

Clean Asia Initiative

CAI

Newsletter

vol.10 March 2013

Toward Sustainable Development

From Japan to Asian Cities

The frontier of transferring
environmental technologies



Greening cities by composting organic wastes: A case example in Surabaya, Indonesia

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The Rapid Growth of Asian Cities and the Dilemma of Environmental Degradation



The Rapid Growth of Asian Cities and the Problem of Environmental Deterioration

Of the world's cities, half of the top 20 ranked cities in terms of population size are located in the Asian region. At present, about 40% of the total population within the Asian region lives in cities on average, with it predicted that this will rise to 60% or more by 2050. The region is also characterized by its densely packed populations, with the average population density of Asian cities standing at 6,500 people per 1 km². This tends to be conspicuously high when compared with the averages of 4,500 people in the Central and South American region and the 4,000 people in the European region. Yet infrastructural improvements have not kept pace with the rapid growth of cities and increasing populations, such that many cities are faced with serious problems in areas such as water supply, sewage treatment, and waste management. The sudden surge in emissions of greenhouse gases also poses a major problem.

The rapid growth of cities has invited population inflows from people like impoverished farmers and has led to the formation of slums in which low-income earners congregate. This tendency is particularly pronounced in the Asian region; with it claimed that roughly 30% of the urban residents in East Asia and Southeast Asia live in slums. Improvements in urban infrastructure have been slowest in these districts, which when coupled with their poor site conditions such as being located in low-lying regions or along riverbanks, are where the ef-

fects from pollution, deteriorating sanitation, and natural disasters such as flooding are concentrated. Such trends have been growing worse year by year as a result of recent climate change.

The city with the largest population in the world is currently Tokyo in Japan. Through its own prior growth process, Japan has experience with resolving these sorts of urban environmental problems by repeatedly undertaking policy and technological improvements. The hope is that this experience can be put to use in solving the problems that are currently facing cities throughout the countries of Asia. It is said that Japan's outstanding environmental technology and know-how, which contributes to vitalizing the Japanese economy, are among the most advanced in the world and can contribute to the sustainable growth of these other countries. The scale of market for environmental businesses in the Asian region is estimated to grow up to approximately 925 billion USD* until 2020.

* Estimation based on the estimated scale of the world market for environmental businesses in 2020, approximately 2,580 billion USD; and the share of the Asian market for environmental businesses to the world's one in FY 2007-2008. (Referred to the estimation by the Japan External Trade Organization based on the data disclosed by the Germany Federal Ministry for the Environment, Nature Conservation and Nuclear Safety. The exchange rate between JPY and USD referred to the one as of March 1, 2013.)



P.10 Japan's Support for Realizing Environmentally Sustainable Cities

Deteriorating Water Environments

The sewage coverage rates for cities in the Asian region remain at low levels compared to other cities from around the world, with domestic wastewater that is discharged without being treated causing the water quality in urban water districts to deteriorate. This also causes health hazards on occasion, especially for groups like low-income earners to whom water supplies do not reach who depend on well water. There are a number of complexly intertwined factors that account for these low sewage coverage rates, such as improvements in sewage facilities not keeping pace with rapid urban development as a result of inadequate urban planning, as well as disputes over land acquisition.



Onsite Wastewater Treatment Systems for Improving Water Quality in Asian Cities

Case Example from Jakarta, Indonesia P.6

Limits to Water Supplies



Waterworks improvements have been making progress in the cities of the Asian region, to the point that safe drinking water can now be supplied to about 90% of their urban populations. Yet as a result of increases in the amount of water used per person and rapid population increases, water supplies continue to be tightly constrained. The water supply coverage rates declined from 1990 to 2008 in cities throughout countries like Bangladesh, Indonesia, Laos, and Myanmar. Conversely, there are also cities like Tokyo that have seen high growth in which the trend is towards improvements in water usage efficiency and decreases in the amount of water used per person.



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Case Example from
Dalian, China

**A New Approach to Disseminating Water Conservation
Technology to Resolve Urban Water Shortages:
Co-benefits of Water Conservation and Carbon Reductions**

Waste Management



The growth of cities has been accompanied by a variety of overlapping factors—such as increased consumption and changing lifestyles due to increasing populations and economic growth—which have led to significant increase in waste and its diversification. Improvements in waste treatment systems have not kept pace with the rapid increase and diversification of waste that have accompanied the rapid growth of many Asian cities. As such, the majority of wastes are handled through landfill disposal, with open-air incineration often seen as well. The collection of household wastes does not make it around much, particularly not to residential districts with low-income earners such as slums. And the wastes are thrown away in drainage channels and alleyways, with reports of cases where this causes serious health hazards for the residents. In order to improve this, it will be important to strengthen the urban governmental structures that should be responsible for waste management, as well as resident cooperation through environmental education.



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Efforts in
Surabaya, Indonesia

**Participatory Program for Composting Household
Organic Waste Offers a Starting Point for Resolving
the Waste Management Problems in Asian Cities**

Greenhouse Gas Emission



Despite the fact that the surface area of cities is only a mere 2% of the total land surface area on Earth, emissions from cities account for two-thirds of the total emissions of greenhouse gases. These are caused by a variety of urban activities that include the construction and use of buildings and residences, transportation, energy use, and waste management. Therefore, integrated solutions that encompass the relevant urban problems are needed in order to cut emissions.



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**Japan's Support for Realizing
Environmentally Sustainable Cities**

Reference Material: UNDP 2012. Asia-Pacific Human Development Report -One Planet to Share: Sustaining human progress in a changing climate -. In: UNDP (ed.) *Human Development Report*. United Nations Development Programme Asia-Pacific Regional Centre Bangkok, Thailand.



