



Feature Column

Future Outlook of Resource Recycling Industry

The EPA has drawn up five major plans to drive the development of the recycling industry and fully attain the goal of "zero waste." The plans address problems faced by each particular industry and include measures to solve these problems and provide assistance. Specific initiatives to facilitate the development of recycling-related industries include opening up import channels for mandatory recyclables, managing excavated earth and materials leftover from construction projects and promoting food waste recycling.

Transcending the prior focus on "proper disposal," waste management in the international arena has adopted the concept of "zero waste." The aim is to cycle and make the best use of all resources through green production, green

consumption, source reductions, and resource recycling and reuse, to eventually create systems that produce little to no waste at all. To facilitate the development of the domestic recycling industry, the EPA has implemented the "Plan to Assist the Resource Recycling Service Industry," which is directed toward the following five areas: "Recycling and Reuse of Mandatory Recyclables," "Recycling and Reuse of General Waste and Food Waste," "Recycling and Reuse of Bulk Waste," "Plan to Reuse Excavated Earth and Mixed Materials from Construction Sites," and the "Environmental Science and Technology

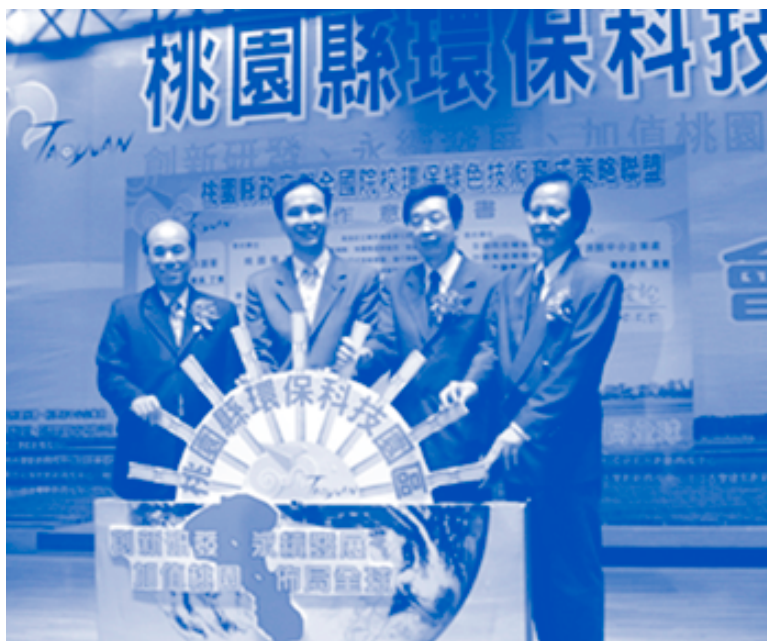
Park Promotion Plan."

Five Plans to Promote Resource Recycling

Looking at the current status of domestic recycling operations, in the area of general waste, the EPA has already announced 31 types of "mandatory recyclables" in 14 categories. Although recycling and management channels are already fully established, there is still room for further development. As for food waste recycling, the EPA now actively promotes the sorting and recycling of food waste

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EPA Acting Minister Tsay Ting-kuei (蔡丁貴, first left) and Taoyuan County Commissioner Chu Li-lun (朱立倫, second left) invite firms to establish operations in the Taoyuan ESTP.

and has worked to establish end-use channels for food waste. The EPA has already drawn up plans to encourage private investment in the construction of economically viable large-scale composting facilities. For large waste items such as furniture, the EPA has actively promoted the reduction and recycling of such bulk waste in recent years. In terms of industrial waste, the future focus will be on plans to reuse excavated earth and mixed construction materials from construction projects.

The EPA has established four Environmental Science and Technology Parks (ESTPs) to promote the reuse and recycling of renewable resources. The parks encourage research, innovation and development of technology by domestic environmental industries via integration of industry cycles, promotion of clean technology and enhancement of reuse technology. Advanced technology, industries and R&D organizations are being introduced into these parks to promote cycling and full utilization of all materials.

As for progress in general waste management, EPA statistics on annual garbage collection show negative growth of total garbage volume since 1998. The 2004 total volume of 16,080 tonnes of garbage collected per day was only 66% of the total in 1997 (24,331 tonnes/day). The average volume of daily per capita garbage generation has indeed seen a noticeable reduction (for details, please see article, "Record Low of 0.709 kg of Garbage Per Person Per Day" in this EPM). In 2004, already 98.92% of waste was handled through appropriate management channels, and 73.49% of all non-recycled waste was incinerated. The Environmental Science and

Technology Park Promotion Plan, slated to last until 2011 with a budget of over NT\$6.2 billion, was ratified by the Executive Yuan on 9 September 2002, and further revised on 11 March 2004. Four ESTPs have already been set up in Hualien County (Fenglin Development Zone, 22.01 hectares), Kaohsiung County (Benjhou Industrial Park, 40.11 hectares), Taoyuan County (Taoyuan Science-Based Industrial Park, 31.15 hectares), and Tainan County (Greater Sinying Industrial Park, 30 hectares), for a total of 123 hectares. The parks are expected to attract close to NT\$13.5 billion in private investment and generate a total production value of over NT\$15.5 billion per year. The parks will also employ and directly benefit 2,250 people.

search buildings, laboratories and factories, and supporting facilities. Construction of these new facilities is slated to begin in September.

