JSWME
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NEWSLETTER

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THE JAPAN SOCIETY OF WASTE MANAGEMENT EXPERTS

Dear Waste Management Experts

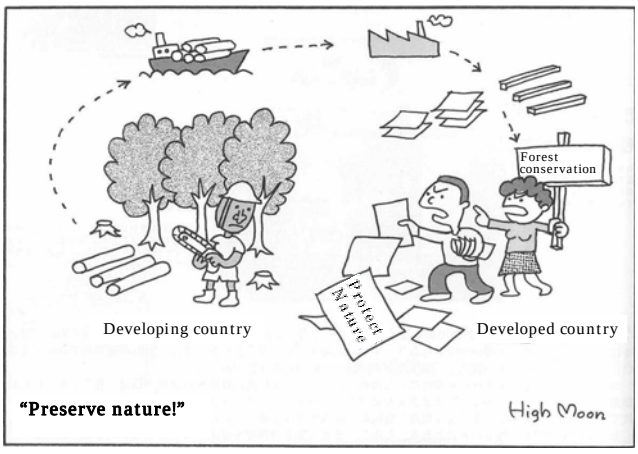
The cherry trees in full blossom have long been the symbol of the start of the new spring term in early-to-mid April for freshmen in Japan. However the bloom has moved forward two weeks or more in recent years. Could this also be a result of global warming?

The recycling system in Japan was established by a series of recycling laws over the course of a decade, but is now undergoing a change. Materials collected from the waste stream, such as used paper, metals and some plastics, are not always recycled smoothly or do not meet the specifications of the system. In addition, the price of recovered recyclables is increasing because of the rapid rise in demand overseas. In this issue, we introduce the current situation of PET bottle recycling.

Reflecting skyrocketing oil prices, the growing importance of bio-fuel has caused another global problem—the rapid increase in the price of grain. Consequently, one of the most sought-after solutions is to produce bio-fuel from waste. In this newsletter we introduce a waste wood to bio-ethanol project using fermentation technology.

Lastly, for the first time in a long while, this issue features a research and education institute related to solid waste management, where quite a few of its students come from developing countries.

(Hideo Azuma)



Comments by High Moon ;
Which one is responsibile for disappearing environmental resources?

Bio-ethanol Industry Uses Waste Wood as Raw Material for Fuel

The world's first commercial plant using waste wood to produce ethanol was completed in January 2007 in Sakai City, Osaka Prefecture. The Ministry of Environment of Japan provided assistance to establish the plant, which was constructed—and is now operated by—the company Bio Ethanol Japan Kansai. The ministry has officially recognized the plant as a business model to produce fuel on a large-scale, providing the Osaka metropolitan area with E3 automotive fuel—a gasoline blend with 3% ethanol.

Wood to Bio-ethanol plant

The annual production capacity at the plant for ethanol alone is 1,400 kiloliters (370,000 gallons). If the full amount is used to produce 3% ethanol blended gasoline (E3), it would make 47,000 kL (12.4 million gallons)—equivalent to gasoline for some 40,000 vehicles.

Bio-ethanol is a carbon neutral fuel since it does not increase carbon dioxide in the atmosphere, making it an effective countermeasure to global warming. The Kyoto Protocol Target Achievement Plan concerning transport fuel, which includes bio-ethanol, estimates that 500,000 kL (132 million gallons) of crude oil will be replaced by the introduction of biomass-derived fuel by the year 2010.