Indonesia

Efforts in Surabaya, Indonesia

Participatory Program for Composting Household Organic Waste Offers a Starting Point for Resolving the Waste Management Problems in Asian Cities

The urban development and the concentration of populations cause serious waste problems. The city of Surabaya has successfully developed a waste management model and the reduction of waste by composting organic waste through resident participation. The City of Kitakyushu assisted it via a city-to-city environmental cooperation partnership. Residents of Surabaya have praised the assistance by the City of Kitakyushu. The Ministry of the Environment of Japan further supports international cooperation through private companies. It also promotes the development of sustainable cities in Asia by spreading this success of Surabaya to Asian cities through “High Level Seminar on Environmentally Sustainable Cities.”

Improvements in the Composting Technique Offer a Starting Point for Resolving the City's Waste Management Problems

– A Case of Surabaya City –

Rapid urbanization and increase in population resulted in a sudden rise in the volume of waste. Since the middle of the 1990s, Surabaya city, home of 3 million people, has been facing difficulties with waste management. Organic waste was the first target as it accounted for more than half of the household garbage at that time. A model project that would introduce an effective technique for composting to this one district was initiated in 2004. This cooperation was conducted between the Kitakyushu International Techno-cooperative Association (KITA) and the local NGO Pusdakota, which has worked on composting organic waste in this district. Introduction of a composting technique that uses aerobic fermenting microorganisms led to success of this project. This technique is known as the “Takakura method,” named after the expert dispatched from KITA. Through this method the time needed to make compost has been shortened from the conventional three months down to one to two weeks. It also solved the sanitary problems by getting rid of the bad odors and leachate as well. The Takakura method is characterized as the starter culture for the fermenting microorganisms which can be easily propagated. It is cultivated from local fermented foods like yogurt, vegetable scraps, rice bran, and rice husks. Another feature is that it does not generate flies or fungi that are harmful to human health since the

fermentation temperature is over 60 degrees centigrade.

This new composting technique vastly improved the efficiency of Pusdakota's small composting facility. This made it possible to compost the organic waste collected from roughly 1,000 households in this district. Following this, KITA developed home composting containers with fermenting microorganisms and distributed to residents. Then, each household started composting their organic waste and used this for potted plants and growing plants at home. As a result, the volume of household waste and abandonment of waste were declined, and then greenery was spilled out into the streets. With their environmental awareness having been raised, the residents also began sorting other waste aside from organic waste, such as bottles, cans, papers, and plastic bottles. Pusdakota has also begun collecting these and functioning as a local recycle center.



Pusdakota's composting facility



Sorted collection of household waste

Recycling from Garbage

Following the 30% reduction of waste by composting organic waste, a daily volume of 1,200 tons of unclassified waste is transported to the Benowo Final Disposal Site, the only site in Surabaya. There are more than 1,000 waste pickers who make a living by collecting and selling off valuable materials such as vinyl and metals. But not only the resource recovery efficiency is low, the waste pickers are also constantly being exposed to risks such as illnesses like tetanus and pneumonia, as well as collisions with the heavy machinery at the disposal site.

Nishihara Corporation is conducting a pilot project for the construction and operation of an intermediate treatment facility for recyclable waste with the assistance of the Ministry of Foreign Affairs of Japan. The pilot project will construct a sorting plant and composting treatment facility in Surabaya with a treatment capacity of 20 tons per day. Organic waste, accounted for roughly 80% of the waste at the final disposal site, will be sorted out by hand and then composted. Valuable materials will be

cleaned and packaged into compressed bales before being sold off to recycle manufacturers. The expectation is that this will reduce the waste disposed at the final site to roughly 30% and cut the treatment costs to one-tenth of their current levels. What is more, waste pickers will be hired as workers to sort waste at the facility in an effort to improve their working and living conditions.



Waste pickers at the Benowo Final Disposal Site

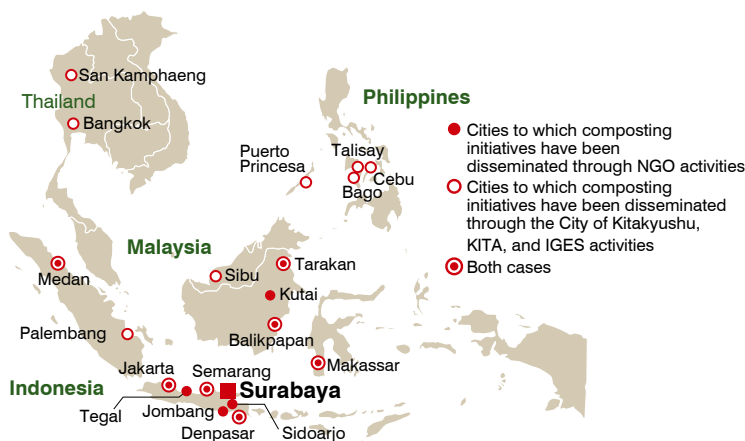


Field assistance by the Japanese staff from Nishihara Corporation(left)

Expanding the Successful Model to All of Surabaya and Global Scale

Acknowledging Puskota's success, the Surabaya city government started an initiative to expand this model throughout the entire city. It introduced the new composting technique to its existing composting facilities. New facilities were also established for composting the organic waste generated from households and fruit and vegetable markets. It also distributed home composting containers to households at a free of charge through local women's organizations and NGOs. Women's organizations and NGOs distributed the containers through "local environmental leaders" that were chosen for each district. They also offer instructions on how to use them, monitoring their usage status, and responding to problems. At present, the new composting facilities are operating in 16 locations within the city. More than 40,000 households using the home composting containers to compost their kitchen waste. The number of local environmental leaders trained through this process has reached 28,000 people, and encompasses all 8,800 districts within the city.