Urgent Need for Complete Measures to Import Waste and Reuse Excavated Earth

Efforts to promote the recycling industry have recently come to a bottleneck. Firstly, this is because the maximum treatment capacity of domestic waste management plants for mandatory recycled waste is far greater than the current amount of resources recycled. However in former years the government has continually adopted strict restrictions on import of scrap metals and ships because of their associated pollution problems. Moreover, a lack of assistance measures in the past prevented treatment plants from working at full

Efforts to promote the recycling industry have recently come to a bottleneck. Firstly, this is because the maximum treatment capacity of domestic waste management plants for mandatory recycled waste is far greater than the current amount of resources recycled.

In terms of progress to date, the Kaohsiung ESTP was the quickest to establish and already 11 firms, mainly resource recycling industries, have entered the park. The Hualien ESTP received its permit to begin construction on 18 February 2005. A contract has already been drawn up with a construction company, which is currently engaged in overall plans and coordination. The park will soon begin seeking firms to set up operations. Bidding for construction contractors is about to begin for the Taoyuan ESTP and construction is slated for September this year. The Tainan ESTP is at the stage of selecting engineering supervisory firms and architects to manage and re-

efficiency. This created competition among treatment plants for material sources and complicated management for these industries.

The second reason for this bottleneck lies in source management of excavated earth and assorted materials from construction projects. Currently, the Construction and Planning Agency, Ministry of the Interior, only regulates management of public engineering, buildings and demolition works, and thus there are no regulations for materials leftover from interior design and maintenance construction. The Construction and Planning Agency has already established diverse processing plants for sorting and handling excavated earth. However, most of this is used in mounds or as backfill, and there is

still room for increasing the reuse of excavated earth.

The sorting of excavated earth still poses a fundamental problem. Currently, firms with facilities for stockpiling earth, sand and stone help manage excavated earth and mixed materials from construction to some extent. However, it is difficult to obtain land for establishing such facilities in densely populated northern Taiwan, and sand and stone stockpile facilities can handle only a certain percentage of management work. The Construction and Planning Agency still needs to expand and guide the nation's earth resource management industry, and build the nation's capacity to sort and treat excavated earth and mixed construction materials.

Regulations and Assistance Measures to Help Recycling Firms

As for mandatory recyclables, the EPA continues to increase recycling rates through promotion of the Compulsory Garbage Sorting Policy. The EPA also evaluates which materials have reuse or recycling value and can be feasibly included under the scope of mandatory recyclables. Another part of the EPA's work in this area is to evaluate the feasibility of opening up import channels to mandatory recyclables and general industrial waste for the benefit of industrial development. Before adding new types of materials to the list of mandatory recyclable waste, each material is first evaluated in terms of the following six criteria: amount generated, environmental pollution, consumer compliance, market value, technical feasibility and policy implementation.

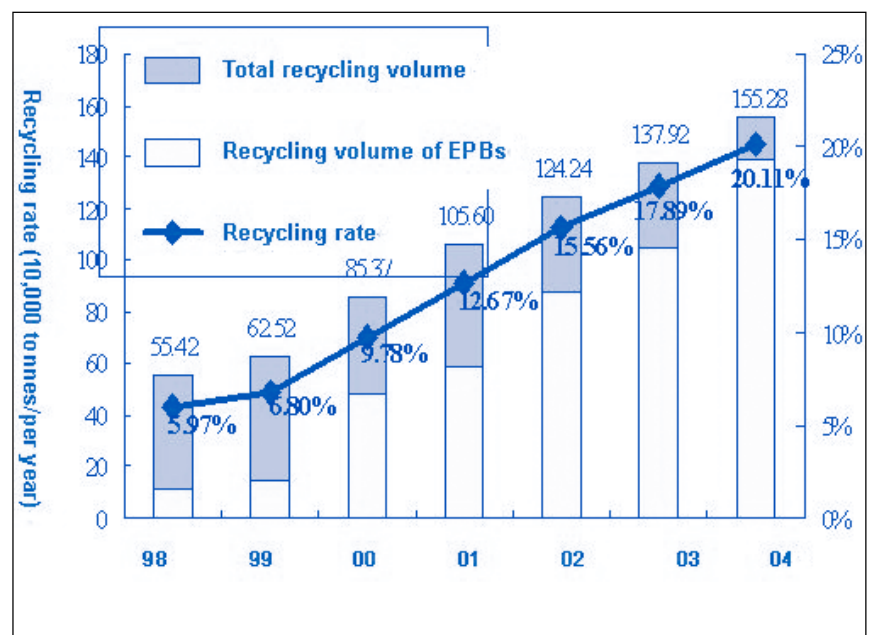
The EPA is currently evaluating the feasibility of opening up channels to import mandatory recyclable waste. Currently no regulations exist to control the import of materials deemed by Taiwan as

mandatory recyclables. This means that companies recycling such waste only have access to the limited amount of waste generated in Taiwan, resulting in infrequent use of machinery and difficulties in maintaining operations. To address this limitation, the EPA is developing regulations on the import of mandatory recyclable waste that will allow more efficient use of existing recycling equipment. In determining eligibility for import, each material will be evaluated based on type of containers, grade of materials, the current status of domestic recycling plants, technology, volume of recyclables available, and the market for secondary material.

Before opening up import channels, the EPA first needs to establish a complete set of measures including import examination and certification procedures and post-import tracking of materials. Domestic volume, processing capacity of domestic materials, and the market for processing such materials should be considered when determining the total volume of imported materials. Other prerequisites include evaluating domestic ability to use such materials after treatment to prevent second-

ary pollution from imported mandatory recyclables. Comprehensive measures should also be added to the existing inspection and certification system. As recycling, clearance and disposal fees are not collected at the upstream end of imported mandatory recyclable waste, recycling plants should process domestic recyclables separately from imported materials to avoid negative impacts to the operation of the national recycling fund.

