



Feature Column

Climate Change and Abating the Greenhouse Effect

The recent movie "The Day After Tomorrow" has aroused increased international concern about the global greenhouse effect. Even though Taiwan is unable to participate in related international conventions, the EPA has proactively drawn up anticipatory response measures to abate the greenhouse effect. Working together with domestic electronics enterprises willing to take steps to reduce their own emissions, and integrating the efforts of the EPA, enterprises and NGOs, the EPA has set the stage for more international cooperation and exchanges.

Increasing concentrations of greenhouse gases are likely to intensify the greenhouse effect and cause a significant rise in atmospheric temperature. According to the IPCC 2001 Third Assessment Report, by the year 2100 global temperatures may rise as much as 1.4 to 5.8 degrees centigrade.

Such rapid increase in temperature has not occurred during the past one thousand years, and is likely to cause ocean levels to rise 9 to 88 cm.

As for global conventions to control the greenhouse effect, the first step was taken in May 1992 when the UN General Assembly passed the UNFCCC (UN Framework Convention on Climate Change). Not long thereafter, already 154 countries had become signatories to this convention, and the FCCC went into formal effect as of March 21, 1994. The next important step was the drafting of the *Kyoto Protocol* in 1998, which proposed to

control emissions of six major greenhouse gases—CO₂, CH₄, N₂O, HFCs, PFCs, and SF₆—by stipulating different reduction standards for individual countries.

Premier Leads Taiwan in Mitigating Greenhouse Effect

Although not yet listed as a signatory party to the convention, Taiwan certainly does not lag behind other nations in terms of response measures taken. At the outset, Taiwan established a Global Climate Change Working Group in 1992, which was later upgraded to the National Council for Sustainable Development in 1997, a cross-de-

In This Issue

Feature Column: Climate Change and Abating the Greenhouse Effect.....	1
Voluntary Reductions and GHG Inventory Soon Underway.....	4
Taiwan Ushers in New Era of Ocean Stewardship	5
Stationary Sources Subsidized to Improve Air Pollution Control.....	6
Seven Counties and Cities to Enforce Waste Sorting	7
Fines for Violating Plastic Bag Restriction Greatly Reduced.....	7
Cistern Cleanup and Maintenance Plan Launched	8
EPA Open to Environmental Groups' Suggestions.....	9
Waste Reduction Works: Construction of Three Incinerators Halted.....	10
Taiwan's First Particle Supersite...11	
News Brief.....	4
Activities.....	12



"The Day After Tomorrow" has aroused international concern about the global greenhouse effect.

partmental organization directly under the Executive Yuan with the Vice-Premier acting as Chairman, and the EPA Department of Air Quality Protection acting as the convening organization. The National Council for Sustainable Development was later reorganized in June 2002 and is now chaired by the Premier and contains a newly established international environmental protection working group. The EPA Department of Air Quality Protection acts as the window for this new working group, taking responsibility for carrying out related international environmental protection affairs.

eration rather than reduces their amounts. The EPA points out that due to the factors of energy supply and industry structure, Taiwan cannot be compared on the same level with other industrial countries like those in the European Union and the United States. Taiwan is incapable of bearing the same level of responsibility toward reducing greenhouse gases as other developed countries. Abatement measures currently focus on retarding the growth rate of greenhouse gas emissions and promoting the sustainable development of Taiwan's industry and economy. This entails the planning of long-term develop-

As for promotional efforts, the EPA's methods have been even more proactive: for example, holding industry forums and directly informing related industry representatives about international development trends, the government's stance, and domestic policy measures, plans and regulations. These forums are opportunities to promote the importance of abating greenhouse gas emissions, and the forums also open up the table for opinion exchanges with industry representatives. On another front, the EPA has already drafted plans to photograph prominent cities such as Taipei, Taichung, and Kaohsiung, for use in making three-dimensional animations of simulated greenhouse effects. This project is intended to give citizens an idea of what drastic changes would occur to their surroundings if the sea level rose by 88 centimeters and to raise their awareness of the dangers of greenhouse gases.

In making 3D animations of simulated greenhouse effects, the EPA intends to give citizens an idea of what drastic changes would occur to their surroundings if the sea level rose by 88 centimeters and raise public awareness of the dangers of greenhouse gases.

The EPA indicates that Taiwan currently wields two key policies to reduce greenhouse gas emissions. The first is the "Concrete Action Plan on the Conclusions of the National Energy Conference" (全國能源會議結論具體行動方案) passed by the Executive Yuan on August 5, 1999. This clearly delineates strategies for coping with developing trends in the FCCC as well as sets forth an energy policy to reduce greenhouse gas emissions. The second key policy was the *Basic Environmental Act* (環境基本法) passed by the Legislative Yuan on November 19, 2002, which stipulated that: "All levels of government shall actively adopt control strategies to reduce CO₂ emissions and draft related plans to prevent the greenhouse effect."

Taiwan currently adopts an abatement policy toward greenhouse gases, which mitigates their prolifer-

ment measures to conserve energy, increase energy efficiency and develop renewable energy.

National objectives to abate greenhouse gas emissions in stages were determined during the National Energy Conference. By 2010 the nation's cumulative energy savings should reach 1,973 KLOE (kiloliters oil equivalent) and by 2020 this figure should increase to 4,187 KLOE, for a respective savings of 16% and 28%. As for concrete achievements reached in the past few years, according to the Energy Commission's estimates, Taiwan reached a total savings of 95% after adjusting the industrial and economic structures of the nation's industry, transport, commercial, power and other departments from 2000 to 2002. This is equivalent to the annual energy output of two two-megawatt combustion power plants.