Bio-ethanol is generally made by fermenting sugars derived from sugarcane or corn into ethanol and then distilling it. However, taking food supply into

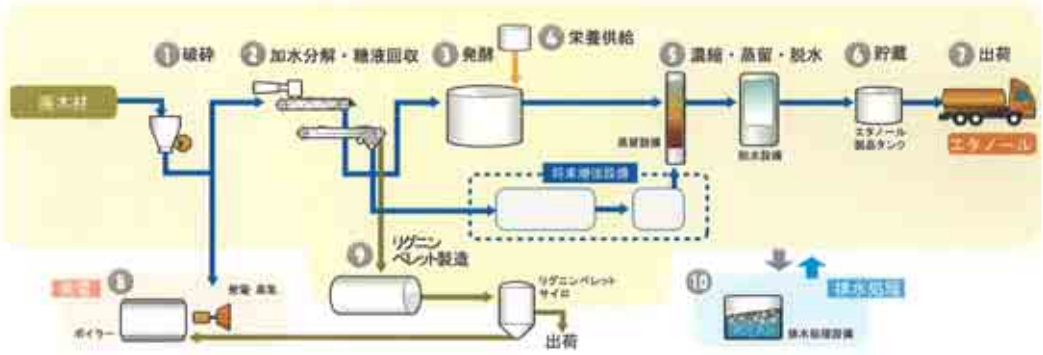
consideration, some have objected to the practice of converting grains that could be used for food and animal feed from the perspective of food supply, to converting grains that could be used for food and animal feed into fuel. Instead of using a food source such as grains, this plant uses cellulose as raw material, and furthermore, another feature is that it uses wood from five million tons of industrial waste generated every year.

Sulfuric acid is used in this process as a catalyst to recover sugar from wood through hydrolysis. Wood chips and residual wood (lignin) from the hydrolysis that are unsuitable as raw material are incinerated to recover steam or power, which is used to operate the plant. Also, the common yeast contained in the recovered sugar will not ferment, but bio-ethanol is produced using a genetically modified fungus to ferment the ethanol.

**This ethanol production technology was introduced by Marubeni Co. & Tsukishima Kikai Co., Ltd.*

Five companies—such as the construction company Taisei Corporation—financed and established the production business of Bio Ethanol Japan Kansai. This is the first project of its kind to produce bio-ethanol from waste wood, which not only contributes to the prevention of global warming, but can also be expected to play a role in recycling waste. This plant has been producing ethanol from an annual amount of 40 to 50 thousand metric tones of wood from construction waste and began shipping out ethanol, used as an additive agent for automotive fuel, since September 2007.
(http://www.bio-ethanol.co.jp/index.php)

(Seiji Kaneko)



Input: Waste Wood, Output: Ethanol
(1) Pulverizing, (2) Hydrolysis/Sugar recovery, (3) Fermentation, (4) Alimentation,
(5) Concentration/Distillation/Dehydration, (6) Storage, (7) Shipment, (8) Generation,
(9) Lignin pellet, (10) Waste water treatment

Production flow of Wood to Bio-ethanol

Shipping

The Trend of PET bottle Recycling in Japan

The law for promotion of sorted collection and recycling of containers and packaging was enacted in 1995, and came into force in 1997. At that time, many municipalities had started recycling used PET bottles, plastics and paper packaging waste to promote recycling as a measure to solve the problem of waste treatment. These recycling activities, however, resulted in an increased financial burden on municipalities, who in turn called on the central government to introduce the concept of extended producer responsibility (EPR) for these materials. At that time, Germany and France had already established packaging waste recycling laws based on EPR policy. Initiatives in these countries influenced Japan to enact the above mentioned Law. In the decade since the law was enacted, the law has led to an enormous achievement of packaging waste recycling. Nonetheless, the law was amended in June 2006 to cope with certain issues. One of the most serious issues concerning the law was the fact that a large amount of PET bottles that had been collected were exported mostly to China outside of the framework of the law, which states that:

