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Japanese Environmental and Energy Services - The Dark Horse

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(summary)

Rapid population growth and growing economic activities in the developing countries require the conservation of natural resources, energy, and environment to be done in parallel for sustainable development. Due to increased environmental regulatory pressure the developing countries are currently concentrating on infrastructure development in the area of Environmental and Energy Technology. However, most of the developing countries do not have the technical, managerial and sometimes financial capabilities to develop such infrastructural projects all by themselves. They therefore seek foreign help. Japan is very advanced in the area of Environmental and Energy Technology business with strength in the Equipment sector, and has high international competitiveness. The developing countries concentrating on infrastructural projects require help at the first place for the Services area such as engineering consulting, design, development, legal, inspection and others. These are then followed by the equipment procurement to support those projects. Unfortunately Japan is not very competitive internationally in the Services areas of the Environmental and Technology businesses. Currently this services area covers half the revenue of this sector, which is expanding at a high pace. For Japan to cooperate with the developing world to meet their objective of sustainable development the competitiveness is required to be built up in the area of services alongside the equipment. The essay discusses on the different trade issues related to Environmental services that the Japanese firms are currently facing. It then advises some measures that the Japanese firms should take to overcome such difficulties.

(full text)

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1. Introduction

In 1972 the Club of Rome published one of its best-known book “The Limits to Growth”¹. It was published in 37 languages and sold twelve million copies. The book was written at the backdrop of the unbridled optimism of the economic growth of 1950s and 1960s of the Western and the Communist world. It warned the world that if the world’s population growth and the consumption pattern remained high the world would be out of its resources within a century. The book received a lot of criticism. Some believed that any shortage of resources could be tackled by the market economy. Others believed that with increase in technology and innovation many new resources could be discovered. Discovery of new oil and gas reserves, Green Revolution, and Medical advancements made us not see what the Club of Rome predicted though. In fact, the warning of the book was not as much on our fate as on the suggestions to check population growth and control consumption pattern. In last half century the world population has grown from 2 billions (1950) to 6.7 billions (2008). Most of this growth is seen in the developing countries. Rapid population growth usually creates some specific problems. Today world’s some 2.7 billions lack access to basic sanitation, and about 1.2 billion lack safe drinking water; some 300 million lack even reasonable access to it. Access to safe drinking water is a great problem particularly in Africa. Many of relatively small African and Asian cities with less than a million inhabitants do not have any sewerage system even.

Since 1990 there has been a new trend – ‘Global Simultaneous Revolution’. Started with Asian economic revolution, many of the developing countries are now surging forward with spectacular economic growth driven by rapid technological changes. The large-scale economic activities have increased the demand of minerals and energy. Rapid industrialization is causing enormous environmental problem of waste and pollution. The trend is much the same what the developed nations had faced in 1950s and 1960s. The stage was crossed when some had doubts whether or not the environmental pollution was causing the climate change. A series of weather related disasters of 1990s erased the last speck of doubt. When some were speculating over the possible extent of climate related damage, Munich Re, a leading reinsurance company of the world, came out with its report in 1998 saying some South-Eastern parts of the

¹ ‘The Limits to Growth’, Meadows D H., Meadows D I., Randers J., and Behreas III W W., Earth Island Limited, London, 1972

US, and a large portion of Indonesia would be uninsurable in years ahead. More than 60 financial institutions have accepted the Equator Principles to finance only those projects that are socially responsible and help sustainable development.

Climate change brings along other worries. It is likely to affect those areas most where people are already suffering from shortages of water and food, chronic diseases, and malnutrition. The current climate change models suggest that globally Iran, Iraq and Saudi Arabia will face the biggest reduction in rainfall. In the Middle East 5 percent of the world's population survives on 1 percent of water. The climate change will cause famine more frequent and prolonged. According to a recent study a 2 – 3 °C rise in temperature will result in 30 – 40 percent drop in crop yields in Africa, the Middle East and South Asia². Egypt will be doubly affected – a country so important for the region's stability. Energy security is an important issue. The world trade of 80 percent Oil and Gas takes place in three regions – Russia and the FSU, West Africa, and the Gulf. The 20 percent of all global oil flows through the Port of Hormuz. An increase in severity of extreme weather events will threaten port and drilling installations across the world. Melting of permafrost will cause havoc in energy infrastructure, e.g., pipelines in Russia. Melting of Himalayan glaciers will threaten India's capacity improvement plan of hydroelectricity.