Inventory System to Be Implemented with Industry's Support

Recently greenhouse gas reduction demands in the international arena have gradually shifted focus from individual countries to specific industries. Currently the EPA is planning an industry greenhouse gas inventory system and compilation of a technical manual of standardized greenhouse gas inventory methods. The EPA will ultimately stipulate industries to devise their own greenhouse gas report and inventory system so as to ensure that each factory and enterprise has their own greenhouse gas inventory database. This information will serve as a foundation for continuing through with potential greenhouse gas reduction work. When the inventory system is fully established, the EPA will proceed with guidance and training measures for industries.

International market pressures have caused domestic export industries such as LCD panels and semiconductors to be aware of the importance of reducing greenhouse gas emissions. Many such enterprises have voluntarily taken initiatives to cooperate with the government and decrease emissions of perfluorinated compounds (PFCs) on their own. The EPA will soon sign cooperation memorandums with the Taiwan TFT-LCD Association (TTLA) and the Taiwan Semiconductor Industry Association (TSIA), both of which are willing to make PFC emission reductions. This is one example of mutual efforts toward abating air pollution and the global greenhouse effect (see the second article in this issue for related news).

Uniting Industry and NGOs to Foster International Cooperation

Taiwan currently adopts three key methods of international cooperation and exchange in the interest of mitigating climate change and greenhouse gases:

1. Participation in UNFCCC - related conferences through NGOs: The Industrial Technology Research Institute (ITRI) has represented Taiwan at UNFCCC - related meetings and peripheral meetings in past years, helping to establish

channels for international communication and cooperation.

2. Taiwan-US cooperation plan: This plan has been employed to set up long-term cooperation with the US EPA. In addition to introducing and establishing the MARKAL energy system model in Taiwan, it has actively helped set up MARKAL models in Central American countries that have diplomatic ties with Taiwan.
3. Taiwan has participated in the drafting process and overview of policy measures made by UNFCCC signatory nations (including Japan, US, and Britain) in response to the convention. Taiwan currently continues partnerships with specially appointed research organizations to expand climate change and energy system models.

In the future Taiwan will continue to expand international channels in addition to the above existing measures. The EPA will moreover seek to incorporate the talents and resources of enterprises, industry unions and NGOs so as to jointly advance international cooperation and strengthen knowledge of the connections between multilateral environmental agreements and the WTO. Meanwhile, based on the developments of the UNFCCC, the EPA will accordingly establish

working groups to handle decision making, implementation and coordination tasks toward planning short-, mid- and long-term objectives and building Taiwan's capacity to respond to climate change.

As for global greenhouse gas reduction measures, Taiwan faces the difficulty of defining its stance in responding to the convention first of all because the date of effectiveness of the *Kyoto Protocol* is still subject to many variables and reduction standards have not been formulated for non-Annex I countries. As Taiwan is currently not a member of the UN, we are unable to sign onto the *Kyoto Protocol*; Taiwan would be greatly impacted if it were to base reduction objectives on its status as an individual nation.

Other problems that Taiwan faces include inadequate reinforcement of reduction measures, a high percentage of imported fossil fuel energy sources, energy prices that do not reflect environmental costs, high initial costs of renewable energy, and the need for further investigation into potentials for and costs of reductions in the energy sector. These problems pose many challenges to developing response measures. An additional concern is the high cost of reducing greenhouse gases, particularly for Taiwan. According to the World Bank's citation of CERT, GTEM and EPPA estimates, Taiwan's

Taiwan's Energy/Economy/CO₂ Emission Index Compared to Other Countries (Year 2000)

	Taiwan	Taiwan's Global		Global	OECD
		Ranking	Percentage		
Energy Sector Emissions Total Volume (million tons of CO ₂)	217.3	22	0.91%	23901	12527
Energy Sector Per Capita Emissions (million tons of CO ₂ /person)	9.8	24	-	4.0	11.2
Population (millions)	22.22	48	0.37%	6023	1122
GDP (billion USD)	412.1	19	0.99%	41751	24624
Per Capita GDP (thousand USD)	19	24	-	6.9	21.9
Energy Supply (10 ¹⁵ joules)	3476	23	0.82%	422970	222609
Per Capita Energy Consumption (10 ⁹ joules)	156	31	-	70.2	198.4
Emissions Per Unit of GDP (kg of CO ₂ /USD)	0.53	51	-	0.57	0.51
Emissions Per Unit of Energy (kg of CO ₂ /10 ⁹ joules)	62	25	-	56.51	56.27

Data Source: Compiled from IEA information. Emissions data in this chart is primarily based on the energy sector.

greenhouse gas reduction costs are quite high, second only to Brazil.

In the next stage in greenhouse gas reduction policy planning, Taiwan may adopt one or both of two sharp reduction models to divide reductions between sectors and/or enforce total control of greenhouse gases. The EPA is the primary government agency responsible for promoting such policies, including administrative controls such as formulating greenhouse

gas emissions standards, assigning reductions, validating emissions balances and coordinating emissions trading, as well as promoting economic incentives such as collecting carbon taxes. These measures will be gradually developed to ensure that greenhouse gas emission reductions for industrial, commercial, transportation and agricultural operations are guided by market incentive mechanisms. These two types of sharp reduction models are currently still in the planning stages.