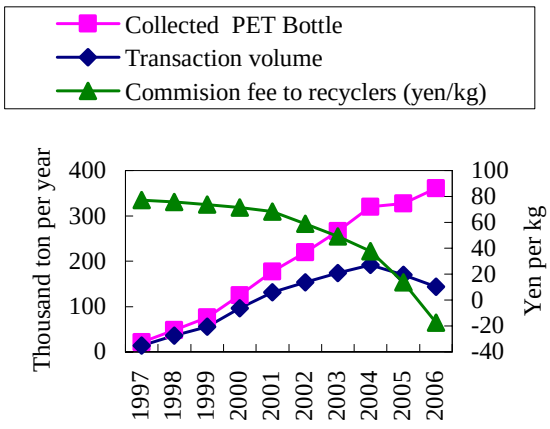
- *Municipalities have the responsibility of collection and segregation of each packaging material using its own budget, of obtaining the minimum quality*

required for recycling, and of providing sorted packaging to a body designated by the law (hereafter, "designated body") for recycling.

- *The specified manufactures and distributors have the responsibility to take back sorted packaging from municipalities and recycling them.*
- *The specified manufactures and distributors can delegate their own duty and action to the designated body. The Japan Containers and Packaging Recycling Association was appointed as the designated body according to the Law.*
- *The designated body deals with bidding sorted packaging of municipalities to commission a recycler.*

The amount of production and recycling of PET bottles in FY1997 was 219 thousand tons and 21 thousand tons respectively, which accounts for a 9.7% recycling ratio. In FY2006, this figure increased to 544 thousand tons and 361 thousand tons respectively; a recycling ratio of 66.3%.

Recently, the market environment of PET bottle recycling has changed dramatically due to rapid economic growth of China. Buyers from China pay a good price to import sorted PET bottles to China. This has lead to a dramatic decrease in the commission fee of the designated body since many municipalities have started to sell PET bottles to recycling brokers instead of using the recycling route involving the designated body.



Result of PET bottle Recycling

According to a report of the Council for PET Bottle Recycling, the exported PET bottle residue was 225 thousand tons in 2006, which accounts for 40% of the total amount of production. The figure on the left shows the commission fee and the amount dealt with by the designated body. A commission fee of 77 yen per kg at the beginning changed to minus 17 yen per kg in FY2006 and subsequently reached minus 39 yen per kg in FY2007. A negative fee means that the designated body can receive revenue through commission bidding. An amendment to the law made it possible for the designated body to pay a revenue of 2.1 billion yen back to the municipalities.

The amount of recycling of sorted PET bottles dealt with by the designated body was 106 thousand tons in FY2006. Usage of recycled bottles is 52% for textiles and 39% for plastic sheeting. The expectation of "bottle to bottle" recycling is on the rise, but it still only has a ratio of 6%.

There are 72 registered PET bottle recyclers in 2007, and out of these 72 recyclers, two of them deal with producing polyester from sorted PET bottle. These recyclers invested in recycling plants on the assumption that a high commission fee would be sustained for several years. They are now suffering from low profitability due to a change in the market environment. The most important lesson learned though this event might be that the recycle business is a high-risk business affected by change in both the business environment and conditions.

Reference: The Council for PET Bottle Recycling
(http://www.petbottle-rec.gr.jp/top.html)

(Masato Ohno)

KITAWAKI LABORATORY, Faculty of Regional Development Studies of Toyo University

The Faculty of Regional Development Studies of Toyo University has a number of researchers with various backgrounds such as sanitary engineering, economics, sociology, and anthropology. Such diversified faculty structure makes it possible to realize a unique mission to solve complicated environmental problems in developing countries through a multi-disciplinary approach. As such, the research policy in my laboratory is to scrutinize environmental issues from various standpoints, such as the above-mentioned academic fields.

Kitawaki Laboratory's research topics cover environmental management including solid waste management, water supply and sanitation in developing countries in Asia, Africa and Latin America. Some examples of research topics include "Evaluation of solid waste management in intermediate cities in Viet Nam", "Recycling industry in China", "Mitigation of arsenic contamination in Bangladesh" and "Promotion of agricultural wastewater reuse in Iraq".