To tackle climate change and resources security, the world should conserve the natural resources – minerals, energy, and environment. Recycling and reuse, clean energy utilization, improvement of energy efficiency, renewable sources of energy, saving environment are the main ways forward. Today, Japan is the most energy efficient economy in the world. From each barrel of oil Japan produces twice as much GDP as the US, ten times as much as China, and twenty times as much as Russia³. For energy security, Japan has 171 days' of oil reserve in compared with, say China, which has a plan to build the strategic reserve of 30 days by 2010. Japan is highly advanced in the 'Environmental and Energy Technology' covering Air Pollution Control, Water Pollution Control, Waste Treatment, Noise & Vibration Control, Power and Utility, and Renewable Energies.

This industry is mostly driven by the government legislations, regulations, and standards. The developing countries are now in the process of building infrastructure. However, they lack necessary knowledge, skills, and expertise to design, develop,

² "Berlin Speech on Climate and Security", Speech by Foreign Secretary, Margaret Beckett at the British Embassy, Berlin, 24 October 2006; available at www.britischebotschaft.de/en/news/items/061024.htm

³ "A Globalization of responsibility", Speech by Margaret Beckett, Foreign Secretary, FCO, London, 7 October 2006. Available at www.britainusa.com/sections/articles_show_nt1.asp?d=0&I=41020&L1=&L2=&a=42261

fabricate, and build such facilities. For this, they seek the expertise of the foreign firms from the Industrialized or Newly Industrialized Countries (NIC). Such enormous is the need in this area that half the revenue of the global market comes from the services business alone. Japan has a long-standing reputation of the Equipment business in the global market, particularly in the area of Air and Water Pollution Control. But, Japan is not known internationally for the 'Environmental and Energy Services' business as much as some of the other countries such as the US, Germany, France, the UK, and Canada. It is, therefore, thought to be appropriate to bring in light through this essay the importance of this area to the developing world. The essay first discusses on the evolution of Japanese environment businesses, and the current need of the developing countries for their endeavor towards sustainable development. It then shows Japanese innovation and internal competitiveness vis-à-vis the US and European countries. Finally the essay proposes the measures that the Japanese companies should take so that the Japanese 'Environmental and Energy Services Technology' becomes more widespread to the developing world.

2. Minamata to Coolbiz - Rise of Japanese Eco-Business

The year 2006 marks the 50th anniversary of Japan's infamous Minamata disease. When post-war Japan was busy catching up with the tremendous pace of economic growth, not enough attention could be paid to the environmental consequences. Between 1950s and 1960s four major pollution-related diseases erupted, the most critical of which was the Minamata disease - a kind of neurological disorder from methyl mercury poisoning found in the Minamata Bay Area, Kumamoto Prefecture. The second Minamata disease broke out in Niigata Prefecture. Next came the Itai-Itai disease, the chronic cadmium poisoning, followed by Yokkaichi asthma. With growing importance of issues related to pollution the first Basic Law for Environmental Pollution was enacted in 1967. It was then one of the first of its kind in the world. By 1970 Japan had one of the most stringent Environmental Regulations in the world.

In the following years Japan's policy measures and strong trends towards the Environmental Technologies and the Eco-businesses are reflected in the increased attention to stimulate sustainable production and consumption patterns through extended producer responsibility, green procurement, and new legislation on waste management and recycling. To stop improper waste management via open incineration, huge-scale illegal waste dumping, and improper storage of the Polychlorinated Biphenyl (PCB) waste the government expanded the scope of recycling by endorsing the Household Electric Appliance Law (2000), the Personal Computers Recycling Law (2003), and the Automobile Recycling Law (2005). The efforts towards 'Reduce, Reuse, and Recycle (3R)' helped Japan build the Sound Material-Cycle Society. In December

2002 stricter dioxin standards were enforced followed by implementation of the Soil Contamination Control & Countermeasures Law in 2003.