As for excavated earth and mixed materials from construction projects, the EPA recommends such materials should first be properly sorted and then channeled into the recycling system. Most excavated earth is currently used in mounding or as backfill, and there is little economic incentive in its reuse. Another drawback is that related industries often run into problems obtaining land for recycling facilities. The Construction and Planning Agency, Ministry of the Interior, has been requested to help solve this problem by encouraging investment from industries genuinely interested in reusing excavated earth and mixed materials from construction projects.



Resource recycling rate over the years

Regarding food waste, which comprises 20~30% of general household waste volume, the primary reuse channel currently being promoted is composting. From 2001, the EPA has provided subsidies to local governments for promoting food waste recycling. Already 21 small-scale food waste recycling facilities had been assisted by June 2004. However, these facilities can only process 2~10 tonnes of food waste per day. Such facilities lack modern equipment and are unable to reach an economically profitable scale. The end product often falls short

of the standard for compost products and can only be used by the government or given to citizens. With little value as a commercial product, subsidization is worthwhile only in the interest of promoting the transition process. The EPA still needs to provide guidance in the composting of food waste so that it can be done on a more economical scale, for instance over 100 tonnes per day. Modern equipment should be introduced, and the industry should be able to reach a level of self-sufficiency.

(recyclables), food waste, and general waste. Through further source reductions and sorting of waste, it is anticipated that this year's resource and food waste recycling rates will be even higher. Striving for pathways to sustainable development, the EPA will continue to promote garbage reduction and resource recycling and eventually close the loops in the flow of material resources so that eventually waste is a thing of the past.

Waste disposal facilities are often called NIMBY ("not in my backyard") facilities because the majority of the public is unwilling to accept proposals to build such facilities near their living environment. The EPA has been carrying out a series of innovative actions to establish a new image for environmental facilities, for example, ongoing greening and restoration works at closed landfills. The EPA is continually working on strategies to increase the utilization of such facilities and let them contribute to a friendlier living environment for nearby residents and for society at large.

Waste Management

Record Low of 0.71 kg of Garbage Per Person Per Day

Taiwan is getting closer to fulfilling "zero waste" goals, after a year of active promotion by the EPA. The national recycling rate increased 2.24% in 2004 compared to 2003, with a total garbage clearance volume of 5,862,900 tonnes. The daily per capita garbage clearance volume dropped to 0.71 kg, marking a record low since the EPA was established in 1987.

After a year of promoting the "Complete Sorting for Zero Waste," a total of 1,552,800 tonnes of resources were recycled in 2004, with a recycling rate of 20.13%, marking a 2.24 percentage point increase over the 2003 rate of 17.89%. A total of 299,300 tonnes of food waste was recycled for a recycling rate of 3.88%, marking a 1.69 percentage point increase compared to the 2003 rate of 2.19%. The nation successfully reduced waste generation by 24.01%.

EPA statistics indicate a garbage clearance volume of 5,862,900 tonnes in 2004, approximately 297,400 tonnes (4.83%) less than the 6,160,300 tonnes of garbage collected in 2003. The national daily per capita garbage clearance volume dropped to 0.71 kg, marking a record low since the

establishment of the EPA in 1987, and attesting to the effectiveness of the EPA's efforts to promote the "Complete Sorting for Zero Waste" policy.

The EPA indicates that the rate of appropriately handled garbage has increased to 98.92%. Pipe-end treatment after waste reduction has already shifted from landfilling to incineration and currently 73.49% of non-recycled waste is incinerated, while 26.22% is landfilled.

The EPA further indicated that overall performance of waste clearance and disposal was good in 2004. The second stage of the Compulsory Garbage Sorting Policy went into effect on 1 January 2005. Enforcement methods are used to make sure citizens sort their garbage into the three categories of resource waste

News Brief

New Website Provides Info on Microbial Agents

As the age of biotechnology approaches, many people have only a half-understanding of what microorganisms are. To stay abreast of the potential effects of environmental agents containing microorganisms, the EPA has established a complete searchable database on microorganisms in Chinese. Interested individuals are invited to explore this database online at <http://ivy2.epa.gov.tw/microbe/search/index.htm>. The EPA has established information on 1,058 microorganisms in the database system, making it easy for users to find basic characteristics and safety information through the website's search engine.

General Policy

Tsay Ting-kuei Fills in for Former EPA Minister Chang

Former EPA Minister Chang Juu-en left the EPA at the end of April and returned to National Cheng Kung University to continue teaching in the Department of Environmental Engineering. The vacancy has been temporarily filled by former EPA Deputy Minister Tsay Ting-kuei.

Former EPA Minister Chang Juu-en (張祖恩) had his resignation approved by the Executive Yuan on 20 April 2005 and left office on April 25. Chang emphasizes that he left the post because the time limit of his four-year granted absence from National Cheng Kung University had been reached. Chang will resume teaching in the Department of Environmental Engineering at NCKU. The vacant post is temporarily being filled by former Deputy Minister Tsay Ting-kuei (蔡丁貴).

Former Minister Chang stated that he made a spoken request to the Executive Yuan for permission to resign just after the Tomb Sweeping Day holiday (April 5). Despite Premier Hsieh's repeated attempts to persuade him to stay, in consideration of the maximum period of absence away from the university, Chang made another spoken request on April 20, which was finally granted.

Chang expressed his yearning to return to National Cheng Kung University and his calling as a professor to serve the society through teaching and research. Chang stated that no matter whether working at administrative or academic careers, his basic notions and support of environmental protection will never change.