The most important policy of the laboratory is to carry out realistic research projects which are able to contribute to international cooperation both academically and practically. Because of this principle, much emphasis is placed on the idea of "Appropriate Technology" which could enhance sustainability of projects in developing countries. For example, many facts concerning indigenous knowledge have been discovered through field research, and they are sublimated to a practical theory through scientific analysis. To offer two examples,

one is "monitoring of arsenic removal from groundwater using guava leaves" and another is the "compost producing landfill method".

The laboratory has 10 graduate students and 40 undergraduate seminar students. At the graduate level, most of the students are from developing countries including Cambodia, Iraq, and China. So far, students from 6 countries carried out their research in more than 20 countries. In addition to foreign students, the laboratory has some Japanese students who are working and attend the evening course. In the daytime, they are involved in international cooperation through ODA or NGO activities. Some of these working students have experience as assignees in the Japan Overseas Cooperation Volunteers program.

The students, both at the graduate and undergraduate levels, show enthusiasm to carry out field surveys in developing countries. More than 200 students in my faculty visit foreign countries annually, and many of them are from my laboratory. Even undergraduate students have stayed in urban slum areas or rural areas in developing countries to prepare their thesis. Our research counterparts are Japanese/local NGOs and universities. Summer vacation is a high time for students to visit the field and collect data through field surveys which includes conducting interviews, water quality analysis, map preparation and so forth.

In addition to academic research, the laboratory has been involved in many activities related to international cooperation in water supply, sanitation and solid waste management. For example, since Kitawaki Laboratory was founded in 1997, it has continuously given technical advice for ODA grant aid projects, development study projects and others. The recipient countries of such projects include more than twenty countries in Asia, Central America and Africa. As for the contribution to academic societies, my laboratory acts as the secretariat for the Research Group of International Environmental Cooperation of the Japan Society of International Development. The society regularly issues a series of newsletters which include reports of the laboratory's overseas activities. Everyone in Kitawaki Laboratory sincerely wishes to help developing countries continuously through the activities outlined above.

(http://frds.itakura.toyo.ac.jp/~kitawaki/)

(Hidetoshi Kitawaki)

Photo Exhibition Booth of Kitawaki Laboratory at the 2006 Environmental Exhibition at Tokyo Big Site

Journal of the Japan Society of Waste Management Experts, Vol. 19, No.2 (March 2008)

Recent issues of the Journal of JSWME contain the following articles. The articles are written in Japanese with the abstract in English.

Paper

Restraint of Rainwater Infiltration within a Landfill Site Capping Layer Using Geosynthetics for Drainage
Toshimasa Ishibashi, Teppey Komiya, Hirotumi Nakayama and Takayuki Shimaoka

LCA on Regional Management Systems for Household Waste with an Analysis of Practical Social Conditions
Yuhong Liu and Kayoko Kondo

Estimation of Reduced Expenses for Final Disposal and Potential Restoration Costs Associated with the Categorization of Inert Waste Landfills
Daisuke Tsuchida, Hirofumi Nakayama and Takayuki Shimaoka

Behavior and Origins of Insoluble Chlorine Compounds in Landfilled MSW Incinerator Residues
Jiro Etoh, Shinya Tsuru, Shogo Sakita, Ruina Zhang and Takayuki Shimaoka

Questionnaire Survey on the Effects of Installing Automatic-turning Composting Facilities and Biogasification Facilities for Treating Cattle Excreta in Hokkaido
Noboru Tanikawa, Toru Furuichi, Kazuei Ishii and Shinta Shimizu

Note

Silicon Content in Livestock Manure Compost and a Simple Estimation Method for it
Noriko Kobayashi, Mikio Morioka, Teppai Komiyama, Toyoaki Ito and Masahiko Saigusa

Feasibility of Easy-to-Recycle Vehicles: A Design Analysis of Vehicle Recycling
Kenichi Togawa and Mami Kimura

Waste Management Research Vol. 19, No.2 (March 2008)

Preface

From Life Time Maximum Income Oriented Society to Energy / Material consumption Minimum Society
Norihito Tanbo

