JAPAN

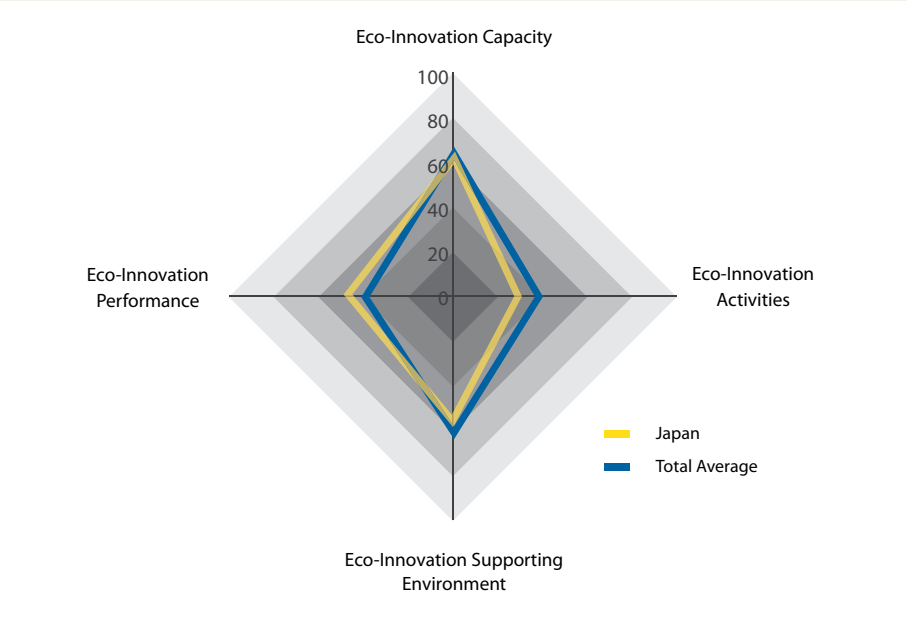

Fig. 15 Result analysis of Japan

Country Result & Analysis

Based on 20 indicators, which are aggregated into four criteria, Japan scores about the average (50/100) in ASEI. It is noteworthy that Japan scores higher than all other Asian ASEM member countries and even some lagging countries in Europe. In regards to the country's level "of eco-innovation capacity", the country demonstrates around the average score in "level of economic competitiveness" and "general innovation capacity". However the country scores well above the average in the "level of awareness on sustainability management" and "number of jobs in green technology industry". Japan's "eco-innovation activities" described by the "number of green patents", "number of commercialized green technology SMEs", "number of green technology SMEs at Early Stage", "level of environmental management", renewable energy utilization level", and "turnover of environmentally friendly companies" falls below the average. However, Japan scores above the average regarding to the "level of environmental management" and "turnover of environmentally friendly companies". In the area of "eco-innovation supporting environment", Japan scores slightly below the average, but the country has high "level of environmental laws" and good "level of commitment towards international environmental agreed goals". "Eco-innovation performance" appears to be the strongest among all four criteria. The criteria measure is well supported with high score in "green industry market size", "CO2 intensity level", "energy sustainability" and "environmental impact on society". Overall, Japan ranks just below the average on the ASEI index.

Japan's Key Eco-Innovation Environment

According to the Ministry of Environment of Japan, Japan's green industry experienced decrease in size with the global economic crisis in 2008, but the industry has recovered and improved its market size reaching 69 trillion yen in 2010. The current number of employees in green industry in Japan is approximately 1.85 million which has grown from 1.80 million in 2009.[64] In 2007, the Japanese government's Industrial Science

[64] *Ministry of Environment (2012), Estimated Market Size of Japan's Environmental Industries of 2010, and Report of Japan's Environmental Industry Growth Engines*

Technology Policy Committee introduced the term "eco-innovation" for the first time at national level. With the introduction of this term, the Japanese government provided vision of transiting towards green growth. Following on, as part of the "New Growth Strategy"[65] adopted in 2009-2010, innovation in environmental sector was promoted. With global economic downturn in 2008 and national disaster of earthquake in March 2011, Japan has been experiencing economic, social and environmental difficulties. It is noteworthy that Japan is putting eco-innovation and green growth as a major pillar in the revitalization of Japan.

