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## Feature Article

### Control of Mobile Source Air Pollution

Control of mobile source air pollution is becoming increasingly important as the number of motor vehicles continues to rise each year. The EPA has developed five focal goals to strengthen controls on new vehicles and on vehicles in use, promote cleaner fuels, popularize low-polluting vehicles and improve traffic management. Other important work to ameliorate emissions of mobile source air pollution includes the active introduction of low-carbon concepts and promotion of electric vehicles.

Economic growth in recent years has caused the number of motor vehicles to skyrocket, especially in urban areas where exhaust from motor vehicles not only seriously affects urban air quality but also harms the health of residents. Reducing air pollution from motor vehicles has become one of the most important tasks in mobile source air pollution control.

#### Doubled Air Pollution Emissions Spur Tighter Controls

The status of mobile source air pollution can be seen by analyzing annual growth trends for population, economic variables, motor vehicles and energy consumption. By the end of 2009 the total population was 14% higher than it was in 1989, yet total energy consumption over that same period of time increased by a factor of 2.4. Meanwhile the number of cars in that same period increased by a factor of 2.3, and

energy consumption in the transportation sector went up by a factor of 2.0. Yet active controls by the EPA have had a considerable effect on emissions from mobile sources over the years. The effectiveness of control measures can be seen by comparing annual emissions of the years 1987 and 2009, during which time PM<sub>10</sub> emissions decreased 5%, SO<sub>x</sub> emissions decreased 95%, NO<sub>x</sub> emissions decreased 22%, non-methane hydrocarbon (NMHC) emissions decreased 69%, CO<sub>2</sub> emissions decreased 68%, and Pb emissions decreased 98%. Nonetheless greenhouse gas emissions from mobile sources have increased by a factor of 2.5 along with the increase in the use of fuel, making it all the more important to promote low-carbon transportation.

#### Five-Pronged Control of Mobile Source Air Pollution

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Taiwan's existing mobile source air pollution control measures can be divided into five main areas: control new vehicles, control vehicles already in use, promote cleaner fuels, popularize low-polluting vehicles, and improve traffic management (see chart). Details on measures taken in each of these areas are explained below.

### Five-Pronged Control of Mobile Source Air Pollution

#### I. Control of new vehicles

##### 1. Tightening of emission standards in stages

Gasoline and diesel cars:

i. In the preliminary stage of setting emission standards for gasoline and diesel cars, US control regulations and standards were adopted.

ii. In the third stage of controls for diesel cars and

in the fourth stage of controls for gasoline cars, EU standards were adopted.

iii. Fifth stage emission standards for diesel cars were announced on 29 October 2009 and will take effect on 1 January 2012.

iv. Fifth stage emission standards for gasoline cars were announced on 31 March 2010 and will take effect on 1 October 2012.

Motorbikes:

i. Fourth stage emission standards were tightened for two-stroke motorcycles, which have been prohibited from manufacture or sale in Taiwan since 2004.

ii. Fifth stage emission standards for motorbikes took effect on 1 July 2007, requiring all motorbikes to use electronic fuel injection systems.

iii. Sixth stage emission standards are currently being

 *Chart: The five main areas of mobile source air pollution control*

<b>Control new vehicles</b>	Implement tightening of emission standards in stages Conduct standard testing of new models and random testing of new vehicles Computerize testing and approval procedures
<b>Control vehicles in use</b>	Conduct regular exhaust testing of motorbikes Conduct random exhaust testing of diesel cars and motorbikes Provide incentives for informants of polluting vehicles Step up replacement of outdated two-stroke motorbikes Promote unification of liability insurance and testing for gasoline cars Promote repair and maintenance systems for diesel cars
<b>Promote cleaner fuels</b>	Set control standards for diesel and gasoline fuel Collect air pollution fees from all vehicles Ban illegal petroleum products Increase the number of liquefied petroleum gas (LPG) dual fuel cars and filling stations Subsidize LPG fuel
<b>Popularize low-polluting vehicles</b>	Promote use of electric motorbikes, cars and buses Promote establishment of battery swapping systems Subsidize purchase of electric assisted bicycles and electric bicycles
<b>Improve traffic Management</b>	Encourage use of mass transportation systems Promote environmentally friendly driving skills Promote anti-idling measures

drafted and will be announced by the end of 2011 and implemented by 2014.