Special Issues: Long-term Comprehensive Operation of Waste Treatment Facilities

Construction and Management of Waste Disposal Facility by Blanket Private Trust

Yasuhiko Wada
Present Status and Issues Surrounding Operation and Maintenance of General Waste Treatment Facilities
Hideaki Fujiyoshi and Shuji fujiwara
Prospects of Long-term Comprehensive Operation of General Waste Disposal and Treatment Facilities
Hidetaka Kurihara
Utilizing Long-term Responsible Outsourcing: Examining the Business Side
Katsuhiro Soejima
The Reality of Long-term Comprehensive Operation Contracts for Waste Treatment Facilities
Kazuhiko yoshioka
Long-term Conclusive Operation and Management at the Municipal Government Level: A Case Study of Kakogawa New Clean Center
Norio Kagawa

Journal of Material Cycles and Waste Management
Volume 10, Number 1, 2008

SPECIAL FEATURE: The 4th International Conference on Combustion, Incineration/ Pyrolysis and Emission Control (4th i-CIPEC)

ORIGINAL ARTICLES
Enhancement of turbulent scalar mixing and its application by a multihole nozzle in selective catalytic reduction of NOx
H. S. Choi, S. J. Kim, K. T. Kim
Leaching Behavior of heavy metals from municipal solid waste incineration bottom ash and its geochemical modeling
H. Zhang, P.-J.He, L.-M. Shao, X.-J. Li
Lead Immobilization in mechanochemical fly ash recycling
Y. Nomura, K. Fujiwara, M. Takada, S. Nakai, M. Hosomi
Volatilization behavior of lead from molten slag under conditions simulation municipal solid waste melting
H. Nakada, N. Mihara, Y. Kawaguchi, S. Osada, D. Kuchar, H. Matsuda
An ultracompact photo-ionization time-of-flight mass spectrometer with a novel vacuum ultraviolet light source for on-line detection of organic trace compounds and as a detector for gas chromatography
R. Zimmermann, F. Muhlberger, K. Fuhrer, M. Gonin, W. Welthagen
Verification results of jet resonance-enhanced multiphoton ionization as a real-time PCDD/F emission monitor
B. Gullett, L. Oudejans, A. Touatl, S. Ryan, D. Tabor
Environmental Technology Verification (ETV) test of dioxin emission monitors
C. W. Lee, D. G. Tabor, K. A. Cowen

ORIGINAL ARTICLES
Evaluation of operation parameters in thermophilic acid fermentation of kitchen waste
Y.-J. Park, H. Tsuno, T. Hidaka, J.-H. Cheon
Effect of $ZnCl_2$ impregnation ratio on pore structure of activated carbons prepared from cattle manure compost: application of N_2 adsorption-desorption isotherms
Q. Qian, M. Machida, M. Aikawa, H. Tatsumoto
Application of the WAMED model to landfilling
V. Moutavtchi, J. Stenis, W. Hogland, A. Shepeleva, H. Andersson
Simplified heating time calculation using the Schmidt graphical method for PCB-contaminated capacitors undergoing the vacuum thermal recycling process
S. Saitoh, A. Melber, H. Ohbayashi, S. Nakai, M. Matsuoka, M. Hosomi
Characterization of only sludge from a wastewater treatment plant flocculation-flotation unit in a petroleum refinery and its treatment implications
M. Kriipsalu, M. Marques, A. Maastik
Concentrations of heavy metals in fly ash from a coal-fired power plant with respect to the new Finnish limit values
O. Dahl, R. Poykio, H. Nurmesniemi

Current Members of JSWME as of March 31, 2008
(The figures in parenthesis indicate the difference from November 30, 2007)

Regular Members	2,953	(-162)
Students	259	(-78)
Non-Japanese Member	19	(-7)
Public Institutions	99	(-6)
Supporting Members	142	(-9)
Individuals of NPOs	5	(-1)
Total	3,477	(-263)

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