and environmental strategies in integrated and linked manner. Indeed, since the late 2000s, environmental issues and sustainable issues are gotten more and more attention from media and citizens as one of the important strategic policy issues by which Japan may regain their industrial and technical competitiveness in the world market. However, the strategy was not a big leap from pursuits of eco-efficiency and voluntary approach in the 1990s. Another important character of Japan’s sustainable strategy for 2000s is the emphasis in collaboration with developing Asia.

#### ***Collaboration with Developing Asia: a case of Clean Asia Initiative***

Clean Asia Initiative (CAI) was launched in 2008 as a component of international outreach for Strategy for an Environmental Nation in the 21st Century of Japan mentioned above. It is intended to be umbrella strategy for Japan’s international cooperation in sustainable and environmental management areas and aims to establish sustainable society in Asia which promotes economic development in harmony with environmental conservation by transferring

Japan’s experience, technology, institutions in a packaged manner.

The CAI follows the same emphasis as Strategy for an Environmental Nation in the 21st Century of Japan: low carbon society, sound material cycle society and a society in harmony with nature.

Under CAI, the measures against climate change are emphasized as one of the most important elements for sustainable development in Asia. Indeed, “promoting low carbon/low pollution society” is listed as a top activity among five priority areas of CAI. It emphasizes the transfer of Japan’s experience and technology for achieving energy-efficient and low pollution industrial activities. CAI follows or re-emphasizes the story-line documented earlier in this paper. Japan’s sustainable strategy was originated in overcoming *Kougai* which resulted in energy efficiency and low-pollution at unit-level of industrial activities and continued to be a major feature in its sustainable strategy.

For the regional cooperation for Sound Material Cycle Society under CAI, this should be understood in the context of the structural change that is taking place in the economic relations among developed and developing countries. The increasing transboundary movement of recyclables can be explained from the following three structural changes in the developed and developing economies: 1) a rapid increase in the recovery of recyclables due to successful implementation of recycling-related legislation in the developed countries; 2) the lowered demands of recyclables in developed countries due to shift in location of manufacturing industries from the developed countries into the Asian developing countries; and 3) the corresponding increase in demands regarding recyclables in developing countries in parallel with improvements in the related economies themselves. Thus, from the viewpoint of developed countries, the recent interest in the 3R Initiative not only concerns domestic promotion of the 3Rs, but also concerns “a policy response to the possible hollowing out of the domestic recycling industry under globalisation”, and “how to establish an environmentally-sound and economically-efficient transnational flow of recyclables.” For the developed countries, the establishment of an environmentally sound downstream material flow is difficult to realize domestically without consideration of the international flow of recyclables. This is one of the reasons why developed countries, such as Japan, which already have the capacity for domestic recycling, need to promote resource circulation and waste management policy in collaboration with the developing countries in Asia. In this sense, sustainability issues/environmental challenges are now internationalized even for waste management which was conventionally considered as domestic and local issues.

Among these, the promotion of “society in harmony with nature” is rather different policy in terms of pursuit of sustainability. This is not directly reflecting EM-type policy discourse of “increasing eco-efficiency” and “voluntary approach.” For example, the idea of Satoyama Initiative is related to traditional landscape conservation, lifestyle, and preservation of commons. On the other hand, it is not clear how to utilize this concept for international cooperation for bio-diversity conservation or natural landscape conservation in Asia.

Overall, CAI can be evaluated a continuous expression of Japan’s Ecological Modernization-type sustainable strategy. Especially, it is now explicit that domestic environmental policy and sustainable strategies are linked to internationalization.