2. Testing of new vehicle models: All new vehicle models must be proven to conform to emission standards.

## II. Control of vehicles in use

### 1. Regular exhaust testing of vehicles in use

Regular exhaust testing for gasoline and diesel vehicles is conducted by the motor vehicle supervision office during mandated yearly vehicle safety checks. The EPA is coordinating with motor vehicle supervision offices to upgrade the quality of exhaust testing and strengthen data applications. The EPA is also developing a regular maintenance system for diesel cars to improve emissions of black smoke. Regular exhaust testing of motorbikes is entrusted by the EPA to motorbike exhaust testing stations. By the end of 2010 there were 2,582 motorbike exhaust testing stations nationwide, and each year testing notifications are sent to approximately 10 million motorbike owners. About 7 million of these motorbikes actually come in for testing, and omitting those that are no longer in use, a testing rate of 83.44% of all motorbikes is attained. About 15% of these do not conform to emission standards, and their owners, as well as motorbike owners who fail to come in for testing, are required by their local environmental protection bureau (EPB) to make improvements.

### 2. Strengthening of random testing

i. Local EPBs are responsible for conducting non-scheduled testing including random roadside motorbike exhaust checks and road patrols. A total of 1,507,924 checks were performed in 2010, and those noncompliant with standards were penalized by local EPBs.

ii. A total of 26 diesel dynamometer smoke test instruments have been installed in 19 counties and cities. This equipment detected questionable pollution emissions from 79,230 vehicles in 2010.

iii. In 2010, local EPBs conducted random roadside exhaust checks on 10,982 diesel vehicles at highway toll stations and other appropriate locations.

### 3. Rewards to informants of polluting vehicles

i. From 1 January 2009, a reward of NT\$300 has been given to informants who send in three pictures of a polluting vehicle after the local EPB confirms the evidence. The percentage of informants who included photos in their reports reached 84.2% in 2010, attesting to the stronger incentive provided by this new system, which increases citizens' willingness to report polluting vehicles.

ii. A total of 133,418 cases were received from civil informants in 2010. Of these, a total of 26,684 two-stroke motorcycles, 1,742 four-stroke motorcycles, 876 gasoline cars, and 8,126 diesel cars came in for testing upon receiving notification.

### 4. Replacement of high-polluting outdated two-stroke motorcycles

i. By the end of 2006, subsidies were approved for a plan to replace all high-polluting, outdated two-stroke motorcycles in the Kaohsiung-Pingtung (KKP) Region, implemented by the Kaohsiung City Environmental Protection Bureau. The plan offered NT\$1,500 for each vehicle and resulted in the replacement of 350,000 two-stroke motorcycles over a three-year span from 2007 to 2009.

ii. The Legislative Yuan decided to subsidize the replacement of 100,000 two-stroke motorcycles in 2008, to be divided evenly between the KKP Region (50,000 vehicles) and other counties and cities (50,000 vehicles total). On 17 July 2008, the Legislative Yuan approved further planning for subsidies to go to all other 22 counties and cities outside of the KKP Region to replace outdated two-stroke motorcycles nationwide.

iii. The two-stroke motorcycle replacement subsidy plan replaced 51,607 vehicles in 2008, 89,449 vehicles in 2009, and 74,249 vehicles in 2010, for a total of 215,305 vehicles within three years.