As a result of the initiatives, Surabaya reduced the volume of waste at final disposal site by 30% between 2005 and 2010. It has also achieved other results such as 1) decreasing child illnesses and eliminating bad odors in urban areas through the improvements in sanitation, 2) increasing the greening rate in residential districts and urban areas by 10% through the use of compost. In order to spread such initiative among its residents, Surabaya is sponsoring the "Green & Clean Campaign" with NGOs, private sector, and media, and commemorating outstanding local environmental leaders. Surabaya's success has received domestically and internationally high praise and it has won a number of awards. Domestically it won the Indonesian Government's Clean City Award for five years in a row from 2005. The Waste Management Law, enacted by



Cities to which Surabaya-style waste management models and composting methods have been disseminated

(Created based on data from Puskota, KITA, the City of Kitakyushu, and IGES)

the Indonesian Government in 2008, also positioned Surabaya's model as the important strategy. Internationally, it won the Urban Environment Improvement Award from the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) in 2007, and the Best Practices Award for Improving the Residential Environment from the UN-HABITAT (United Nations Human Settlements Programme) in 2008. In 2011, it was chosen as one of the ASEAN Environmentally Sustainable Cities.

In addition, efforts to spread Surabaya's experiences outside of Indonesia are being carried out through the "High Level Seminar on Environmentally Sustainable Cities" with the assistance of the Ministry of the Environment of Japan, as well as workshops in Bangkok (Thailand), Bago (Philippines), and Sibul and Kuala Lumpur (Malaysia) through the assistance of UNESCAP. Each of these cities has initiated similar activities.

In addition to reducing the wastes through composting and sorted collection, plans to introduce incinerators are being developed in Malaysia, Thailand, Indonesia and Vietnam. This expects to reduce the amount of wastes dumping at the final disposal sites. Generating electricity from waste materials is also expected due to the serious power shortage in the developing countries. Japan obtains good technologies and experience on incinerators and is expected to contribute the countermeasures on waste management in developing countries.



A composting facility run by the city of Surabaya



A city park that has been greened through the use of compost

Comments from partners

Manager of Waste Sorting Plant, the Nishihara's Intermediate Treatment Factory for Waste Recycling
Mr. Yanto



—Mr. Yanto is a former waste picker who now serves as the Manager at the Waste Sorting Plant in the intermediate treatment factory for waste recycling built by Nishihara Corporation. Mr. Yanto expressed his impressions of the cooperation by Nishihara Corporation.

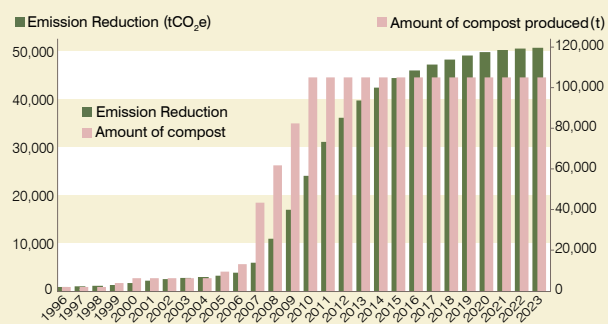
Since we do a dirty job, the other people around us look at us funnily, but there's nothing we can do about that since we have to make a living. It seems that a number of waste processors from other countries have come in the past, but Nishihara Corporation was the first one to think of working together with people on the lowest rungs of society like ourselves.

Thanks to the Nishihara's decent plant for waste sorting and clean uniform for workers, the "dirty" impression toward waste pickers and our working conditions have become substantially improved. Now I can somewhat proudly talk to my children about my work. I would also be happy if we are able to recover more resources than we could before by working together with Nishihara Corporation. My child will soon be born, and so I intend to work as hard as I possibly can together with Nishihara Corporation.

I feel that this is a great way of doing things, and I would like to see it deployed in other places as well. I think that would definitely make everyone happy.

Effects on Reducing Greenhouse Gases

Reducing organic waste leads to a reduction in the greenhouse gases by final disposal sites. When calculating the greenhouse gas emissions (carbon dioxide equivalent) from the final disposal site using the computational formula for the Clean Development Mechanism (CDM) based on the current state of waste management in Surabaya, it is estimated that approximately 36,000 tons of CO₂ are reduced for 2012 (figure below).



Curbing the generation of organic garbage in Surabaya and curbing the generation of greenhouse gases through this

(Created based on the primary decomposition model of the "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site" (Version 4) by the CDM Executive Board of the United Nations Framework Convention on Climate Change (UNFCCC))

Onsite Wastewater Treatment Systems for Improving Water Quality in Asian Cities



Case Example from Jakarta, Indonesia

Water pollution has been growing more severe as a result of the urbanization and population increases that have accompanied the rapid economic development in Asian developing countries. The Ministry of the Environment of Japan has started “The Model Projects for Improving Water Environment in Asia”. The projects aim to contribute to creating a favorable water environment and to sustainable development in Asia by developing businesses that will improve the water environment, such as through wastewater treatment, via Japanese private sector companies. This article will introduce the initiatives of Kubota Corporation towards improving the water environment in the city of Jakarta, Indonesia.