After the Executive Yuan granted his resignation, Chang engaged in dialogue with dozens of environmental NGOs for the last time in his capacity as EPA Minister on April 21 during a series of Earth Day events. Chang emphasized

that whoever fills the next post for Minister should continue through with existing environmental policies. Environmental NGOs expressed their hopes for the next minister to spread environmental concepts more extensively. Chang indicated regret that the compulsory garbage sorting policy was not as successful as he wished during his turn in office, and hopes citizens can cooperate more with this policy in the future.

Chang stepped into office on 20 October 2003, leaving his original post as deputy minister to fill in the post of resigned EPA Minister Hao Lung-bin (郝龍斌). Originally vice dean of the College of Engineering, National Cheng Kung University, Chang was temporarily transferred to serve in the EPA in 2001. Now nearly a year and a half after serving as minister, the deadline for his four-year term of leave from the university was April 25.

Newly appointed Acting Minister Tsay Ting-kuei formerly taught in the College of Engineering at National Taiwan University, specializing in hydrodynamics, groundwater hydraulics, computational hydraulics, and coastal engineering. Before he became EPA Deputy Minister on 20 May 2004, Tsay was vice chairman of the Research, Development and Evaluation Commission, Executive Yuan.

General Policy

Building International Cooperation in Energy and Environment

After one year of hard work, the EPA earned sponsorship rights to hold an international conference with the Energy Technology Systems Analysis Programme (ETSAP) in early April. Especially significant for Taiwan was the record high attendance at the conference, with participation by over 50 specialists from more than 30 countries.

The EPA and the Energy Technology Systems Analysis Programme (ETSAP) jointly hosted an international technical conference on Global and Regional Energy Modeling in Taipei at the Grand Hotel from 4~7 April 2005. Around 50 specialists representing over 30 nations in Europe, the Americas and Asia convened to discuss the development of energy technology and greenhouse gas reduction strategies.

After over a year of preparations and with the assistance of international friends, the EPA successfully earned the right to host this ETSAP conference in Taiwan. This is the first time for this conference to be held in Taiwan. A record number of participants and nations attended, holding special significance for Taiwan.

The Energy Technology Systems Analysis Programme was established by the International Energy Agency in 1976 in response to the budding global energy crisis. The programme draws on global cooperation to analyze the interconnection between energy, environmental and economic issues through

energy engineering models. ETSAP conferences have been held worldwide for nearly 30 consecutive years.

During the opening ceremony, Executive Yuan Vice Premier Wu Rong-I (吳榮義) remarked that although Taiwan is not a signatory nation to the *Kyoto Protocol*—an agreement implemented on 16 February 2005 to control global climate change and greenhouse gas emissions—Taiwan is nonetheless actively implementing greenhouse gas emission reductions. Win-win solutions for both the environment and the economy are being adopted as Taiwan pursues sustainable development. Vice Premier Wu voiced strong hopes for this conference to build Taiwan's capacity to evaluate greenhouse gas reduction strategies.

Hosting the occasion, former EPA Minister Chang Juu-en (張祖恩) welcomed the international guests to Taiwan and expressed his hope for this four-day meeting of experts to make exceptional academic contributions in the field of energy technology. During the conference, the EPA arranged for the international guests to visit the Hsinchu Science-Based Industrial Park to get a first hand look at the development of Taiwan's high-tech industry.

Former Minister Chang noted the attendance of foreign experts from a wide range of fields including international financial investment and renewable energy development technology. The EPA also took advantage of this rare opportunity to arrange for foreign experts to engage in discussion with domestic counterparts in the interest of incorporating international experience into domestic policy and practice.

Air Quality

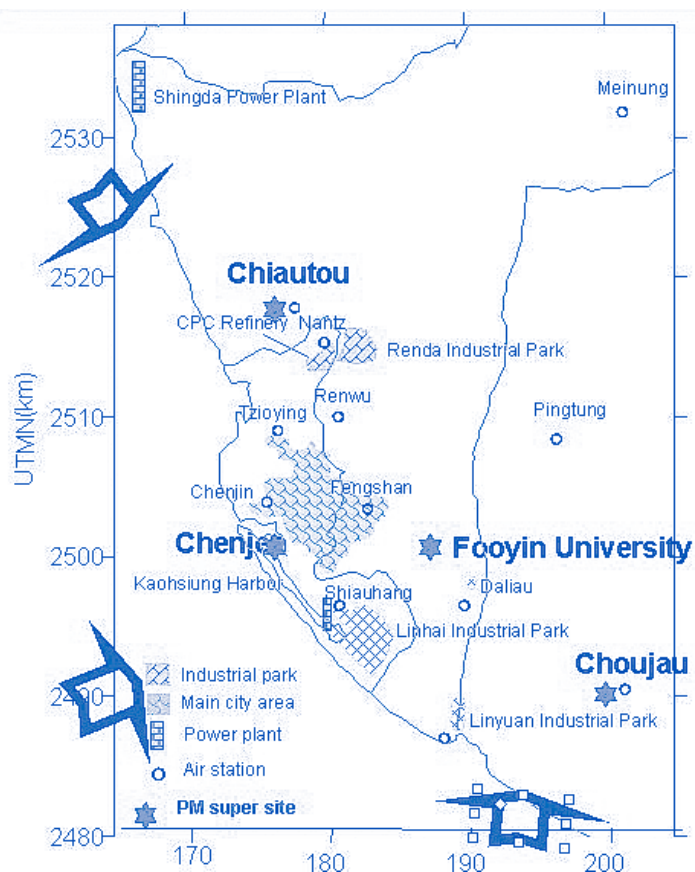
Southern PM Supersite Commences Operations

Taiwan's second particulate matter monitoring Supersite began operations in late April. This Supersite is designed to enhance Taiwan's ability to monitor air quality and analyze time-space distribution of air pollutants. Located in southern Taiwan, the new station will help monitor the characteristics of suspended particulate matter and facilitate air quality improvement initiatives in the Kaoping region.