This is estimated to account for 61.52% of all two-stroke motorcycles. To receive the subsidy, vehicles must comply with certain conditions. According to the EPA Recycling Fund Management Board's statistics on recovery of end-of-life vehicles (ELVs), around 300,000 two-stroke motorcycle ELVs were collected in 2008 and 2009, and 180,000 were collected in

2010, for a total of 480,000 ELVs in those three years. Data from the Ministry of Transportation and Communication's Department of Statistics shows registration of light motorcycles (the majority of which are two-stroke motorcycles) decreased by 160,000 in 2008, by another 160,000 in 2009, and by 120,000 in 2010, for a total decrease of 440,000 vehicles, reaching the targeted number for this period.

### III. Promotion of cleaner fuels

#### 1. Establish petroleum product composition standards

i. The Control Standards for the Composition and Properties of Automobile Gasoline and Diesel (車用汽柴油成分及性能管制標準) took effect in 2000.

ii. Annual reductions in sulphur content of diesel fuel for automobiles, from 5,000 ppmw in 1989 to 50 ppmw in 2005. Sulphur content of gasoline was reduced to 50 ppmw on 1 January 2007.

iii. Revisions were made to the Control Standards on the Composition of Automobile Gasoline and Diesel (車用汽柴油成分管制標準) on 29 July 2009, calling for reduced sulphur content in diesel to 10 ppmw effective 1 July 2011, and reduced sulphur content in gasoline to 10 ppmw effective 1 January 2012. These reductions are in line with international quality control trends.

#### 2. Strengthen bans on illegal petroleum products

i. Working to eliminate the use of illegal petroleum products in cars, the EPA revised the Standards for Penalizing Vehicular Violations of the Air Pollution Control Act (交通工具違反空氣污染防治法裁罰準則) on 8 January 2003, which stepped up fines by a large margin for using illegal diesel products, stipulating a maximum fine of NT\$75,000.

ii. A total of 25,931 cases were reviewed in 2010, of which 25, or 0.096%, of cases involved the use of illegal petroleum product. This shows an effective reduction in the use of such products and is positive reinforcement for continuing this clampdown in the future.

### IV. Promotion of low-polluting vehicles

#### 1. Subsidies for purchasing electric assisted bicycles

and electric bicycles

i. Electric assisted bicycles allow the use of both pedal power and a battery powered motor to occasionally assist the rider. Subsidy regulations were put into effect from 2001, providing NT\$3,000 for each purchase of about 3,000~4,000 electric assisted bicycles each year.

ii. Electric bicycles do not feature pedal power and rely entirely on battery powered motors. The EPA coordinated with the Ministry of Transportation and Communications, which agreed to revise regulations so that these vehicles would be legal on the roads. The EPA then drafted subsidy regulations on 5 May 2009 to provide a subsidy of NT\$3,000 per vehicle.

#### 2. Incentives for enterprises to establish electric vehicle battery swapping systems

The establishment of electric vehicle battery swapping systems would allow users to quickly replace their batteries as easily as filling up a tank of gas. Such convenience would encourage more widespread use of electric vehicles.

i. The EPA has completed the legislation of the Electric Motorbike Battery Swapping Station Subsidy Regulations (電動機車電池交換站補助辦法) and the Electric Motorbike Battery Swapping Fee Subsidy Regulations (電動機車電池交換費用補助辦法).

ii. Two electric motorbike battery swapping stations have been set up as models to help assess effectiveness and to plan for the future.

iii. Standards have been formulated for establishing universal battery specifications and swapping stations.

iv. The establishment of battery swapping systems has been planned in coordination with low-carbon community and low-carbon island promotion plans.

#### 3. Promotion of LPG dual fuel cars

Stage 1: From 1996 to the end of 2000, subsidies have been provided to retrofit over 27,000 taxis with LPG dual fuel technology.

Stage 2: From 1 October 2001, subsidies have been provided to reduce the price of LPG by NT\$3.0 per

liter. This subsidy had gradually receded to NT\$2.5 in 2006 and NT\$2.0 in 2007.