The 'Kyoto Protocol Target Achievement Plan' followed the enforcement of the Kyoto Protocol on 16 February 2005. With the level of GHG emissions in 2005 being 8.1 percent higher than the base year 1990, Japan has to reduce its emission by 14.1 percent during the first commitment period, 2008-2012. The plan was formed as 8.7 percent reductions through domestic means, 3.8 percent removal by sinks, and 1.6 percent reductions through Kyoto Mechanisms. It stressed two important points – one is the national campaign that involved every citizen and business entity to combat global warming, and another, the dissemination of low emission technology. Introduction of the Green Purchasing Law to procure eco-friendly goods and services for all public services were a major factor for expansion of Japanese Eco-businesses. Toyota's hybrid vehicle – Prius, is an example. It combines gasoline engines and rechargeable electric batteries. Hitachi's energy efficient Room Air-Conditioner is another. It uses a double accelerator system to deliver dramatic energy efficiency and heating capability. Hitachi's ecology services produced 'Eco-assist' to help companies acquire environmental ISO certification. Sanyo brought photo voltaic and nickel metal hydride battery, 'eneloop', and amorphous silicon solar cells to the market. The nationwide campaign 'Team Minus 6%' was organized by the Ministry of Environment (MOE) to encourage citizens, businesses, civil groups and government to cut carbon dioxide emissions to achieve Japan's goal. In summer 2005, the MOE promoted "Cool Biz" campaign to encourage citizens to wear light business attire to save on electricity consumption in the air conditioner. All these efforts helped Japan moving towards a *Low Carbon Society*.

For energy Japan relies almost entirely on imports – oil, coal, and natural gas. About 90 percent of the oil comes from the Middle East. With recent increase in energy prices and unreliable supply Japan's national energy strategy has taken a shift from deregulation to national security. The Energy Conservation Law sets the "Top Runner" program in 1998 as energy efficiency standards for home/office appliances and fuel efficiency standards for automobiles. Use of Bio-ethanol (E3) is supported for the official vehicles. In addition to setting standards the law calls for increases in use of energy from renewable sources. In Japan the solar energy's installed capacity is expected to reach 5,000 mega Watt (MW) by 2010. The similar targets for wind power and geothermal energy are 300 MW and 1,000 MW respectively (Andersson and Widegren, 2006). There has been a fairly recent legal change through the introduction of the Renewable Portfolio Standard (RPS) system, which ensures that certain percentage of power must come from renewable sources.

Thus the enforcement of environmental regulations due to increased pollution and health concern of 1960s and 1970s spurred Japan's entry to eco-businesses. In recent years, expansions of the eco-businesses are driven by the recycling law, the higher standards on dioxin and soil contamination, the Green Public Purchasing Law, and the commitment towards Kyoto Protocol. In the area of energy, increase of oil price in the international market changed the direction of national policy away from oil dependence. This encouraged Energy Technology businesses particularly in the area of renewable energy.

3. Environmental and Energy Services Technology - Today's Need for the Developing World

Due to large-scale economic activities and rapid population growth the developing countries are concentrating more on the infrastructure development in different sectors - water, waste, transportation, power, utilities and environmental protection. In 2004 the global environmental technology market was US \$ 629 billion, with the US counting for 37 percent, Europe 28 percent and Japan 16 percent. The developing and emerging markets consist 15 percent of this total, and is expanding at a rate of 5 – 20 percent (Andersson and Widegren, 2006). The main purchasers of the environmental goods and services are the local municipal authorities, the state & central government, and the manufacturing sectors.

Environmental Services:

The services sector includes engineering design, construction and management of utilities, collection and treatment of wastewaters, waste collection and processing, hazardous waste management, legal and consulting services, remediation services and strategic environmental management. The current market is matured, and is mainly in the developed countries - North America, Western Europe, and Japan. But, the developing and emerging markets are growing. In Latin America the market for water and wastewater treatment is expanding rapidly. In Southeast Asia most countries have implemented legislation related to air, land and water protection. German firms are particularly successful in the air pollution control, noise abatement, and recycling field (Bilfinger+Berger Bauaktieng). French firms have considerable strength in the water treatment (DUMEZ, Bouygues, GTM-Entrepose). The US firms have the competitive advantage in hazardous waste (Parsons, Bechtel, ABB Lummus Crest, Foster Wheeler). Japanese firms are famous for the air pollution control (Kawasaki, Mitsubishi, Hitachi, and Ishikawajima Harima).

Energy Services:

Energy is perhaps the biggest business in the world economy with an annual turnover of a minimum of US \$ 1.7 – 2 trillion. It is a segmented market, and is dominated by a small number of large firms. They are active in oilfield services. A myriad of Small and Medium-sized Enterprises (SME) are active in some specific segments such as energy management and metering. The energy services are required at each stage of the three distinct processes – Energy Extraction, Transportation, and Delivery to final customer. According to a study (UNCTAD, 2003), activities related to the search for oil fields made up only a fifth of the revenue of large oil firms, but it contributes two-thirds of the total profit. Due to structural changes of privatization of previously state-owned companies especially in the downstream segments of natural gas and electricity i.e., transmission and distribution, some new services are increasingly coming up, for example the operation of power pools, the provision for continuous information on energy prices, energy trading and brokering, trading of emission rights, and energy management. The sector is dominated by the US (Bechtel Group, CRSS, Guy F. Atkinson), French (CEGLEC, DUMEZ), Italian (Ansaldo), and Japanese (Mitsubishi Heavy Industries) firms.