Although PFCs account for only around one percent of the total global greenhouse gas emissions, this substance is several thousand times more destructive to the ozone layer than CO₂. Currently Taiwan is responsible for over 30 percent of the world's total production of semiconductors and TFT-LCDs (thin film transistor – liquid crystal displays), and therefore the growing rate of PFCs used during production cannot be overlooked.

Currently, these two domestic industries have already responded to international demands, promising to do their utmost to reduce global PFC emissions. The Taiwan Semiconductor Industry Association (TSIA) has agreed to control PFC emissions under 0.66 MMTCE (million metric tons of carbon equivalent) by 2010, or about half the amount generated in the year 2000. The Taiwan TFT-LCD Association (TTLA) meanwhile has agreed to control PFC emissions from TFT-LCD manufacture processes to under 0.82 MMTCE by 2010.

The EPA has affirmed these two industries' promises to make reductions on their own and is glad to help enterprises work together in facing this challenge. The EPA and the two industry associations will sign memorandums of cooperation to voluntarily reduce PFC emissions this year, working in tandem to mitigate greenhouse gas emissions. Concrete actions include providing a platform for technology and information exchanges, establishing an inventory of industrial emissions, seeking alternative products that do not harm the environment, looking into ways to promote more efficient use of PFCs, and encouraging the adoption of PFC treatment technologies.

Assisting each industry to make thorough audits of greenhouse gas emissions, last year the EPA began providing assistance to the Busi-

Air Quality

Voluntary Reductions and GHG Inventory Soon Underway

The EPA will sign cooperation memorandums with the Taiwan TFT-LCD Association (TTLA) and the Taiwan Semiconductor Industry Association (TSIA), both of which are willing to voluntarily reduce emissions of PFCs. This is a collective effort toward retarding air pollution and global warming. The EPA will also launch a new system to inventory and register industrial greenhouse gases (GHG), and will assist individual enterprises in making thorough audits of greenhouse gas emissions.

Although Taiwan is not yet subject to international greenhouse gas reduction controls, the international trend in recent years has seen a demand to gradually shift responsibility for greenhouse gas reductions to individual industries rather than countries. Considering Taiwan's heavy reliance on export industries, if there is not an appropriate response to this international

trend in greenhouse gas reduction measures, products for export may be subject to international boycotts. The EPA has therefore advised domestic industries to get a head start in responding to this trend.

Perfluorinated compounds (PFCs) are often used in the semiconductor industry as a cleaning agent.

News Brief

Taiwan Cement Hualien Factory Announced as Pollution Control Site

Due to a complaint lodged in February, it was discovered that the Taiwan Cement Hualien Branch had illegally disposed of hazardous waste oil underground (see EPM Vol. VII, Issue 5). The EPA has confirmed that the waste oil has already contaminated the soil and has announced the polluted area as a soil pollution control site and a pollution

control zone according to the *Soil and Groundwater Pollution Control Act*. The EPA has restricted the removal of objects from the control site, and the company has been required to promptly clean up the waste oil and sludge until the pollution levels in the soil and groundwater has been verified to be below soil and groundwater pollution control standard levels. For more related information please call 02-23832389.

ness Council for Sustainable Development (BCSD) to introduce the internationally prevalent *Greenhouse Gas Protocol (GHG Protocol)*. The industrial greenhouse gas investigation plans submitted by the EPA this year target steel, petrochemical, cement, papermaking and power generation industries.

True to the spirit of the ISO, the EPA is providing assistance with

thorough investigations this year and expects this to provide more opportunities for industries to obtain ISO certification in the future. The EPA will openly search for industries willing to engage in this environmental initiative on their own, and it is expected that the plan will be fully underway by August this year, at which time the search will be announced on the EPA's website: <http://www.epa.gov.tw/f>.

and Marine Industry." Among the 60 people in attendance included members of the NCSO, the CCMOA, as well as representatives of the industry, government, and academic fields related to environmental protection, marine fisheries, and marine transport.

NCSO Secretary-General and CCMOA Deputy Convener, Yeh Jiunn-rong, explained that Taiwan is surrounded by ocean with over 1,500 km of coastline, placing Taiwan high on the list of countries with the longest coastline per square kilometer of land area. It therefore behooves Taiwan to focus on sustainable development of its marine resources. Additionally, Taiwan's marine waters are habitat for nearly one tenth of the world's marine species – something that its citizens should be proud of and place more value on. This precious resource should be managed sustainably so that it can be passed on to our descendents. The decision to hold this forum just days preceding World Environment Day (June 5) therefore held special significance.

EPA Administrator Chang pointed out that in the past few decades of rash development, Taiwan's coastal wetlands have been severely damaged. Heavy pollution upstream and wastewater effluent as well as marine waste disposal and pollution generated by marine vessels, have degraded Taiwan's marine ecology and environment, and protection of Taiwan's marine and coastal environments has become a critical environmental issue. This is also one of the focal tasks promoted in the EPA's "Environmental Protection Policy Three-Year Action Plan."