Stage 3: After the EPA submitted a report to the Executive Yuan on 16 January 2008, the Executive Yuan was quick to ratify the LPG Dual Fuel Car Promotion Plan on 21 January 2008. This plan aimed to invest NT\$7.572 billion over five years, toward increasing the number of LPG dual fuel vehicles to 150,000 and the number of LPG filling stations to 150. The EPA is responsible for providing fuel subsidies and NT\$25,000 in fuel coupons for owners of new or retrofitted LPG vehicles.

Twenty-two new LPG filling stations have been established from 2008 to 2010, increasing the total number of stations in operation to 42. Meanwhile the number of LPG dual fuel vehicles has increased by 11,967, putting the total number at 21,826.

## V. Improvement of Traffic Management Measures

### 1. Promotion of Measures to Stop Engine Idling

i. The Tainan City Anti-Idling Bylaw was announced on 28 June 2007 and took effect on 1 January 2008, with fines for violators from NT\$500 to NT\$2,000. Law enforcers inspected a total of 18,480 cases of idling in 2008, and penalties were handed out to one motorbike, 35 cars, one government vehicle, and 11 trucks for a total of 48 penalties. The idling incidence rate dropped from 7.9% in January 2008 to 3.5% by the end of that year, and surveys showed up to 93% of the population support the bylaw.

ii. Taichung City and Hsinchu City announced that leaving automobiles in idle for over three minutes is defined as air polluting behavior in accordance with the Air Pollution Control Act.

iii. The Legislative Yuan approved the third reading of revisions to the Air Pollution Control Act on 8 April 2011, adding regulations against engine idling. The EPA is also drafting related management regulations and penalty standards which are expected to take effect in 2012.

### 2. Promotion of environmentally friendly driving

Environmentally friendly driving demonstration teams are being established with a total of more than 300 buses, trucks and taxis. In addition, 2,000 environmental driving training manuals will be printed. The EPA is also developing a comprehensive strategic action plan to promote environmentally friendly driving.

### 3. Continued promotion of mass transportation, bicycles and controls in Clean Air Zones

To ensure effective and comprehensive implementation of mobile source air pollution controls, the EPA will integrate low-carbon community and city plans with low-carbon transportation plans to create a more human-oriented driving environment and actively improve vehicular pollution emissions and a more peaceful living environment.

## Feature Article

# President Ma's Environmental Policy Sees Three Years of Good Results

President Ma Ying-jeou's "Health and Sustainability for Taiwan" environmental policy has achieved good results since his inauguration on 20 May 2008. Apart from legislative affairs which are still underway, already 115 of the total 172 tasks have been completed, attesting to the EPA's hard work to put the President's ideals of environmental protection into practice. The many notable achievements brought forth in just three years have received support from all circles.

**T**he EPA has achieved significant concrete results on several fronts including the organizational planning of the Ministry of Environment and Natural Resources, the legislation of the Environmental Education Act, reduction of greenhouse gas

emissions, strengthening of river purification, waste reduction and recycling, and nationwide clean neighborhood campaigns, as outlined in detail below:

1. Ministry of Environment and Natural Resources: The EPA has coordinated the establishment of this ministry, which integrates related departments of all government agencies under one organization. The new ministry is to see to both pollution control and nature conservation work through comprehensive decision-making mechanisms and strengthened administrative efficiency.

2. Legislation: Eighteen years since its inauguration, the EPA established the Environmental Education Act on 5 June 2010, making Taiwan one of the few nations with legislation on environmental education. The Act went into effect on 5 June 2011 to improve the environmental literacy of citizens. The Greenhouse Gas Reduction Act and the Indoor Air Quality Management Act have also been drafted and are currently under review by the Legislative Yuan.

3. Air quality: The percentage of poor air quality days (PSI>100) has dropped from 3.68% in 2007 to 1.44% in 2010, the best it has been in five years. The greatest margin of improvement was observed in 2010.