### **Conclusion**

The promotion of environmental policy in terms of efficiency as seen in the case of Japan in 1990s and 2000s is intended to include business and industry into efforts towards sustainability by using a familiar logic and language. This approach has indeed improved environmental performance at unit-level (each industrial facility-level, each household, and each product level) in drastic manner. The current Japan’s Sustainable Strategy is based on its experience attaining technical expertise and industrial competency gained through pollution prevention and energy saving in 1970s as well as the recent success in sound material cycle society in 1990s to 2000s. However, other than eco-efficiency and voluntary approach, it is not clear yet as a next step of socio-economic reform for sustainability. It is not clear yet what kind of visions and models of national landscape and infrastructure are expected to be established in the next 10-20 years to come with proper implementation of Japan’s sustainable strategy. When a clear and concrete vision of national landscape of sustainable society is established, we will be able to call Japan has the true strategy for sustainability in the 21<sup>st</sup> Century.

### **List of References**

- Ayers, R. (1997), “Toward Zero Emissions: Is There a Feasible Path? – Introduction to ZERI Phase II”, presented as a working paper, UNU/IAS, Tokyo.
- Barrett, B. (2005), *Ecological Modernization and Japan*, Routledge, London.
- Dryzek, J. S. (1997), *The Politics of the Earth – Environmental Discourses*, Oxford University Press, Oxford.
- Environment Agency Japan (1973), The 1st natural environment conservation basic research, 1973. downloadable at <http://www.biodic.go.jp/reports/1-1/u000.html>
- Environment Agency Japan (1981), *Showa 56 nen-do Kankyo Hakusyo* (Environmental White Paper of Japan 1981), Environmental Agency of Japan. Tokyo.  
Available from



- [http://www.env.go.jp/policy/hakusyo/past\\_index.html#env-kankyo](http://www.env.go.jp/policy/hakusyo/past_index.html#env-kankyo)  
Environmental Agency Japan (1992), *Heisei 4 nendo-ban Kankyou Hakusho* (Environmental White Paper, 1992.), Ministry of the Environment of Japan. Tokyo.  
Available from  
[http://www.env.go.jp/policy/hakusyo/past\\_index.html#env-kankyo](http://www.env.go.jp/policy/hakusyo/past_index.html#env-kankyo)
- Hotta, Y., 2004. *The transnational politics of ecological modernisation, An analysis of the formation of transnational authority in global environmental and industrial governance, with special reference to the Zero Emissions Initiative in Japan*. University of Sussex. Sussex, UK.
- Hotta, Y., Hayashi, S., Bengtsson, M., and Mori, H. (eds.) (2009), *Extended Producer Responsibility in East Asia – in Consideration of International Resource Circulation-*, IGES: Hayama.  
Available from  
<http://enviroscope.iges.or.jp/modules/envirolib/view.php?docid=2607>
- IGES (ed.) (2000), *Minkankigyou to Kankyou Gabanansu* (Private Corporation and Environmental Governance [translation]), Chuo-houki: Tokyo.
- Jänicke, M., Monch, H., and Binder, M. (2000), “Structural change and environmental policy”, in Young, S. C.(ed.), *The Emergence of Ecological Modernisation – Integrating the Environment and the Economy?*, Routledge. London.
- Ministry of the Environment of Japan (2001), *Heisei 13 nen-ban Kankyo Hakusho*(Quality of the environment in Japan 2001), Ministry of the Environment of Japan. Tokyo.  
Available from  
[http://www.env.go.jp/policy/hakusyo/past\\_index.html#env-kankyo](http://www.env.go.jp/policy/hakusyo/past_index.html#env-kankyo)
- Ministry of the Environment of Japan (n.d.), Clean Asia Initiative (brochure), Ministry of the Environment of Japan. Tokyo.
- Ministry of the Environment of Japan (2007), *21 seiki kankyo rikkoku senryaku* (Strategy for an Environmental Nation in the 21st Century of Japan), Ministry of the Environment of Japan. Tokyo.
- Moriguchi, Y. (2006), “Establishing a Sound Material Cycle Society in Asia” a presentation at *Asia 3R Conference*, October 30th-November 1st, 2006, Tokyo, Japan
- OECD (2007), *Measuring Material Flows and Resource Productivity: An OECD Guide*. Paris: OECD
- Yamaguchi, M. (2000), *Chikyu Kankyo Mondai to Kigyou (Global Environmental Issues and Business Actors)*, Iwanami Shoten. Tokyo.