Coast Guard Administrator Hsu Hui-yo indicated that in order to effectively assure the protection of marine environments and fishery resources, the Coast Guard Administration is more rigorously clamping down on foreign fishing

General Policy

Taiwan Ushers in New Era of Ocean Stewardship

Paving the way for sustainable use of marine resources in Taiwan, the Executive Yuan's National Council for Sustainable Development, the EPA, the Coast Guard Administration, and the Cabinet Committee on Maritime and Ocean Affairs, have joined in discussion with citizen representatives to tackle the two key issues of safeguarding marine environments and marine industry. All parties in attendance engaged in earnest dialogue, showing strong commitment toward a new long-term plan to establish a new era of marine stewardship in Taiwan.

Two bodies under the Executive Yuan - the National Council for Sustainable Development (NCSO) and the Cabinet Committee on Maritime and Ocean Affairs (CCMOA) held the "Marine and Coastal Sustainable Development Forum" (海洋及海岸永續發展論壇) on June 3. NCSO Secretary-General and CCMOA

Deputy Convener, Mr. Yeh Jiunn-rong (葉俊榮), along with EPA Administrator Chang Juu-en (張祖恩), and Coast Guard Administrator Hsu Hui-yo (許惠祐) jointly presided over the forum. The two topics of discussion were "Protection of Marine and Coastal Environmental Resources" and "Development of a Marine Nation



NCSO Secretary-General and CCMOA Deputy Convener Yeh Jiunn-rong (standing)

boats that illegally intrude in Taiwan's waters and activities that damage the marine and coastal environments. This includes gathering evidence and prosecuting as well as closely collaborating with related organizations to ensure the sustainable development of Taiwan's marine waters and coasts.

Conclusions reached in the forum are as follows: 1) Taiwan should work to strengthen local marine culture as it works toward sustainable development of marine resources, and should also strengthen cross-departmental cooperation to establish comprehensive coastal and marine development plans and management. 2) The government should actively

integrate marine related NGO and industry interests to strengthen public-private partnerships and to promote consensus and action in sustainable development of marine and coastal areas by the entire citizenry. 3) The government should actively strive for fair and legitimate standing and participation in regional international marine organizations so that Taiwan can join other nations in protecting marine resources and ensure the sustainable use of our nation's high seas fishery resources. 4) Owing to Taiwan's advantageous geographical position as an international port, measures should be taken to actively strengthen international port competitiveness and further promote Taiwan's status as a shipping nation.

pollution sources. Moreover, the enterprise must fit one of the following categories:

1. Enterprises that follow regulations to adopt best available control technology (BACT) or technology that provides more effective pollution control and whose emissions concentrations or emissions factors after control measures are in place are lower than stationary pollution source BACT as stated in the appendix chart; and those enterprises that have established facility management rules with control facilities better than those listed in the regulations.

2. Any stationary pollution sources not listed above that comply with one of the following conditions:

a. Emissions concentrations or emissions factors are equal to or less than stationary pollution source BACT as listed in the appendix chart,

b. Monthly emission concentrations before dilution are three fourths the amount stated in the Emission Standards stipulated in this regulation,

c. The enterprise is not subject to Emission Standards stipulated in this regulation, but control technology already effectively reduces over 70% of air pollution emissions.

3. Those enterprises that have researched and developed new advanced technology certified by the EPA.

Enterprises should be sure to submit applications for subsidies before the deadline announced by the EPA as late applications will not be processed. The EPA shall complete its audit of applications within 60 days of receiving the application. For those enterprises whose application has been approved, subsidies shall be prioritized and assigned according to audit results. Plans and finances must be approved to range within the annual subsidy budget.

Air Quality

Stationary Sources Subsidized to Improve Air Pollution Control

The EPA has drafted regulations for subsidizing private sector initiatives to research, develop and implement pollution controls or control technology as a means of achieving pollution improvement goals. Individual enterprises could be eligible for funding of up to half of costs, up to a maximum of NT\$15 million.

Making full use of collected air pollution control fees and aiming to effectively ameliorate pollution and promote related technologies, the EPA has developed economic incentives to encourage those public and private enterprises or industry groups that voluntarily adopt pollution control technology or invest in research and development of related technology. On May 5, the EPA announced the *Regulations for Subsidizing Public and Private Enterprises for Air Pollution Improvements* (公私場所固定污染源空氣污染改善補助辦法) based primarily on Article 18 of the *Air Pollution Control Act* (空污法) and containing 14 articles. The regulation will take effect after it is promulgated on a further date.

This regulation targets industries that adopt air pollution control technology to effectively improve pollution emissions, or industries that research and develop innovative and advanced air pollution control technology that is transferable to other industries. To qualify for the subsidies, such initiatives should: research and develop low polluting raw materials and fuel; adopt low polluting manufacturing processes; and incorporate emissions control equipment or other EPA-approved air pollution reduction technology.

Enterprises eligible for the subsidies in this regulation must be either a public/private enterprise or industry group with an air pollution emission source, and must be planning improvements to stationary

The above auditing shall be performed by the Air Pollution Control Fund Management Committee and related experts and academia called together by the EPA. Subsidies shall be granted by the EPA for individual pollution improvement plans and subsidy amounts shall not exceed half of the plan's total cost, up to a maximum of NT\$15 million. For more information please call 02-23117722 ext. 2770.

Waste Management

Seven Counties and Cities to Enforce Waste Sorting

A study carried out by the EPA instructs that from 2005, Taipei, Kaohsiung and five other cities should begin carrying out the first stage of the "Compulsory Waste Sorting Plan." The public will be asked to cooperate by sorting trash at home into the three categories of "resource waste, food waste, and general waste." An initial trial stage will be implemented for a period of time, after which inspections and penalties will be enforced if necessary.