Push for Renewable Energy after Fukushima Disaster

Following the Fukushima nuclear disaster, in July 2011, the Japanese government set up the Energy and Environment Council and disclosed its plan to reach 0 percent nuclear energy target by 2030 including alternative targets of 15 percent and 25 percent. To reach the national goal, the government aims to strictly apply no longer than 40-year operation rule to all of its nuclear reactors throughout Japan and not grant permission to build any more reactor plants. Japan's rather extreme plan to reduce national nuclear power production brings a concern of increase in energy prices. In regards to the target rate of 0 percent, 15 percent, and 25 percent of energy supply from nuclear power, the corresponding rate of increase in energy price is projected to be around 21-27 percent, 15-20 percent, and 12-15 percent respectively.[66] Therefore, it is essential for Japan to improve energy efficiency and develop alternative energy sources via eco-innovation. In the late 2011, Renewable Energy Act was put in action, and significant growth is expected in the renewable energy market especially in the solar sector. From July 2012, the new feed-in tariff law has put into effect which approves generous feed-in tariffs for renewable energy projects. It is stated that the change in direction on energy system and the new feed-in tariff law expect to promote the development of new green technologies that can be practically applied. This change will also increase revenue from renewable energy industry to more than $30 billion by 2016.[67] In the next ten years, eco-innovation is expected to appear in the renewable energy sector more rapidly than other areas in Japan.

Public Support to R&D on Green Technologies

As Japan is known as a strong technology advanced country, there is a great amount of both public and private R&D efforts. In fact, the Japan's expenditure on R&D is among the highest in the world. Therefore, the proportion of R&D spending on environmental technology may seem small, but the amount itself stands for a very large amount.[68] As a result, Japan is one of the countries with highest number of patents with relatively large share of patents in environmental technology. As part of the government's plan for New Growth Strategy, 1.9 billion Euros has been allocated with specific emphasis on low carbon energy supply, highly efficient, smart use of energy and greening of social infrastructure. Environment Research and Technology Development Fund (ERDF) is a main R&D program related to eco-innovation. Another supporting program for eco-innovative R&D activities is the Global Environment Research Fund (GERF), which is a grant scheme for global environment research and calls for proposals. Since the launch of this fund in 1990, the GERF played a significant role in researching environmental issues. Advanced technological knowledge and such R&D supporting schemes related to environmental issues have continuously enhanced the eco-innovation activities of the country. With the change of energy policy and direction towards green growth, more practical eco-innovation solutions are expected to appear with the background of such government supported R&D funding.

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[65] *The government outlined the green growth strategy in July 2012 which included five key policies "(1) establishment of Japan's presence in global markets through next-generation vehicles; (2) development of energy systems and their expansion to overseas; (3) creation of storage battery markets and strengthening of Japan's competitiveness in such markets; (4) achievement of industrial growth through green materials; and (5) strategic development and use of the ocean environment."*

[66] *KEMRI (2012), the 36th Weekly Report*

[67] *http://www.reuters.com/article/2012/06/18/us-energy-renewables-japan-idUSBRE85H00Z20120618*

[68] *OECD (2008), Eco-Innovation Policies in Japan*

Setting a High Environmental Performance Targets for Business

To promote green growth, several legislative[69] (e.g. Top runner Program) and voluntary (e.g. Keidanren Voluntary Action Plan) environmental targets, mostly related to energy efficiency, have been set up to stimulate such efforts. In 2008, the Energy Conservation Law was partly revised mainly to prevent the increase in energy consumption of consumer sector. The standard gives guidance to increase the energy efficiency by 1 percent annually. In 1999, under the Agency for Natural Resources and Energy as an element of the Energy Conservation Law, a regulatory scheme named Top Runner Program was set up as an effort to target energy efficiency for products within selected segments of markets. The primary purpose of the program involves pushing not only manufactures but also importers of energy consuming products and equipments. Currently, 23 product groups are targeted by the program, and the set energy efficiency level should be met within four to eight years. Japan's Top Runner Program scheme interacts with the Energy Label Program (2000) to grant Top Runner Label to the products that satisfied the standards. Legislative environmental targets such as the Top Runner program allow more energy efficient products to enter the market.