Deteriorating Water Quality in Jakarta and the Need for Onsite Wastewater Treatment

Water pollution has been growing more severe in Jakarta following the rise of the urban population and its industrial development, with most of this caused by domestic wastewater. In Jakarta, detached housing are legally obligated to install a septic tank*, but the majority of these only perform anaerobic treatment and they fail to remove the sludge from it. As a result, the quality of the discharged water is absolutely awful, and it ends up contaminating rivers and groundwater. Because of this, water pollution poses a health risk to the people who live in the city, as evidenced by the fact that roughly 40% of the well water is contaminated with feces and water-borne infectious diseases are commonly seen.

Disseminating public sewer systems is one solution when it comes to treating the domestic wastewater in a city. But since only a small fraction of the districts in Jakarta have public sewer systems, the coverage rate for the total population in the Special Capital Region is no more than 2%. A



master plan for improving the public sewer systems was created in the 1990s. However, as things currently stand, no progress is being made in extending coverage because it is difficult to lay sewage pipes and secure sites for sewage treatment plants as a result of factors such as the city's rapid urbanization and traffic congestion. A new master plan was recently formulated, but the thinking is that a full-fledged dissemination of the sewer system will require enormous costs and a great deal of time.

In light of such circumstances, Kubota Corporation instituted a feasibility study and onsite demonstration of trial wastewater treatment systems and the adoption and dissemination of operation and maintenance techniques. Onsite wastewater treatment systems have the advantages of preventing outflows of sewage and being quickly restored when disasters such as floods or earthquakes occur. For this reason, it is believed that there is a strong possibility that they can be adapted to other cities in Asia where natural conditions are similar.

*An underground tank for treating human excreta and household wastewater through decomposition by anaerobic microbes. A commonly used method in other Southeast Asian countries.

Results of the Feasibility Study and Onsite Demonstration Trial and Challenges

The survey found that wastewater is discharged without treatment to environment many households use well water for even though drinking water. Human waste is often treated in septic tanks. With respect to the water quality of nearby rivers, it was also discovered that they contain high biochemical oxygen demand (BOD), total suspended solids (TSS), E. coli, ammonia, and other pollutants. It was also learned with regards to the government's regulations that while BOD standards are lenient, Jakarta's ammonia standards are stringent, and that regulations are not carried out for detached housings. Moreover, while there is a plan to improve the various wastewater treatment plants found within Indonesia, this revealed problems

such as the fact that for some projects, priority is placed on disseminating septic tanks to such an extent that compromises are made on the quality of the discharged water, or that operation and maintenance by local communities is not working. Based on such circumstances, the Corporation performed a demonstration trial.

Results were obtained from the demonstration trial in which the water discharged from the onsite wastewater treatment equipment cleared the water quality standards in Indonesia and Jakarta, as well as the more stringent water quality standards of Japan, with regards to water quality indicators such as dissolved oxygen (DO) levels, transparency (Tr), suspended substance (SS), and BOD. A workshop was held with the local relevant

agencies based on these results where comments were received from the Indonesian side with regard to matters such as reducing the initial costs, designing the tanks to suit the actual sites, and producing the onsite wastewater treatment equipment locally and the need to make them smaller.



Contents of the Feasibility Study and the Onsite Demonstration Trial

Kubota Corporation instituted its feasibility study and the onsite demonstration trial in cooperation with the public sewerage works corporation of Jakarta, the Ministry of Environment and Ministry of Public Works of Indonesia, and the Environmental Bureau of Jakarta. For the feasibility study, the Corporation performed a current status survey on the water quality in Jakarta, and also surveyed the government's water quality standards and plans to improve wastewater treatment plants, etc. For the onsite demonstration trial, it installed onsite wastewater treatment equipment and performed water quality measurements. Workshops were held to train people in operation and maintenance techniques and exchange opinions with the relevant agencies.



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- 1 Survey on the current status
- 2 Planning and Installing Onsite Wastewater Treatment Equipment
- 3 Training for the operation and maintenance of the equipment
- 4 Workshop

Outlook for the Future

Based on the results of the feasibility study and demonstration trial, a number of outlooks for the future were indicated. These include the fact that the Ministry of Environment of Indonesia will take part in a project scheduled to last five years concerning a demonstration trial of the onsite suitability of large onsite wastewater treatment tanks, and promote efforts to produce the onsite wastewater treatment tanks locally and popularize them. It will also support policies related to initiatives like strengthening wastewater standards, equipment certification and subsidy schemes, and capacity development for improved human resources. What is more, onsite wastewater treatment tanks produced by Kubota have also begun to be disseminated in Vietnam as well. The hope is that the deployment of Japanese technology on onsite wastewater treatment systems to Asian cities will improve their water environments in the future.

Interview

Technical and Business Director PD PAL JAYA
Ir.E. Setiawati RN., MT



We interviewed Ms. Ir.E. Setiawati RN., MT, Technical and Business Director at PD PAL JAYA, the State enterprise responsible for public sewer system, on the Kubota Corporation's initiatives towards improving water quality in the urban areas of the State.

—How do you observe the Japanese technology on onsite wastewater treatment system and the efforts by Kubota Corporation?

The Japanese onsite wastewater treatment system has shown desirable effluent quality beyond the Indonesian quality standard. With its dedicated research activities in Jakarta, Kubota has delivered us beneficial knowledge and information on the activities related to the application of Japanese onsite wastewater treatment system. The research results sug-

gest us that this technology can become the basis for the technical standard on the onsite systems in Indonesia for the future.

—Do you have any requests or challenges for the future?

These latest efforts by Kubota Corporation have contributed enormously to survey activities related to onsite wastewater treatment systems, but further technical support and knowledge from Japan will be needed in order to move forward with improving the water quality in Jakarta based on these efforts. By having the Japanese onsite systems sell at a price that is competitive with conventional products with low effluent quality, I feel that there is a possibility that progress can be made with disseminating them in Jakarta.