To reach the goal of complete sorting for zero waste and raise the efficiency of recycling efforts, the

EPA finalized an initial draft of the "Compulsory Waste Sorting Plan" (推動垃圾強制分類計畫) on May 25. The current plan is to adopt the two policy tools of a per-bag fee collection system and a compulsory waste sorting system. This strategy promotes recycling in incremental steps to eventually reach the goal of zero waste.

According to the plan, the public will be asked to separate items into three main categories of recyclable resources, food waste and general waste. Special resources such as dry cell batteries and fluorescent light tubes must be separated from the rest of the recyclables. Large waste items such as furniture or electronic appliances should be reported to sanitation crews or taken to private recycling operations. Frequency of collection by sanitation crews has been adjusted from three recycling days per week to five, while food waste will be collected daily.

The first stage of the plan targets Taipei City, Kaohsiung City, Keelung City, Hsinchu City, Taichung City, Chiayi City and Tainan City. Those cities that have already implemented per-bag fee collection systems will be given more flexibility to carry out self-assessments of how to further cooperate with this initiative. County governments will be given

authority to request townships under their jurisdiction to develop model compulsory waste sorting plans.

After this plan is implemented, the EPA will first focus efforts on advocacy and guidance to get citizens to cooperate by separating all recyclables, food waste and general waste. Inspections and penalties may be introduced later as necessary to make sure that everyone is sorting their waste properly.

Waste Management

Fines for Violating Plastic Bag Restriction Greatly Reduced

The Legislative Yuan has just passed a revision to the *Waste Disposal Act*, easing penalties that originally required industries to repeatedly face fines of ten thousand to several hundred thousand dollars for violating the plastic bag (tableware) restricted use policy. Provisions have been made to reflect actual circumstances and make it easier for environmental inspectors to put the law into practice. The EPA also plans to train environmental inspectors to assist control targets and effectively implement this policy.

Last year the former EPA administrator heavily promoted the plastic shopping bag (tableware) restricted use policy. The *Waste Disposal Act* (廢棄物清理法) stipulated that violators would face penalties from NT\$60,000 to NT\$300,000. Inspectors actually wrote up only a small number of fines, and frequently handed out educational flyers in place of fines. Nonetheless, steep fines sparked opposition among tar-



Collection of recyclables will soon be increased from twice per week to five times per week.

geted enterprises. Some legislators suspected that the fines were excessive and disproportionate compared to other relative fines.

Members of both ruling and opposition parties felt that the former fine rate for food and beverage enterprises that provide plastic bags or plastic (or polystyrene) disposable tableware was inappropriate as it was comparable to the same rate used for industries that violate hazardous industrial waste disposal regulations. They proposed that the amount should be based on similar fines applicable to general waste. The Legislative Yuan therefore passed a revision to Article 51 of the *Waste Disposal Act* on May 18, agreeing that the fine for violating the plastic bag restricted use policy should be between NT\$1,200 and NT\$6,000 and those violators that do not change their behavior within the allotted time shall be subject to daily continuous fines.

The EPA will soon make a review of definitions and criteria used in implementing this policy. For example, the plasticware commonly used in households to store food functions primarily as a storage container, however some enterprises and public easily confuse such plasticware with "plastic disposable tableware." Therefore the EPA is deliberating a clear definition of PP plasticware using concrete identification methods based on thickness of clearly defined "containers" and "tableware" to avoid further confusion.

After the fines for violating the plastic bag restricted use policy are reduced, the EPA will convene a meeting with all local environmental protection bureaus to jointly discuss problems concerning implementation and draw up consistent implementation methods. The EPA will also administer training to inspectors in all levels of environmental protection agencies to explain the reduction

in fines and related implementation methods so that each locality adopts consistent measures. Meanwhile, targeted enterprises will also be informed of changes to ensure that they clearly understand the implementation methods involved concerning revisions to Article 51.

Water Quality

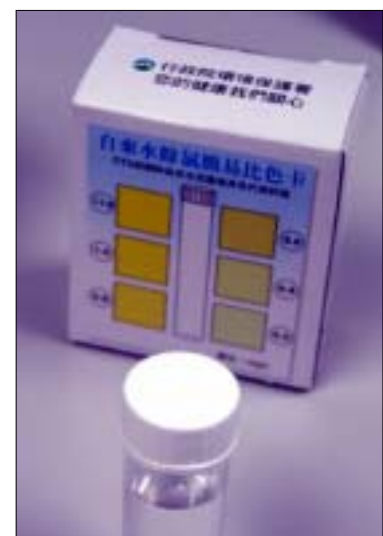
Cistern Cleanup and Maintenance Plan Launched

Working to prevent water quality pollution due to inappropriate maintenance or installment of cisterns and water towers, the EPA has drafted the Tap Water User Cistern/Water Tower Cleaning and Maintenance Plan. The plan will be carried out in stages this year, first focusing on schools from kindergarten to high school as well as regional hospitals.

Tap water supply in Taiwan already meets the standards of other developed nations in terms of universality. However, in some cases water quality tends to deteriorate during distribution. The EPA indicates that 90.88% of citizens are provided with tap water, over 99% of which tests positive as good water quality before it reaches end users' cisterns and water towers. According to a survey commissioned by the EPA in 2001 on tap water that had passed through cisterns or water towers in Taipei City, Taichung City and Kaohsiung City, as many as 35% of tests showed substandard water quality, and 9% contained fecal coliform. This shows that cleaning and maintenance of cisterns and water towers needs to be strengthened to ensure safe drinking water.