The EPA has completed construction of the southern particulate matter (PM) monitoring Supersite and commenced operations at the core station at Fooyin University in Daliao Township, Kaohsiung County on 19 April 2005. Former EPA Minister Chang Juu-en (張祖恩), Kaohsiung County Deputy Chief Wu Yu-wen (吳裕文), and Fooyin University founder Jhang Peng-tu (張鵬圖) presided over the ribbon-cutting ceremony. The Supersite will complement existing regular air quality monitoring stations to enhance the time-space analysis functions of air quality

monitoring in the Kaoping region (Kaohsiung County, Kaohsiung City and Pingtung County) and to stay abreast of air quality in the region.

The EPA indicated that the southern Supersite consists of a central core monitoring station and three auxiliary satellite stations located in Daliao Township (大寮鄉), Kaohsiung County; Cianjhen District (前鎮區), Kaohsiung City; Ciaotou Township (橋頭鄉), Kaohsiung County; and Chaozhou Township (潮州鎮), Pingtung County. The locations of the



Southern Supersite distribution data map.

Supersite stations were decided primarily based on concentration of air pollutants and wind field characteristics. This thorough monitoring network is designed to closely monitor major suspended PM air pollutants in southern Taiwan, and is expected to help stay abreast of air quality and pollution sources in the Kaoping region.

In light of the effect of PM on Taiwan's air quality, Taiwan introduced the U.S. concept of establishing a PM Supersite system, which uses high precision instruments and monitoring technology to analyze the composition, and physical and chemical properties of suspended PM. The EPA installed Taiwan's first Supersite in Sinjhuang (新莊), Taipei County in 2001, which was the first Supersite in Asia. In operation for over three years now, this Supersite has already established ample ground-work data on the physical and chemical properties of PM in densely urbanized northern Taiwan. Due to higher PM concentrations in southern Taiwan, the properties of pollution in the Kaoping region are different than those of pollution in the Greater Taipei Area. The EPA thus began plans to establish a PM Supersite in southern Taiwan in 2003.

Among the precision research-grade instruments employed at the Supersite include nanoparticle monitoring equipment that can detect concentrations and distribution of microscopic PM, spectrometers, as well as instruments for measuring hydrogen peroxide, total nitrogen oxides (NO_x), ammonia, aerosol carbon composition, sulfates, nitrates, scattering coefficients, and black carbon concentration (absorptivity).

Monitoring results of the southern PM monitoring Supersite will be regularly posted on the Internet in the future for all interested parties to use and learn from. In consider-

ation of the research needs of academic research organizations, extra room has been set aside for

the future installation of research equipment so as to maximize the benefits of monitoring work.

Toxic Substance Management

Taiwan Attends Stockholm Convention COP1

To stay abreast of international trends in controlling persistent organic pollutants (POPs), a delegation made up of representatives from the EPA and ITRI's Center for Environmental, Safety and Health Technology Development participated as an NGO in the first convention of the parties (COP1) to the Stockholm Convention. Major themes discussed included assessment of continued use of DDT for pest control, the formation of a POPs monitoring system, and the establishment of a POPs assessment committee.

The first convention of the parties (COP1) to the Stockholm Convention on Persistent Organic Pollutants was convened in Punta del Este, Uruguay from 2~6 May 2005. Representatives from the EPA and the Industrial Technology Research Institute's Center for Environmental, Safety and Health Technology Development formed a delegation to fully participate in the convention as an NGO. The delegation brought back to Taiwan a better understanding of the international control trends toward POPs, which will serve as a valuable reference for domestic implementation of related controls.

POPs control work has become one of the most popular environmental issues in the 21st Century. The Stockholm Convention took effect on 17 May 2004 and currently has 98 participating signatory nations including Canada, Germany, Japan, France and the European Union. The main topics of discussion during this COP1 included evaluation of continued use of DDT for pest control, the formation of a POPs monitoring system, and the establishment of a POPs assessment committee. Among other issues discussed

included the development of guidelines for assisting signatory nations to halt production or emission of POPs such as furans and dioxins, and the formulation of guidelines for best available technology or best environmental practices.

The Stockholm Convention currently extends controls over 12 chemical substances, all of which have long been under strict control or banned in Taiwan. Among the 12, Mirex (an ant poison) is subject to controls under the *Pesticide Control Act* (農藥管理法) and has not been approved for use. Furans and dioxins are classified as products of industrial manufacture or incineration processes and are regulated by the *Pollution Control Act* (污染防制法). As for DDT and the remaining eight "dirty dozen," including organochlorine pesticides and polychlorinated biphenyl (PCBs), all have been announced as toxic chemical substances in the *Toxic Chemical Substances Control Act* (毒性化學物質管理法) from 1988 to 2001, and their use is strictly prohibited.

The EPA affirms Taiwan's stance on adhering to international bans

and control treaties on the production and use of pollutants, and will continue to monitor and investigate the environmental distribution of POPs. The EPA will also continue to collect related data and

carefully assess the need to control other chemical substances to prevent dangerous chemicals from accumulating in the food chain and jeopardizing human health and the ecology.