A New Approach to Disseminating Water Conservation Technology to Resolve Urban Water Shortages



Case Example from Dalian, China

The development of many of the cities in Asia has been accompanied by a rapid surge in their demand for water, such that they are being faced with the problem of chronic water shortages. One solution in response to this problem would be to disseminate water conservation technology for the plumbing equipment that is essential for daily life, such as toilets and showers. However, this carries the drawback that such technology is hard to disseminate due to its high costs. Therefore, a methodology has been proposed which focuses on the effects of reducing carbon emissions through the conservation of water in order to encourage the dissemination of water-saving equipment via carbon credits. This article will introduce a feasibility study for the dissemination of water-saving equipment via the co-benefits of water conservation and carbon reductions in the city of Dalian, China that was carried out by TOTO Ltd. with assistance from the “Feasibility Studies on New Mechanism” by the Ministry of the Environment of Japan.

Water Shortages in Chinese Cities

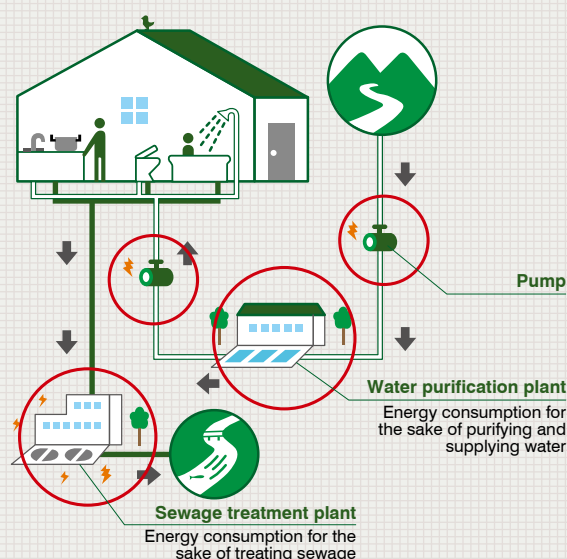
Dalian, Liaoning Province in northeastern China, is a city with a population of 5.864 million people. It has maintained growth that is higher than the average in China, which has also continued to experience strong growth. The amount of water used in daily life per person tends to increase in the wake of economic growth and rising living standards. Amidst the downward trajectory that the total amount of water resources in China are on, there are severe water shortages in the northeastern region, which includes Liaoning Province, in particular as well as in other cities in China. According to the United Nations Development Programme (UNDP), whereas the standard annual amount of water resources per person needed for daily life is 1,700 m³, the fact that this is a mere 396 m³ in Liaoning Province, 127 m³ in Beijing, and 218 m³ in Shanghai reveals that these are in a “state of water stress” that falls vastly short of this standard. As indicated by the fact that water conservation and total volume controls for irrigation water were listed in the No. 1 Circular of the Party Central Committee, which indicates priority challenges for national policy for each year, the Chinese government has a strong awareness of the dangers of water shortages. Yet conversely, the public lacks an adequate awareness of water conservation due to the fact that the government holds water charges down at low levels.

Co-Benefits of Water Conservation and Carbon Reduction

In Japan, water-saving plumbing equipment—so-called water-saving equipment—is disseminated as a means of conserving water. But in China it is not easy to disseminate the high performance water-saving equipment that is made in Japan over popular items that are inexpensive. The cost gap could be filled by carbon credits. Since enormous amounts of energy are consumed by water supply and sewage treatment at their various different stages, conserving water lessens the burden placed on water supply and sewage treatment facilities and saves a corresponding amount of energy. That is to say, it brings about the

co-benefits of reducing carbon. The reduction of carbon emissions can be converted into offsets and carbon credits. It works as a kind of subsidy for high performance water-saving equipment. Such a scheme is expected to be an incentive for the dissemination of water-saving equipment. The Chinese government has not only set forth the water conservation and irrigation water total volume control regulations mentioned above, but also ambitious medium to long-term targets for reducing greenhouse gases. Therefore, the co-benefits from adopting high-performance water-saving equipment from Japan through the use of carbon credits is an approach that can bring about synergistic effects for achieving these two policy targets.

Major treatment processes that entail energy consumption in a waterworks system



Source: TOTO Ltd

Study on the Feasibility of a Water Conservation Co-Benefits Project under the New Mechanism

Therefore, TOTO Ltd. carried out a survey, supported by an intercity partnership between Kitakyushu where TOTO's head office is based, and Dalian, on the feasibility of a water conservation co-benefits project in Dalian under the feasibility study for the so-called New Mechanism^{*1} funded by the Ministry of the Environment of Japan. There had not previously been a credit scheme aimed at energy consumption from water supply and sewage systems, and so the survey results provide an important basis for implementing a water conservation co-benefits project under the New Mechanism in the future.

This study focused on flush toilets that use a comparatively large amount of water from among the plumbing equipment that is crucial for daily life, and defined a project scenario in which every household in Dalian introduced the ultra-water saving type (with the water volume per flush at 3.8 L for feces and 3 L for urine), for which TOTO's products boast higher performance compared to

other company's products. When this was compared against a reference scenario using the Chinese government's recommended values (5 L for feces and 3.5 L for urine), saving 14,073,600 m³ of water and reducing 15,622 tons of CO₂ emissions each year were obtained. The price difference between the ultra water-saving type of toilets and the popular type of water-saving toilets was computed to be roughly 1,640 yuan (23,600 yen).^{*2} This suggests that it would be possible to promote the dissemination of the ultra water-saving type by minimizing this difference through measures such as carbon credits. Furthermore, easiness to monitor was also acknowledged as advantage since the reduction amount from this project under the New Mechanism would be acquired by only monitoring the number of ultra water-saving type toilets installed.