As for concrete implementation measures, each county/city environmental protection bureau (EPB) will deliver free chlorine test kits to schools and hospitals, which will be asked to inspect cisterns and water towers and self-administer water quality tests as well as any required maintenance or improvement measures. Inspection and test results shall be recorded on environmental agency websites, and environmental authorities shall work together with local tap water providers to follow up on test results and if necessary dispatch personnel to assist with inspections. The first stage of this plan entails sending out the necessary testing kits and chemicals to 590 regional hospitals and 7,335 schools, from kindergartens to high schools.

Common reasons for pollution of tap water users' cisterns and water towers include: 1) cisterns are built on the ground or underneath buildings so that cistern walls are in direct contact with soil making it easy for polluted water to permeate through cracks; 2) manhole is lower than the surrounding walls and not raised up high enough to prevent rainwater, polluted water or grease from entering; 3) manhole cover is damaged or missing, allowing rainwater, dust, insects or debris to enter. Of these commonly seen pollution causes, apart



Free chlorine test kit color chart used to test water quality.

from basement cisterns, which are more difficult to rebuild, all other situations can be solved by simple means with equipment designed to change, adjust or improve the situation.

The Taiwan Water Supply Corporation (<http://www.water.gov.tw/sample1/know/use/use.htm>) and the Taipei Water Department (<http://www.twd.gov.tw>) have listed contact information of cistern and water tower cleaning service enterprises on their websites, allowing tap water users directly inquire via Internet and make their own choice. The EPA hopes this plan will allow kindergartens, schools and hospitals troubleshoot problems with their cisterns or water towers and carry out the required maintenance or improvements. The bottom line is that schoolchildren, patients and school and hospital staff should have access to safe, clean drinking water.

General Policy

EPA Open to Environmental Groups' Suggestions

Coinciding with World Environment Day, the EPA took measures to widen communication channels with environmental groups and engage in face-to-face exchanges with local environmental group representatives. Some of the diverse recommendations offered by these environmental groups include having the EPA actualize its three-year action plans and prioritize implementation steps, as well as strengthen lateral links with other government departments when carrying out environmental protection work.

Fortifying links and exchanges with environmental groups, the EPA held the "Forum for Linking and Sharing Experience with Environmental Organizations" (環保團體聯繫暨經驗交流座談會) on June 2. The forum was presided by EPA Administrator Chang Juu-en (張祖恩) and each EPA department director and deputy director were present. Many environmental groups were also in attendance, each of them showing their concerns about upgrading the quality of living environments, and upholding Taiwan's ecology and natural areas. Many recommendations were presented during the forum and these ideas will become an important reference for future environmental policies.

During the forum, environmental groups made the following suggestions:

- 1) Regulations regarding environmental impact assessments need to be reviewed and amended so as to strengthen public participation and make information more open to the public. They also proposed strengthening monitoring and tracking to ensure protection of ecosystems and the environment.
- 2) Resources and hazardous waste should be clearly defined and separated. Also, a secondhand goods flow mechanism should be established.
- 3) It was requested that the EPA strengthen full public participation and make the best use of material, financial and human resources in all fields of society so that citizen organizations can help promote green consumption.
- 4) Incinerator monitoring mechanisms should be revised so that the public and environmental organizations play a greater role in monitoring.
- 5) It was suggested that environmental education and advocacy efforts be stepped up, using related organizations to link with communities to establish en-

vironmental education centers and work through schools and communities to strengthen promotion of waste reduction, recycling and environmental sanitation.

Environmental organizations attending the forum held high expectations of the EPA, expressing their wishes for the EPA to fully actualize the existing "Environmental Protection Policy Three-Year Action Plan" via prioritized steps for incremental implementation. The EPA should also work harder to strengthen horizontal links with other departments so that more agencies are involved together in carrying out environmental protection work. During the forum, each environmental group offered many constructive recommendations toward policies on resource recycling and reuse, green consumption, food waste recycling, EIAs, environmental inspection and assistance to enterprises, incinerator management and supervision, environmental education, public information and full public participation. Administrator Chang and each EPA department director listened carefully and expressed their understanding of these recommendations as well as provided clear responses to each issue in the interest of promoting two-way communication and sharing of experience.

Administrator Chang expressed that this forum greatly facilitates efforts to strengthen links and exchanges with environmental organizations. Both sides shared their experiences in promoting environmental protection measures, and the advice offered by environmental groups during the forum will be given high consideration when carrying out future environmental protection work. The EPA is determined to fully implement the Environmental Protection Policy Three-Year Action Plan to create high quality living environments and a resource-recycling society.

Waste Management

Waste Reduction Works: Construction of Three Incinerators Halted

The Executive Yuan informed the EPA on May 25 that the construction of three incinerators in Nantou County, Hualien County and Penghu County will be discontinued. Instead, garbage sorting, waste reduction and regional cooperation models will be adopted to resolve local waste management problems.