4. Low-carbon transportation: From 2008 to 2010, the EPA subsidized and popularized electric assisted bicycles, electric bicycles, electric scooters, hybrid cars, and dual-fuel cars, increasing the total combined number of these vehicles by 56,902. Through inter-agency negotiations, the Ministry of Finance determined on 23 February 2009 that hybrid cars shall be classified as electric cars, for which only 50% of commodity taxes are collected. The Legislative Yuan further approved the Amendments to the Commodity Tax Act on 10 January 2011, completely exempting electric cars from commodity taxes, thereby effectively decreasing their market price.

5. Greenhouse gas reductions: Legislation of the Greenhouse Gas Reduction Act has been underway in addition to the establishment of a national greenhouse gas registry platform. Already 341 companies have voluntarily submitted data accounting for 85% of emissions in the industry and energy sectors. Efforts have been made to strengthen international cooperation on carbon credits and carbon trading. This has encouraged enterprises to voluntarily reduce carbon emissions by 33 million tonnes. Taiwan's CO<sub>2</sub> emissions from

fuel combustion saw negative growth for the first time in 20 years, dropping 4.1% from 2007 to 2008. An even greater margin of reduction occurred in 2009 as emissions were cut by another 4.9%.

6. Water body water quality: Recent focus has been given to promoting the remediation and restoration of urban rivers. By the end of 2010, remediation works were completed along the Fongshan River in Kaohsiung City and the Wannian River in Pingtung County, benefitting a total of 550,000 nearby residents. Restoration and remediation works continued along three rivers in New Taipei City, including the Chung-Kang Drainage Canal, benefitting a total of 1.37 million people. The total length of seriously polluted river segments nationwide decreased from 196.3 kilometers in 2007 to 168.3 kilometers by March 2011, a total of 28 kilometers. This attests to continually improving river water quality.

7. General waste reduction, sorting and recycling: By the end of February 2011, per capita garbage clearance volume was 0.475 kilograms, falling 18.52% from 2007 (0.583 kilograms), and 56.13% less than the highest recorded volume of 1.135 kilograms in 1998. By the end of February 2011, the resource recycling and reuse rate had risen to 56.77%, which is 13.81% higher than the 2007 rate of 42.96%.

8. Green consumption: Guidance was provided to retailers, resulting in the transformation of 10,353 shops into Green Stores that provide general consumers a convenient way to purchase green merchandise. The EPA also established a product carbon footprint labeling system, making Taiwan the eleventh nation in the world to implement carbon labeling.

9. Clean neighborhoods: The EcoLife Web site has been promoting mobilization of citizens to help with environmental beautification and environmental sanitation in rural villages and neighborhoods. This included implementing three-tier multiple mobilization for dengue fever inspections, resulting in the elimination of 27,002 mosquito breeding grounds, the disposal of 3.99 million containers and 190,000 used tires, and the tidying of over 50,000 vacant lots. The number of regulated public toilets was increased, as was the level of cleanliness of public toilets, bringing the percentage of top quality toilets to 93% (45,327 toilets).

The EPA will continue to draw together the strengths of all circles to implement the President's environmental ideals and establish a new nation that embodies low-carbon lifestyles, cycling of resources, health and sustainability. This marks a milestone

for sustainable development for the coming second century of the ROC government. Performance results for the past three years are posted on the EPA Web site (<http://www.epa.gov.tw>).

## Environmental Education

# Environmental Education Act to Usher in New Era of Earth Stewardship

A series of environmental activities was held in commemoration of the centennial of the ROC government, with 5 June 2011 holding special historical significance as it was both World Environment Day and the anniversary of the implementation of the Environmental Education Act (環境教育法). The EPA held a special activity to announce this occasion in coordination with several civil organizations at Wugu Wetland Ecological Park education center in New Taipei City.