TOTO's ultra water-saving toilet



A Toilet generally used at the study site



door-to-door survey

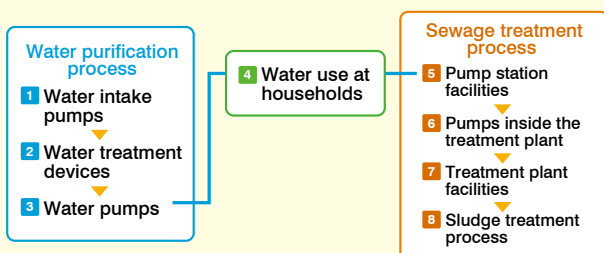
^{*1} The framework for carbon emissions rights trading that was introduced in the Kyoto Protocol is called the Clean Development Mechanism (CDM). But a similar framework for the period from 2020 onwards is provisionally being referred to as the New Mechanism.

^{*2} Calculated based on the exchange rate between the Chinese yuan and the Japanese yen as of January 21, 2013 (1 yuan = 14.39 yen).

Method for calculating reductions in annual CO₂ emissions

$$\begin{matrix} \text{Reductions in annual emissions (tCO}_2\text{)} \\ \text{=} \\ \text{Emission factor derived from water use (tCO}_2\text{/m}^3\text{)} \\ \times \\ \text{Annual amount of water saved per toilet (m}^3\text{)} \\ \times \\ \text{No. of toilets installed (No. for every household)} \end{matrix}$$

Evaluation range for CO₂ derived from water use



→ Calculated based on data on the water treatment volume and the amounts of electricity and diesel oil used at the nine water purification plants and ten sewage treatment plants in Dalian

Interview

Auditor, Dalian Environment Exchange
Zhang Xing Wen



We asked Mr. Zhang Xing Wen, the Auditor of the Dalian Environment Exchange, which is the onsite partner organization for the feasibility study.

—How do you observe the water conservation and carbon emissions reduction co-benefits initiative?

I am grateful for the recent opportunity to take part in the onsite survey. This survey has demonstrated new methodologies and evaluation methods for soundly conserving water resources and reducing carbon emissions at the global level. However, further research and validation will be needed in order to make this a globally recognized methodology. We are engaged in the development of a carbon reduction project and research on interregional carbon credits. But hereafter I would like to continue to contribute to the promotion of this project and carbon reduction initiatives by means of strengthening exchange and collaboration between Japan and China, and between the cities of Dalian and Kitakyushu.

Japan's Support for Realizing Environmentally Sustainable Cities

●Joint Crediting Mechanism for Achieving Low Carbon and Clean Cities in Asia

Joint Crediting Mechanism (JCM) aims to provide solutions for various urban environmental issues in the Asia region harnessing on the reduction of carbon emission through leveraging Japanese experiences, policies and technologies. Through this process, it reinforces the capacity of developing countries to implement relevant programmes by supporting the formulation and implementation of higher institutional dimensions such as the Nationally Appropriate Mitigation Actions (NAMA) and urban planning.

Japan has advanced technologies for reducing carbon emission. These technologies have various co-benefits that could contribute to resolving a number of local environmental issues. Trams, the Bus Rapid Transit (BRT), and electric vehicles and bikes, for example, can reduce air pollution and traffic load, as well as carbon emission. 3R (Reduce, Reuse, Recycling) and Waste to Energy plants have multiple environmental benefits such as carbon reduction and improved waste treatment and public health.

Many developing countries in the Asian region have difficulties in implementing effective solutions for environmental issues with limited know-how. Many cities in Japan, on the other hand, have become environmentally advanced after overcoming environmental pollution. For example, Kitakyushu, Yokohama and Kawasaki cities and Tokyo

metropolitan government have accumulated environmental know-how. Private industries with sophisticated environmental technologies and civil society in these cities also have substantial roles to play.

Ministry of the Environment of Japan aims to establish the partnership between cities in Asian developing countries and Japanese cities with accumulated environmental know-how, and provides these partner cities a supporting package of technologies, low carbon development strategies and capacity development programs. A large-scale implementation of JCM could promote shifting the development of Asian cities toward a sustainable path.

●How Japan Will Assist Asian Cities

Now we will take a look at specific ways of the JCM Project through examples in the waste sector and ESCO businesses.

Japanese cities have been facing waste issues for many years, but underpinned by robust waste management systems and technologies, from collection to final treatment. Experienced Japanese municipal staffs from these cities can transfer these systems and technologies to the partner cities through capacity building programs. This will then establish the rules for waste management and separation and raises residents' awareness of these rules. The 3Rs will be achieved by introducing management systems and waste separation. Japanese know-how and technology can enable appropriate waste management.