Waste reduction policies over the years have led to notable success and the incinerator policy developed years ago has taken a major turn. Due to a marked reduction of residential waste throughout Taiwan, and increasingly apparent results of resource recycling initiatives, as well as the fact that municipal waste incinerators sometimes lack enough fuel (garbage) to maintain efficient incineration, the EPA has decided to make a thorough review of the necessity of original plans to construct 36 municipal waste incinerators. Twenty-one of these incinerators were to be either publicly owned and operated, or publicly owned and privately operated. Apart from the 19 incinerators already completed and in operation, the other 17 will not be built due to opposing political parties in each region as well as strong local interests and public

opposition. This change will leave some counties and cities without incinerators in their jurisdiction. After a review on June 27, 2003, the Executive Yuan approved of canceling plans to build six incinerators throughout Taiwan and approved an alternate plan to build a publicly owned and privately operated incinerator in Penghu County.

Now one year later, the EPA has already reassessed alternative waste management plans, and the Executive Yuan officially announced on May 25 that construction of two incinerators in Nantou County and Hualien County shall be immediately terminated. Furthermore, on May 24 this year, the Executive Yuan issued approval of an alternative "Penghu Waste Recycling Plant Construction Plan" in place of

Penghu's former incinerator plan. The EPA indicates that Penghu County currently faces greater difficulties in terms of regional cooperation in waste management due to its remote location. Therefore it will adopt a complete sorting policy that strengthens the sorting, recycling, and reduction of garbage to achieve the goal of comprehensive and effective waste management. Hualien County will adopt regional cooperation, waste reduction, and sorting methods to cope with residential waste within its jurisdiction. Nantou County may adopt similar means as well.

The EPA indicates that those incinerators currently under construction, including three publicly owned incinerators in Keelung City, Yilan County, and Tainan County and two privately owned incinerators in Taitung County and Yunlin County will be completed as scheduled. As for the Jhubei incinerator (竹北廠) in Hsinchu County and the Jhunan incinerator (竹南廠) in Miaoli, the Executive Yuan has instructed the EPA to reevaluate whether or not it is necessary to continue construction based on mutual discussion and review with the relevant county and city governments. For more information, please call 02-23117722 ext. 2530.

News Brief

Dr. Ting-Kuei Tsay Appointed EPA Deputy Administrator

In the new cabinet reshuffle, National Taiwan University Department of Civil Engineering Professor Dr. Ting-Kuei Tsay (蔡丁貴) was appointed as the



EPA Deputy Administrator Ting-Kuei Tsay

new EPA Deputy Administrator, formally entering office on May 20. Deputy Administrator Tsay received his master's degree at National Cheng Kung University Department of Civil Engineering, and earned his doctorate degree in environmental engineering at Cornell University, with research and expertise in the areas of fluid mechanics, groundwater hydraulics, computational hydraulics and coastal engineering. Tsay was a professor for several years at Syracuse University, U.S. Upon returning to Taiwan, Tsay served as Deputy Minister of the Research, Development and Evaluation Com-

mission (Executive Yuan), and the secretary and deputy chairman of the Taiwan Association of University Professors. In addition to his extensive academic background, Deputy Administrator Tsay has always shown deep concern about environmental issues in Taiwan whether he is living here or abroad, and he has personally participated in grass roots environmental protection movements. Tsay has good rapport with environmental groups and aspires to become a bridge for communication between the EPA and environmental groups in the future.

Air Quality

Taiwan's First Particle Supersite

Following the lead of the U.S. concept of "supersites" to monitor suspended particulate matter, Taiwan has been planning and building the nation's first Supersite which will provide continuous monitoring of particulate matter. The EPA's Sinjhuang air quality monitoring station has been retrofitted with new equipment that will include measurements of visibility, solar radiation, and secondary particulates in the scope of monitoring, greatly expanding the functions of this monitoring station.

The US EPA included suspended particulate matter within a diameter of 2.5 microns ($PM_{2.5}$) in their new ambient air quality standards drafted in 1997. Due to insufficient scientific research and data of suspended particulate matter, the extent of human exposure, and the relationship between pollution sources and pollution receptors, the US Congress requested the EPA to carry out more research. This research developed into the concept of the Supersite particulate matter monitoring station.

Particulate matter is one of the main pollutants affecting Taiwan's air quality. The results of exposure investigations in numerous epidemiology studies show that $PM_{2.5}$ is significantly harmful to human health. $PM_{2.5}$ easily enters the lungs and can give rise to lung diseases and chronic damage of respiratory organs. If the fine particulate matter breathed in is an acidic substance it could lead to inflammation of heart arteries.

Due to the fact that suspended particulate matter has such a marked effect on the environment and human health, from April 2003 the EPA has been busy designing Taiwan's first Particle Supersite through a project commissioned to the National Central University's Graduate Institute of Environmental Engineering. The system integrates various particulate monitoring instruments to continuously monitor the characteristics of particulates and probe into their physi-

cal and chemical nature. The Supersite, located at the EPA's Sinjhuang monitoring station, currently includes automatic monitoring equipment for measuring $PM_{2.5}$ and PM_{10} concentrations, carbon content, distribution of particulate diameters, sulfates, nitrates, scattering coefficients and absorptivity.

The equipment and technology involved in making the Supersite is quite unique, and at the outset there are no standard PM samples to help with calibration of instruments. Therefore in the interest of ensuring quality monitoring data, the main objective currently lies in localizing operations and performance of instruments as well as developing standard operation procedures for quality assurance audits, and data verification and analysis. This will help to establish background data on local PM characteristics as a basis for operation maintenance and planning management of the monitoring station.