For the demand of clean energy the developing countries particularly Asia will give most future growth of nuclear power. It is both capital-intensive and services-intensive. The service industry plays a vital role in the Transformation Process. Renewable energies include non-hydro renewable such as thermal and photovoltaic solar energy, wind energy, biofuel, mechanical and thermal energy from ocean, and geothermal energy. In the developing countries about 30 percent energy comes from these sources. With considerable population lived in sparsely settled remote off-grid locations the renewable energies are often the most economical to generate power and light. The potential for this sector is yet to be fully explored.

4. Japan's International Competitiveness

Japan's technological competitiveness is driven by eco-innovation. The Japan Patent Office (JPO) recently conducted a survey on publicized and registered Japanese patents in the field of Environment and Energy. It revealed that in the area of environment there has been a five-fold increase in number of publicized applications between 1990 and 2005. In the area of Renewable Energy, the number of publicized patents is greatest. This is due to higher public spending and increased attention to R&D in solar, wind and biomass utilization (JPO, 2006).

OECD (2006) had surveyed the shares and trends of patent applications at the

European Patent Office (EPO) in six categories – Air Pollution, Recycling, Environmental Monitoring, Waste Disposal, Noise Protection, and Water Pollution. Japan ranked first in four out of six categories with largest number of patents in Air Pollution (32.5 percent), Environmental Monitoring (23.2 percent), Waste Disposal (22.8 percent), and Recycling (18.4 percent). Japan placed third in both Water Pollution and Noise Protection, after the US and Germany who ranked first in each of these two categories respectively. Noise protection is comparatively weaker area for Japan. According to a study (CIRJE, 2003) on the US patent data from the Centre of International Research on the Japanese Economy at the University of Tokyo, commercialization of Intellectual Properties (IP) is most important for Japanese inventors. The legally protected prototype closer to commercialization, or the rate of assigned patents, and the citation index are highest for Japan at 0.88 and 5.29 respectively.

Environmental Business International (EBI) made a comparative study on the international competitiveness of the US, Japan, Germany, Canada, France and the UK. The competitiveness is calculated in all the three areas of Equipment, Services, and Resources (see Table). Japanese industries have strength in Equipment. The US and German industries are also highly competitive. The services sector is largely dominated by the US firms. Japan is significantly poor in this area. German, Canadian, French and British companies are somewhat better than the Japanese firms. Japan's Resources Sector is also no better. French and the British companies have particular strength in the resources or the utility sector.

This is also reflected in the trade figures. Large portion of Japanese export is in the air and the water pollution control equipment. As per a study by Japan External Trade Organization (JETRO), the export revenue from the waste treatment equipment is nearly one-third of both Air and Water Pollution Control areas. Japan's external trade in the Environmental Technology area is mostly in East and West Asia. The market for the waste treatment is almost entirely in East Asia. Japan has negligible trade with FSU, Eastern Europe, and Africa. According to a study, the external trade consist only 2.4 percent of domestic production of environmental control equipment or 41 billion yen. This shows large consumption in domestic market. Out of total export, 49.2 percent is for East Asia, and 33.5 percent is for West Asia. Japan has very small portion of noise and vibration control equipment to export (JETRO, 2003).

Japan should, therefore, need to improve competitiveness in the Environmental Services sector – an area so important for today's infrastructure development of the developing world.

5. Issues of Trade in Environmental & Energy Services

The classification of this sector within the framework of the General Agreement on Trade in Services (GATS) is a debatable issue. Unlike other services sector, export of environmental services involves significant investment in the developing countries. Therefore, ownership and control become important. The movement of experts and their duration of stay are also an issue. The regulations may require firms operating in this area to obtain numerous permits to conduct different types of operations. Affordability of the new technology by the developing countries is to be considered. The users of technology sometimes do not have enough financing to acquire new technology. Enhancing domestic capacity of the developing countries is also very important. Moreover, lack of market access to other sectors such as engineering, legal, consulting, and analytical services, poses a lot of problems.