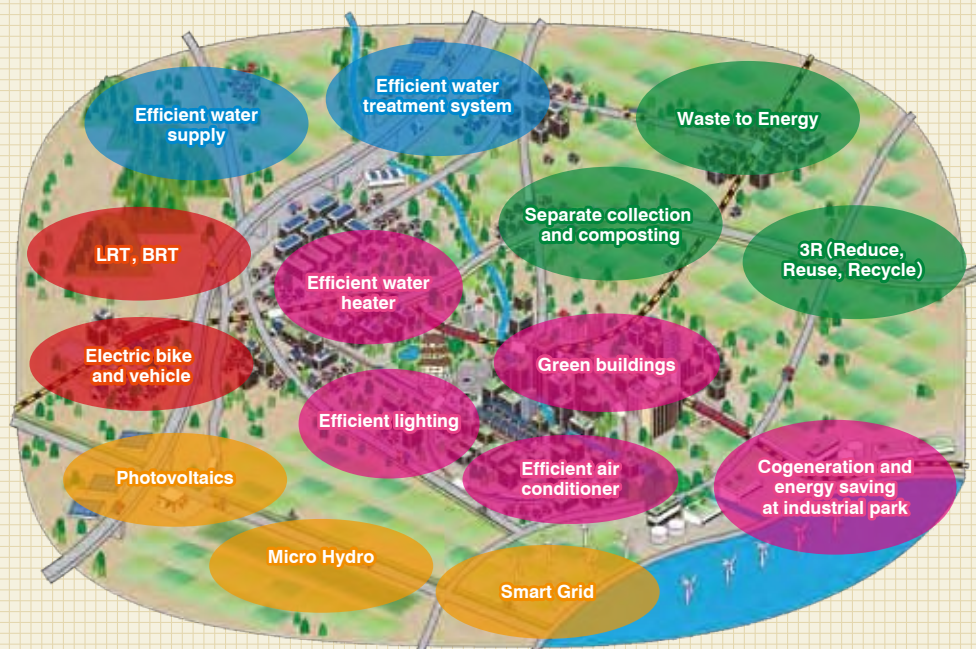


Figure 1. Vision for Environmentally Sustainable Cities

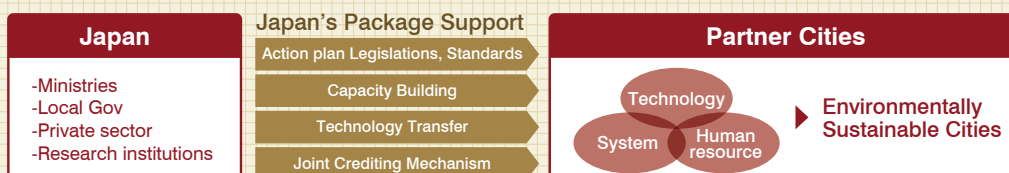


Figure 2. Comprehensive support from Japan

The Asian region currently accounts for roughly 30% of global carbon emissions, which is estimated to increase further due to the expected high economic growth in the region. Moreover, cities which emit approximately two thirds of global greenhouse gasses are simultaneously facing various different issues such as waste management, air and water pollution, water shortages, and electricity shortages. To comprehensively tackle these issues, the Ministry of the Environment of Japan will be implementing the “Project to Support the Large-Scale Formation of Joint Crediting Mechanism Programs to Realize Low Carbon Societies in Asia (hereafter referred to as the “JCM Project”) from the fiscal year of 2013.



Methane recovery from landfills is a potential technological option. Waste incinerator is another cleaner option. Japanese incinerators emit very low level of air pollutants, wastewater and residue. Many Asian cities recently started considering the introduction of incinerators due to the difficulties in finding new landfill sites and have also become interested in energy and heat recovery from incinerators to supplement growing demand for electricity. Proper management of waste will prevent health hazards for workers, make living environments sanitary, and result in a beautiful townscape.

The Energy Service Company Project (ESCO Project) is a

promising option for energy saving in many Asian countries where energy saving has not permeated. Moreover, Japanese legislations such as the Energy Saving Act and Eco Action 21 provide backing for the dissemination of energy-saving equipment. Eco Action 21 was formulated by the Ministry of the Environment of Japan for certifying and registering the process of planning, implementing, inspecting and evaluating environmental management of private or public organizations. Such instruments can raise awareness of Asian people for energy saving and give them incentive to adopt advanced Japanese technologies such as inverter and heat-pump. ESCO Projects can also promote adoption of advanced facilities for energy saving in developing countries by diminishing their initial investment cost.

●Toward Environmentally Sustainable Cities

In FY2013, the Ministry of the Environment of Japan will conduct surveys on partner countries and carry out pilot projects in a number of cities. It is also slated to begin the full-scale operation of the project starting from FY2014. Launching a large number of such projects in Asian cities will contribute to the mitigation of carbon emissions and other local environmental issues in Asian cities. This could produce carbon credits, which could be used for the achievement of the Japan's reduction target and contribute to the achievement of global target of 50% carbon reduction by 2050 as well.

What is ESCO Business?

In an ESCO business, one contractor evaluates the energy performance and retrofits and operates the energy-saving facility consistently. The cost for the contract is covered by the benefit from energy saving. By this, the users are not required to make any investment in retrofitting facilities, rather to continue conventional utility payment until the cost for the contract is met. The consistent contract accurately verifies the energy-saving results and promotes the dissemination of energy-saving technologies.