The EPA pointed out the following goals for the Supersite: establishment of standard operation procedures for quality assurance audits, implementation of quality assurance audit work, instrument performance analysis, establishment of monitoring data verification standard procedures, verification of monitoring data and establishment of an annual report system, analysis of monitoring data application, manual sampling and analysis, and technology research

and assessment, and recommendations for follow-up operation maintenance.

Currently, the EPA has finished plans for Supersite standard operation procedures for quality assurance audits, which will facilitate implementation of follow-up maintenance and quality assurance audits. The Supersite is currently able to support research on PM health risks, Mainland China dust storms, and biological aerosols. Its functions may also be expanded in the future to help assess visibility, solar radiation, and secondary particulates.

News Brief

Four Firms Enter Kaohsiung ESTP

The EPA has chosen four county governments to build Environmental Science and Technology Parks (ESTPs). So far Kaohsiung County has made the fastest progress and the EPA has already invested NT\$2 billion into the Kaohsiung ESTP. Contracts have already been confirmed with four companies to set up in the park. Several other companies including Meishang World Resources (美商世界資源), Youshih Nanotechnology (由式奈米), Guangyang (光洋), Fuyi (福誼), Jialong (佳龍) and Taiyu (台禹) are actively engaged in preparations to set up in the park as well. Among the companies that have already signed contracts, Shankou Metals (山口金礦物) has invested NT\$800 million toward the recycling and reuse of precious metals, Leige Technology (磊格科技) has invested NT\$200 million toward the recycling and reuse of lead batteries, Guolian Mechanics (國聯機械) and Jhengjia Hsingye (正加興業) have each invested NT\$100 million toward the manufacture of environmental production equipment. These four companies have already invested a combined total of NT\$1.2 billion in the Kaohsiung ESTP.

Activities

Environment Day Focuses on Protecting Oceans and Rivers

Resounding the UN World Environment Day 2004 theme "Wanted! Seas and Oceans - Dead or Alive?" and looking to encourage citizen participation in environmental protection work, the EPA held a National Environment Day activity on June 5 at the Gaoping River artificial wetland. The activity theme was "River, Estuary, and Marine Water Quality Protection and Remediation Results." Marine aquariums from all over Taiwan were invited to cooperate in this great project by providing special deals for visitors and holding public activities, giving the public a greater understanding of the importance behind protecting Taiwan's river and marine environments. This activity also was a chance to draw the nation's citizenry together to show concern about rivers and marine waters on National Environment Day.

International Drinking Water Quality Management and Treatment Technology Symposium

The Tenth International Workshop on Drinking Water Quality Management and Treatment Technology was held in Taipei on June 1-2. Discussion topics included tap water treatment technology and water source protection and 27 domestic and foreign scholars and experts were invited to give dissertations, and

exchange opinions and experience. In the interest of promoting national drinking water quality management and treatment technology, the EPA also specially invited top specialists in this area from the US, Germany, Britain, France, Japan, Hong Kong to Taiwan to discuss designated topics and engage in discussion with domestic industry, government and academia representatives to share views on domestic drinking water quality management. These specialists were also invited to propose concrete conclusions and advise to improve the status of drinking water management in Taiwan.

International Seminar on ESTPs Kicks Off to a Perfect Start

The EPA sponsored the International Seminar on Environmental Science and Technology Parks on May 14 in Taipei, inviting Prof. Heinz Strebel & Mag. Arnulf Hasler, Institute of Innovation and Environmental Management, University of Graz, Austria; Hirotohi Kakisako Director of Northern Kitakyushu City Environmental Industry Policy Office, Japan, Mr. Ernest Lowe of Sustainable System Inc., US; and Mr. James Ireland of Eco-Industrial Group, Canada to deliver speeches. The guests were invited to share successful foreign experiences in the area of environmental science and technology parks and "ecological societies,"

which will serve as a useful reference in the development of Taiwan's four ESTPs. Among the nearly 200 participants present at the seminar included EPA officials, many of the nation's university scholars in related fields, and private environmental technology enterprise representatives.

"Little Green Sprout" Award Designed for Children's Books

The EPA held the "First Little Green Sprout Awards" as a means of encouraging artists, writers, teachers and publishers to collaborate in designing, creating, translating and publishing more environmental education books for pre-school children. Parents and teachers are encouraged to use "Little Green Sprout" books when reading with toddlers with the aim of advancing the overall quality of environmental education in Taiwan. The EPA intends for this award to facilitate environmental education initiatives that convey the beautiful and amazing diversity of life on Earth to younger generations. Selection criteria for the award include environmental education books that have been published within the last five years with content suitable for pre-schoolers, either in the category of environmental protection or nature conservation. Registration deadline is August 15. For more information please call 02-23117722 ext. 2739.

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Publisher

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Publishing Directors

Tsay Ting-Kuei, Lin Ta-hsiung
Ni Shih-piao

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Roam Gwo-dong

Executive Editors

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Hsiao Lee-kuo, Lin Char-hung,
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For inquiries or subscriptions to the printed version, please contact:

Environmental Policy Monthly
Environmental Protection Administration
Office of Science and Technology
Advisors

41, Sec. 1, Jhonghua Rd.,
Taipei, Taiwan, R.O.C.
tel: 886-2-2311-7722, ext. 2207.
fax: 886-2-2311-5486
e-mail: umail@sun.epa.gov.tw

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