Water Quality

Seriously Polluted River Lengths Halved in 2004

Three years of dedicated effort toward river remediation have proved effective. EPA statistics show the lengths of seriously polluted river sections have been substantially cut by 8.2% from 2003 to 2004.

The EPA has recently announced the lengths and proportions of polluted river sections in 2004. The percentage of seriously polluted river sections has substantially dropped from 15.8% in 2003 to 7.6% in 2004. The percentage of river lengths having little to no pollution has increased to 73.6%.

Based on a survey carried out by the EPA in 2004 on a total of 2904.2 km of rivers in 50 of Taiwan's watersheds, a total of 1859.1 km (64.0%) of river lengths have little to no pollution, 279.4 km (9.6%) have light pollution, 543.7 km (18.7%) have moderate pollution, and 222.0 km (7.6%) have serious pollution.

Improving the water quality of Taiwan's rivers is one of the EPA's most important policy objectives, starting with the declaration of the Year of River Remediation in 2002. Through implementation of the "Taiwan River Basin and Ocean Conservation and Management Plan" from 2002 to 2004, initial results of remediation are already beginning to show forth.

Compared to the extent of river pollution in 2003, the percentage of seriously polluted river length has already dropped from 15.8% to 7.6% in 2004. The greatest decrease in seriously polluted river length was observed in the

Beigang River (北港溪) in Yunlin County. Comparison of water quality monitoring data from the years 2000 and 2004, before and after implementation of the "Taiwan River Basin and Ocean Conservation and Management Plan," shows the number of rivers with over 40% of total river length deemed as seriously polluted dropped from seven rivers in 2000 to four rivers in 2004. The top five rivers with the greatest decrease in seriously polluted river length were the Nankan River (南崁溪), Beigang River (北港溪), Ehren River (二仁溪), Laojie River (老街溪) and Pozi River (朴子溪). Water coloration problems in the Dianbao River (典寶溪) have already been solved, and the iron content of river water at the Dianbao's Changruen Bridge (長潤橋) monitoring station has dropped from 25 mg/L in 2001 to 2.2 mg/L in December 2004.

Apart from efforts to strengthen water pollution source inspection and controls, the government's work to improve river water quality also involves water quality purification engineering projects and establishment of mechanisms to allow citizen participation, both of which are essential to enhancing water quality.

Earth Day 2005: EPA Declares Dedication to Environment from Atop Mt. Jade

In observance of Earth Day 2005, the EPA and Chiayi County Environmental Protection Bureau (EPB) held a series of Earth Day activities from April 22~24 in Alishan. Former EPA Minister Chang Juu-en (張祖恩) led close to 1,000 environmental volunteers, aboriginals, and NGO members in cleaning up Alishan's forest recreation areas, picking up trash along popular routes to renowned scenic areas. The final activity was a climb up Mount Jade, Taiwan's highest mountain, from where they announced their determination to protect Taiwan's mountain and forest environments.



Former EPA Minister Chang Juu-en (fifth from left) at the summit of Mt. Jade.

Air Quality

Survey Shows Dioxin Levels Near Incinerators Not High

To prevent people's anxiety about the public health threat of dioxin from incinerators, the EPA investigated three municipal waste incinerators in Shulin, Taipei County; Linnei, Yunlin County; and Taidong City. Results showed dioxin concentrations in air, plants, and soil near the incinerators were lower than those found in other countries, and were not considered high concentrations by most standards.

The EPA has been investigating dioxin concentrations in air, soil and plant life near municipal waste incinerators throughout Taiwan since 2000. Twenty-two incineration plant investigations have already been carried out; the three latest investigations in 2004 were incinerators in Shulin, Taipei County; Linnei, Yunlin County; and Taidong City. Investigation results have recently been made available and on the whole, figures are lower than those for corresponding investigation figures in other countries.

The EPA states that for five consecutive years since 2000 it has been investigating dioxin concentrations in the air, soil and plants in areas adjacent to the nation's large-scale waste incinerators. The main reason for this ongoing investigation is to prevent citizen fears that dioxin emitted by incinerators could be affecting air quality and human health.

Investigation results show that of the 22 municipal waste incinerators studied so far, dioxin levels in the air surrounding incinerators ranges from 0.0044~1.7 pg (10-12 g) WHO-TEQ/m³. Corresponding values in other nations range from 0.010~1.8 pg WHO-TEQ/m³. For plant life near incinerators in Taiwan, dioxin levels range from 0.22~21 pg WHO-TEQ/m³, compared to 0.62~71.4 pg WHO-TEQ/m³ in other countries. Nearby soil samples showed a range of 0.003~73.3 pg WHO-

TEQ/m³, compared to 0.00067~110 pg WHO-TEQ/m³ in other countries.

The EPA's latest investigation in 2004 shows dioxin concentrations ranging from 0.015~0.662 pg WHO-TEQ/m³ in air samples taken near the three incinerators. Dioxin levels in plant life near the incinerators ranged from 0.605~13.3 pg WHO-TEQ/m³. The range for soil samples was 0.134~12.9 pg WHO-TEQ/m³. In comparison with the ranges given above for other nations, the highest concentrations found in Taiwan are all within the ranges of values found in other nations.