For trade in services Japanese firms prefer a new classification for 'non-core' environmental services under GATS. Trade liberalization may include several related sectors. The use of IT should reduce the duration of stay abroad for Japanese experts to deliver services. New business models such as private-public partnership are increasingly used based on the Build-Operate-Transfer (BOT) technique. This is widely used in water utilities and waste treatment segments. Japanese companies can take advantage of this arrangement to provide technology services in the developing countries. In the developing countries, SMEs constitute nearly half of the environmental services business. Some developing countries are encouraging foreign firms to 'adopt' promising local SMEs, having potential to become future suppliers, to assist them with upgradation of technology and management. This would help Japanese firms to get into time-limited specific activities with the domestic firms. Visit of experts and managers from Japanese firm to the local SME to provide advice, assignment of Japanese staff to the SME for limited period and the access of the SME's internal training system, sharing market information and strategy with SMEs for possible additional business opportunities, offering favorable pricing for SME's services, helping SME's cash-flow through advance purchases and payments and long term financial assistance through capital and bank-loan guarantee – could be some important ways forward. Japanese companies can explore the route of the activities of the 'Action for Better International Community' (ABIC) for exchange of personnel between Japan and the developing countries. In addition, use of the Japanese Official Development Assistance (ODA), the Green Aid Plan, initiated by the Ministry of International Trade and Industry (MITI), can be used to provide finance and technical assistance for environmental management in Asia.

The liberalization of trade in the energy services plays an important role. Japanese

negotiating proposal in the World Trade Organization (WTO) is on transparency in energy services regulations. In some developing countries underdevelopment of regulatory frameworks and lack of transparency in the regulations of energy services obscures predictability of trade. This causes Japanese companies' apprehension about potential trade barriers and lack of confidence. Also, the regulatory reforms should ensure energy security. Due to the increased environmental impacts efforts to be made by all countries to harmonize energy policies with environmental policies. Even more important is that the countries undertaking such measures should not be in a disadvantageous position in the energy services trade. Japan at present has bilateral Economic Partnership Agreement (EPA) with Chile, Thailand, Brunei, Indonesia, Singapore, Mexico, Malaysia, and the Philippines. Japanese businesses should make use of these reduced trade barrier avenues to cooperate with the developing countries in the area of Technology Services trade. Japan's Free Trade Agreement (FTA) with Gulf Cooperation Council (GCC) is an important step towards promotion of trades in the Middle East.

6. Conclusion

Japan has strength in the air and water pollution control technology and has market mostly in East and West Asia. But, Japanese Services area of energy and environmental technology sector is not so competitive internationally. With developing countries set to build their infrastructure the need for knowledge in designing and building such infrastructural facilities are important. To help developing countries achieve their goal of sustainable development Japanese firms should develop competitiveness in the Services Area. Uses of ODA, Green Aid Plan, SME development, public-private partnership arrangement, Foreign Direct Investment in the developing countries are some of many ways to look forward. Japanese businesses should also take advantage of the numerous bilateral EPAs to spread Japanese technologies in the developing countries particularly Asia. Incorporation of above measures by Japanese firms will strengthen their global position in the environmental and energy services. In the years ahead Japan's Environmental and Energy Services Technology may well prove the world as the Japanese dark horse!

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Table: Competitiveness of Environmental Industries (Andersson and Widegren, 2006)

ENVIRONMENTAL INDUSTRIES	JAPAN	US	GER	CAN	FR & UK
EQUIPMENT					
A. WATER TREATMENT & CHEMICALS	GE	G	G	G	GE
B. AIR POLLUTION CONTROL	E	OG	E	O	O
C. INSTRUMENTS & IT SYSTEMS	G	E	G	O	O
D. WASTE MANAGEMENT EQUIPMENT	OG	G	GE	OG	O
E. PROCESS & PREVENTION TECHNOLOGY	M	P	P	P	P
SERVICES					
A. SOLID WASTE MANAEMENT	OM	OG	OG	OM	G
B. HAZARDOUS WASTE MANAGEMENT	O	G	O	O	OG
C. CONSULTING & ENGINEERING	M	GE	OG	G	OG
D. REMEDIATION / INDUSTRIAL SERVICES	M	G	O	G	OM
E. ANALYTICAL SERVICES	O	G	O	G	O
F. WATER TREATMENT WORKS	MP	MP	M	MP	GE
RESOURCES					
A. WATER UTILITIES	P	MP	MP	MP	GE
B. RESOURCE RECOVERY	O	O	OG	O	O
C. CLEAN ENERGY SYSTEMS & POWER	OG	OG	OG	O	OG
<i>Rating : E - Excellent; G - Good; O - OK;</i>					
<i>M - Mediocre ; P - Poor</i>					
Sources : EBI (2006)					