Eco-Innovation Case Studies

CASE STUDY 1

ENAX

ENAX manufactures rechargeable lithium ion batteries (LIB) which can be used for a variety of uses. ENAX's product features high energy density, high power and large size. The product demonstrates high energy per unit mass which suits a use in mobile electronics for its portability. ENAX's LIB is good for industry use for its high power-to-mass ratio. Electric vehicles are seen as eco-friendly alternative to conventional gas-fueled cars because it generates no exhaust gases. The ENAX's Li-ion rechargeable batteries contribute to reduction of environmental impacts since the battery is used as an energy source to electric vehicles. Furthermore, ENAX's know-how skill makes it possible to provide its products at cheaper price. ENAX's LIBs offer both environmental and economic advantages to its customers. In 2004, the company was named the winner of Excellence Prize for Tokyo Venture Technology Awards for development of specific LIB for vehicles as an alternative to lead secondary batteries. In addition, in 2011, ENAX was introduced at the German-Japanese Energy Symposium 2011 under the theme of "Research & Development and Business Opportunities for Optimal Sustainable Energy Allocation".

Source: http://www.enax.jp, http://www.dr-kiehl.net/programs/ENAX%20Presentation.pdf

[69] *Other Japanese legislative actions on environmental targets include: Packaging Law (1990), Air Pollution Control Law (2006); Energy Conservation Law (amended in 2010); Reinforcement of Energy Saving for plants, buildings & transportation (2005); Law for Enhancing Motivation on Environmental Conservation and promoting of environmental education (2003)*

CASE STUDY 2

Mitsubishi Materials Corporation

Mitsubishi Materials Corporation (Mitsubishi) is a subsidiary of a multinational enterprise, Mitsubishi Group, and has been involved in the field of cement, metals, advanced materials &tools, aluminum, electronic materials & components, energy, precious metals and recycling business. As a country of advanced technology, use of metal and mineral resources in Japan is high. Unfortunately, Japan is also known to be a country with few natural resources, thus brings the nation's high dependency on imports of raw material. In the 1980s, urban mining was introduced in Japan to resolve the country's shortage on mineral resources and to reduce the cost of imports. The concept of urban mining is basically recycling of rare earth minerals from used electronic devices. Urban mining not only reduces environmental impact but also conserves natural resources. Among a number of companies in the field of urban mining, Mitsubishi proactively leads the field. Mitsubishi has put good amount of efforts to increase the recycled content of their materials. Over half of the aluminum sold by Mitsubishi comes from recovered and recycled drinks cans. Mitsubishi runs Naoshima Smelter and Refinery where the company recycles metals from household appliances. The size of urban mining in Japan is about 68,000 tons of gold, 60,000 tons of silver, and 1,700 tons of indium, which is even more than the amount in South Africa, the country with the most reserves.

Source: http://www.mitsubishicarbide.com/mmus/ca/index.html
http://www.icmm.com/page/9004/mitsubishisurban-mines-recycling-for-production

CASE STUDY 3

Laminate Industry Co., Ltd.

Laminate Industry Co., Ltd. (Laminate Industry), is a developer of processing technology of metal plate and plastic film. Laminate Industry has developed its own solution breaking the traditional way of using laminating paper and became the world's only company with environment-friendly laminating technology. The company holds a patented technology solution for glue-free and solvent-free laminate, and its can products are proven to release less environmental hormones and minimize sources for volatile organic compounds. Laminate Industry's technology can be used for variety of two piece cans, three piece cans of canning and manufacturing lid, household appliances, building materials, car and train compartment exterior and a wide range of areas.

Source: http://www.laminate.co.jp/us/index.html
http://www.chipf.com.cn/qyyd/E2en/e2s076/e2s076_en.html