During each investigation, investigators also analyze emission samples taken from within the incinerator stacks and compare results with air samples taken from the outside environment near the incinerator. Type, distribution, and composition of dioxin found in samples from stack samples are inconsistent with those of environmental air samples, meaning that the dioxin in environmental media is unrelated to the type of dioxins emitted by incinerators. This shows that incinerators are not significantly influencing the level of dioxin in the surrounding air. Dioxin levels in air samples taken near incinerators that have been in operation for longer periods of time do not show evident changes over time, and therefore citizens living near these incinerators need not

worry about the possibility of negative health effects.

Of those incinerators investigated in 2004, the Shulin incinerator has been in operation for the longest duration at just over nine years from installation date to investigation date, four years since the last investigation was carried out in 2000. Investigation results showed considerable changes in dioxin concentrations of environmental media near the incinerator. However, the average level has generally remained the same over the past four years.

General Policy

EPA Presents Environmental Books to Kindergartens

As environmental education takes off in Taiwan, emphasis is also directed at the preschool level. The EPA held the first awards last year to select outstanding environmental education children's books. This year, the EPA presented environmental children's books by native authors to 1,361 of the nation's kindergartens.

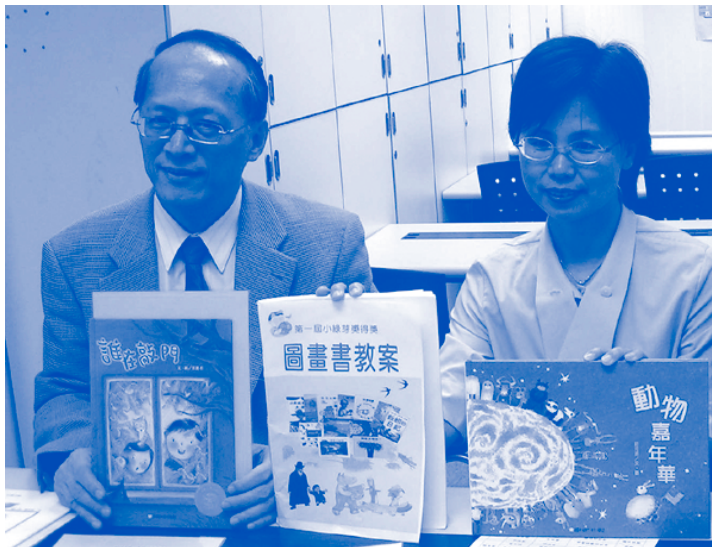
Working to spread environmental concepts by promoting private publication of outstanding environmental education picture books for children, last year the EPA selected and awarded 22 of the most outstanding children's environmental picture books. This year, to encourage teachers and parents to use these high quality environmental education picture books in class and during reading time at home, the EPA has presented the first place picture books in categories of environmental lifestyle ("Who's Knocking at the Door?" 「誰在敲門」),

nature conservation ("Animal Festival" 「動物嘉年華」) to 1,361 public kindergartens for use as teaching material. "Teaching Plans for the First Little Green Sprout Award Winning Picture Book" were also provided to over 3,000 public and private kindergartens throughout Taiwan.

The "Teaching Plans for the First Little Green Sprout Award Winning Picture Book" is a collaborative effort commissioned by the EPA to preschool teachers and graduate students at National Taiwan Normal University's Graduate Institute for Environmental Education. The contents were reviewed and approved by professors from environmental and education related departments. The teaching plans are specifically geared toward preschoolers and make use of active learning methods such as skits, games, outdoor activities and chants to instill environmental concepts. Related environmental issues are discussed through the central ideas of storybooks, and methods are given to help integrate the concepts into children's everyday life experiences and facilitate development of higher environmental consciousness.

The EPA highlights some of the interesting lesson plans, which encourage children to experience nature firsthand and get to know the environment and feel the joy of nature through personal contact and experience. For example, after reading "Who's Knocking at the Door?" teachers are encouraged to let children go outside and observe trees, imitate their postures, embrace trees to feel how big they are, and give the trees names and express their feelings toward the trees, all of which can be recorded and compiled into a special file for each tree. The idea is to help children cultivate feelings of care and respect for trees.

These lesson plans will be ready to download off the Internet by late June at http://ivy2.epa.gov.tw/out_web/E/education-announce/home.htm. It is hoped that more people get involved in environmental education and help plant the seeds of environmental concern among today's children. With care and cultivation, these "little green sprouts" will grow into tomorrow's environmental stewards.



EPA officials display Little Green Sprout award-winning book "Who's Knocking at the Door?" (誰來敲門)

General Policy

NCSO Reviews Reasons for Low ESI Ranking

The 2005 Environmental Sustainability Index assessment report has been released and Taiwan is ranked near the bottom of the list. The EPA explains that Taiwan's high population density is among the main reasons for its inability to score high on an index based on land area. Another reason for the low score was because the evaluation was based on inaccurate data.

The World Economic Forum, Yale University, and Columbia University issued the 2005 Environmental Sustainability Index (ESI) assessment report on 27 January 2005. Finland, Norway and Uruguay ranked highest on the list of 146 countries mentioned in the report, while Taiwan ranked 145th place, just ahead of North Korea at the bottom of the list.

Concurrently acting as secretariat for the National Council for Sustainable Development (NCSO), the EPA indicates that the main reasons for the low evaluation score are Taiwan's dense population and heavy environmental loading, both of which are disadvantageous to an index based on land area. For instance, Taiwan received the world's lowest scores on the ESI's calculations for pollution emissions and vehicles in use per populated land area under the core indicator "Reducing Air Pollution." Having the second highest population density in the world coupled with flourishing commercial activity, it is easy to see why a comparison based on populated land area is not in Taiwan's favor.