Taiwan is the fourth nation in Asia and the sixth in the world to legislate an Environmental Education Act. This important Act shows that environmental education has become indispensable to environmental protection policy administration. Enforcement of the Environmental Education Act will ensure the government and private sectors do their best to promote environmental education. The Act builds on Taiwan's existing foundation of environmental education which was established years ago, by working to change people's values and behaviors to protect and enhance environmental quality, and help Taiwan make strides toward sustainable development. The Act also helps realize President Ma Ying-jeou's ideals of environmental and generational justice.

Several organizations and schools have begun promoting environmental education since the Environmental Education Act was promulgated on 5 June 2010. Now that the Act is in effect, the Office of the President, and all central and local government agencies throughout Taiwan, as well as schools, are planning environmental education courses for the second half of 2011. For example: the Office of the President has invited experts to give speeches on caring for the environment and has made

arrangements for staff to visit the Beitou Municipal Waste Incineration Plant; the Executive Yuan is organizing ecological and cultural site visits for staff; the Legislative Yuan is holding lectures on endocrine disruptors; the Examination Yuan is organizing lectures on the Environmental Education Act; the Judicial Yuan is scheduling viewings of the film "Plus or Minus Two Degrees Celsius - the Truth Taiwan Must Face"; and the Control Yuan is organizing environmental education visits to water resource and wetland conservation areas.

The EPA explained that the theme of World Environment Day 2011 – Forests: Nature At Your Service – strengthens the relationship between quality of life and healthy forests and forest ecosystems. Thus the EPA has complemented this theme by holding this special event to commemorate the launch of the Environmental Education Act and related activities at the Wugu Wetland Ecological Park education center in New Taipei City.

The EPA calls on all citizens to check out the EcoLife Web site (<http://ecolife.epa.gov.tw/>) and sign the Carbon Reduction Pledge as well as join in on actions to mitigate global warming by reducing carbon emissions and conserving energy.

## Toxic Substance Management

# Toxic Chemical Advisory Council Held to Review Plasticizer Classification

The EPA convened toxic chemical scholars and specialists for an advisory council on 1 June 2011 to review the

toxicology and environmental characteristics of DEHP, DMP and DBP, which are regulated under the Principles for Screening and Identifying Toxic Chemical Substances (篩選認定毒性化學物質作業原則). The council also evaluated a proposal to add BBP, DINP, DIDP and DEP to the list of regulated substances. The council also evaluated a proposal to add BBP, DINP, DIDP and DEP to the list of regulated substances.

On 1 June 2011, in order to strengthen the management of Class 4 toxic chemical substances, the EPA promulgated revisions to regulations for the management of Class 4 toxic chemical handling records, requiring Class 4 toxic chemical handlers to keep daily records and submit handling records online each month. The advisory council came to several conclusions. Di(2-ethylhexyl)phthalate (DEHP), dibutyl phthalate (DBP) and benzyl butyl phthalate (BBP) are currently listed by the EU as toxic to reproduction, and although reproductive toxicity of phthalic acid esters (PAEs) is not as strong, none of these substances break down easily and tend to accumulate in the environment, thus harming the environment and human health. The council recommended switching DEHP and DBP from Class 4 to Class 1 and Class 2. They also recommended moving dimethyl phthalate (DMP) from Class 4 to Class 1, as well as adding BBP to the list of Class 1 and Class 2 toxic substances. The council advised listing diisononyl phthalate (DINP), diisodecyl phthalate (DIDP) and diethyl phthalate (DEP) as Class 1 toxic substances. It also advised

listing all PAEs other than the seven abovementioned chemicals and di-n-octyl phthalate (DnOP) as Class 4 toxic substances. The EPA will promptly act on these recommendations by initiating the standard legal process, which involves issuing a preannouncement and holding public hearings on these revisions. Once revisions are promulgated, the above seven chemicals will be limited for use as plasticizers only.