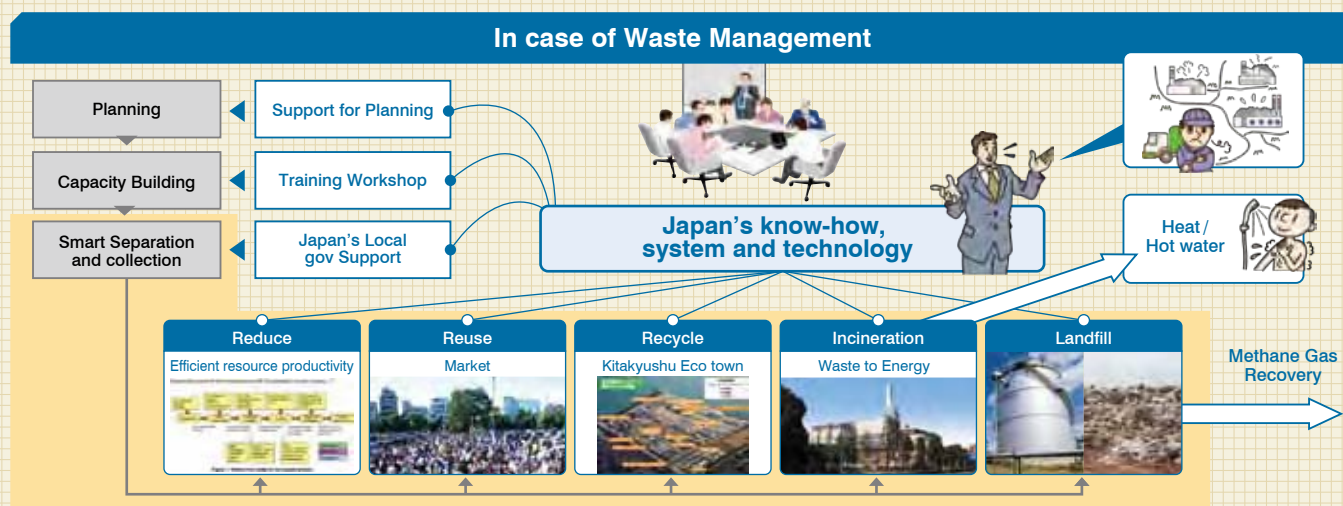


Figure 3. Examples of Japan's support for waste management

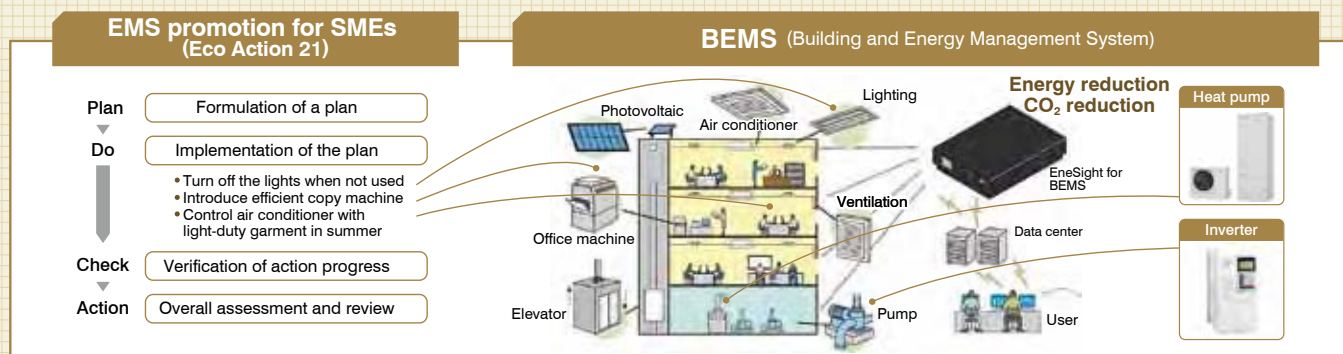


Figure 4. Example of Japan's support for ESCO Project

Bilateral Agreement for a Joint Crediting Mechanism



Signing of a Bilateral Agreement between Japan and Mongolia for a Joint Crediting Mechanism

The Japan-Mongolia Low Carbon Development Partnership, which is a bilateral agreement concerning joint crediting mechanisms between Japan and Mongolia, was signed in Ulaanbaatar, the capital of Mongolia, on January 8, 2013. The following points were specified within this bilateral agreement.

The Japanese side and the Mongolian side (hereinafter referred to as "both sides"), in order to promote investment and deployment of low carbon technologies, products, systems, services and infrastructure to achieve low carbon development in Mongolia, establish a Joint Crediting Mechanism (hereinafter referred to as the "JCM") and implement it in accordance with the relevant domestic laws and regulations in force in respective countries. Both sides establish the Joint Committee to operate the JCM.

Both sides work in close cooperation to facilitate financial, technological and capacity building support necessary for the implementation of the JCM.

Both sides mutually recognize that verified reductions or removals from the mitigation projects under the JCM can be used as a part of their own internationally pledged greenhouse gases mitigation efforts.

Both sides ensure the robust methodologies, transparency and the environmental integrity of the JCM and maintain the JCM simple and practical, to promote concrete actions for global greenhouse gases emissions reductions or removals.

Neither side uses any mitigation projects registered under the JCM for the purpose of any other international climate mitigation mechanisms to avoid double counting on greenhouse gases emission reductions or removals.



Signing ceremony for the bilateral agreement between Japan and Mongolia

Japan will provide cooperation for cutting emissions of greenhouse gases within Mongolia through its bilateral offset credit mechanism with Mongolia, while also contributing to efforts to prevent warming at the global level.

In addition, in FY2013 the Ministry of the Environment of Japan will carry out the Project to Support the Large-scale

Formation of Programs on Joint Crediting Mechanism to Realize Low Carbon Societies in Asia in order to promote the greening of Asian cities. It is currently holding intergovernmental consultations over this with the abovementioned Mongolia, as well as India, Indonesia, Vietnam, and Bangladesh.

Related events

Fourth High Level Seminar on Environmentally Sustainable Cities

March 21 – 22, 2013

Hanoi, Vietnam

<http://www.hls-esc.org/> (English)

Smart City Week 2013

SCW 2013

October 21 – 25, 2013

Pacifico Yokohama

<http://expo.nikkeibp.co.jp/scw/2012/2013plan/> (Japanese)

Clean Asia Initiative Newsletter vol.10, Edited/Published by the Institute for Global Environmental Strategies in March 2013



[Edited/Published]
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