The EPA points out the limitations Taiwan faces without membership status in the United Nations. Not only is Taiwan barred from participating in global environmental protection activities led by the UN, the sponsoring agencies of the ESI assessment had no official channels (the UN or other international organizations) through which to obtain accurate data on Taiwan's indicators. Of the 76 indicators assessed, the data for as many as 24 indicators were erroneous, undoubtedly a factor contributing to Taiwan's low ranking.

Taiwan is still hard pressed to balance environmental protection with economic development. Since the 1970s, government and industry have developed effective economic development strategies to create an economic miracle that boosted Taiwan's standing in the world. However, more effort now needs to be concentrated on balancing economic development and environmental protection.

To address those areas in which Taiwan is lagging behind, Premier Hsieh requested during the April 2

NCSD meeting that agencies responsible for each indicator area should place their administrative focus on each respective indicator. Each agency should also post related data and figures in their websites or publications for the public's reference. In the future the NCSD will act as the window for providing official data on Taiwan to those parties sponsoring the ESI assessment in the interest of presenting a more accurate picture of environmental sustainability in Taiwan.

News Briefs

Motorbike Owners to Pay for Regular Exhaust Testing from 2006

Currently, motorbike owners do not need to pay for regular testing of their vehicle's exhaust. However, the EPA has slated to cancel subsidies of this service starting in 2006, and in the future, citizens will have to pay the NT\$80 fee for regular exhaust testing. Former EPA Minister Chang Jui-en explained during a question-and-answer session in the Legislative Yuan on April 13 that, based on principles of fairness and limitations of the Air Pollution Control Fund, it was decided that vehicle owners should foot the bill for regular exhaust checks. However, new vehicles are not subject to testing for the first three years after purchase. The Department of Air Pollution Control pointed to statistics showing that each year over seven million motorbikes receive regular exhaust testing, calling for over NT\$560 million in subsidies. Approximately NT\$800 million is collected in air pollution control fees annually, and over half of this is used to subsidize regular testing of motorbikes. This means that the subsidy for motorbike users draws from some of the air pollution control fees paid for by car owners (included in the price of gasoline). The EPA is therefore considering canceling the subsidy out of fairness to car owners.

EMF of Transformers and Mobile Phone Base Stations Posted Online

To inform citizens of the intensity of electromagnetic fields (EMF) from transformers and mobile phone base stations, the EPA has carried out random testing of the nation's transformers and mobile phone base stations since 1997. So far, 602 transformer stations have undergone examination with electromagnetic values ranging from 40–378 mG, which is within the recommended range for ambient electromagnetism. Out of the 1,156 mobile phone base stations tested so far, all electromagnetic val-

ues range between 0.0000292 and 0.3004 mW/cm², also within the recommended range for ambient electromagnetism. Testing values have been posted on the EPA's website for "Taiwan GIS for non-nuclear ionizing radiation" at http://ivy2.epa.gov.tw/out_web/f/noise/eme/default.asp. Citizens who would like to know the intensity and other data on electromagnetic fields generated by mobile phone base stations, transformers or high voltage towers in their neighborhood can search this website.



400 children signed the Children's Environmental Declaration.

Activities

Japan Shares Experience in Marine Oil Pollution Emergency Response

The EPA held the "Forum on Risk Management of Maritime Oil Pollution" (海洋油污染風險管理研討會) on May 12, inviting Mr. Nishigaki Kenji, the director of the oil pollution emergency response department of the Petroleum Association of Japan (PAJ) to share Japan's experience and help enhance domestic industry's emergency response to maritime oil pollution incidents. Over 80 people from the public and private sectors attended, representing a wide variety of fields including environmental protection, coast guard, ports and harbors, petroleum, power generation, and maritime affairs consultants. It is hoped that by drawing on the Japanese government and industry's experience in establishing a large-scale oil spill response system, Taiwan can review its own response system and establish co-operation between industry and government to further enhance Taiwan's emergency response capability and integrate and enhance response resources and efficiency.

40,000 Participate in National Beach Clean-up

The EPA's 2005 annual beach clean-up event kicked off on the afternoon of April 30 at 98 locations on the coasts of Taiwan. This is the first time since the EPA began carrying out environmental clean up and

maintenance in coastal areas that all counties, cities and townships along the coastline joined in simultaneously to broaden the scope of this annual beach clean-up. Premier Hsieh showed up in person to preside over the activity in Jinshan Township (金山鄉) at a beach on the northern cape of Taiwan, where over 3,000 people from all walks of life including central and local government staff, foreign residents, environmental volunteers and citizens helped pick up trash. An estimated 40,000 people participated nationwide, and thanks to the many environmental volunteers, devoted citizens, environmentalists, students, soldiers, and coast guards, the beaches of Taiwan have taken on a new clean face.

Taiwan Youth Issue Children's Environmental Declaration

Echoing the worldwide observance of Earth Day on April 22, the EPA,

Council of Agriculture, Taipei City Department of Environmental Protection and the Society of Wilderness jointly held the "Children of Taiwan Love the Earth" festival at the Taipei City Zoo. Children were invited to play and show their concern to protect nature and the Earth. The Society of Wilderness' Cool Bee Nature Scouts read aloud the Children's Environmental Declaration and the Top Ten Environmental Issues for Children signed by 400 children in Taiwan. The children clearly voiced their greatest environmental concerns through their desire for simple lifestyles, rich natural ecology, clean water, a stable food chain, clean air, renewable energy, clean soil, the chance to get close to nature, respect for other cultures on Earth, and more emphasis placed on environmental protection rather than economic development.



Premier Frank Hsieh (right) pitches in during the national beach clean-up event.

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