The EPA emphasizes that apart from regulating PAEs and other toxic chemicals under the Toxic Chemical Substances Control Act (毒性化學物質管理法), each agency is responsible as the industry competent authority for gathering information and prioritizing substances for control. Working through the cross-ministerial endocrine disruptor management taskforce convened by the EPA, work has been divided so that each competent authority can promptly and effectively reinforce regulations and related controls for each product or food item in order to ensure the protection of the environment and the health of citizens.

## Soil and Groundwater

### EPA Explains Fines for Unjust Enrichment of Formosa Plastics Renwu Plant

Pollution was covered up at Formosa Plastics' Renwu Plant for six years without adoption of emergency treatment measures, resulting in even more serious pollution. A discretionary review concluded that the plant deserves a high level of censure due to the serious impacts caused by the pollution, which has spread beyond its original boundary. Due to the company's high margin of economic profit as defined in the Administrative Law, the EPA fined the company NT\$80 million according to the Administrative Penalty Act.

Groundwater pollution at the Formosa Plastics Renwu Plant is so serious that the EPA has already announced the area as a pollution remediation site. Although the plant operators were aware of serious leakage into the groundwater, they not only concealed the pollution incident without reporting to local competent authorities, but also failed to immediately adopt comprehensive emergency response measures. Their inadequate response to the incident resulted in even worse pollution as they

allowed the pollutants to remain in the ground and spread further into the surrounding environment.

The EPA explained that the Formosa Plastics Renwu Plant constitutes serious polluting behavior as the company allowed pollution to leak into groundwater, failed to report the incident, and failed to take response measures. These circumstances violate Article 28 of the Water Pollution Control Act (水污染防治法), which states the violating enterprise is subject



to being penalized between NT\$10,000 and the NT\$600,000, the maximum fine according to Article 46 of the Act.

The EPA demonstrated by way of objective facts and investigation results, that in light of Formosa Plastics' concealment of this pollution incident for nearly six years, and its failure to adopt comprehensive emergency response measures resulting in serious pollution, the profits gained through the abovementioned violations exceeded the maximum penalty of NT\$600,000. A discretionary review concluded a high level of censure is justified due to the serious extent of pollution having spread beyond its original boundaries. The company was thus found in violation of the Administrative Law regarding high profit margins. According to Article 18 Paragraph 2 of the Administrative Penalty Act, the penalty can be increased to an amount within the range of profits gained through violation, overriding the aforementioned maximum penalty stated in the Water Pollution Control Act. It was therefore decided that the

penalty should be increased to NT\$80 million.

Regarding civil environmental organization concerns that the NT\$80 million fine is not proportionate to the pollution caused by Formosa Plastics Renwu Plant, the EPA has explained as follows. The EPA assisted the pre-reformed Kaohsiung County Government to appropriately handle the pollution incident, as well as advised on the use of open, transparent, participatory and professional methods to establish the "Taskforce on the Spread and Remediation of Soil and Groundwater Pollution" which was composed of experts recommended by each side of the dispute. The EPA advised the government to entrust follow-up pollution control and remediation planning to this taskforce so that inspection by objective experts could lead to better decision-making. The amount of the fine was based on the value of remediation plans drawn up by this taskforce through neutral and objective scientific investigation and discussion, which was calculated as remediation expenses that Formosa Plastics had previously avoided.

## Environmental Analysis

# Environmental Monitoring Simplified through Innovative Passive Sampling Equipment

The Environmental Analysis Laboratory (EAL) invited EPA Minister Stephen Shu-hung Shen to preside over the inaugural ceremony of its newly developed passive sampling instrument on 13 May 2011. This technological breakthrough marks a new milestone for environmental monitoring in Taiwan.

Conventional environmental monitoring is predominantly carried out via manual sampling equipment. The results of sample analyses only show the compositions of pollutants that are present at a particular time and place. Sample data shows only concentrations at one instant in time rather than showing the overall status of environmental pollution. Addressing these shortcomings of conventional methods, the EPA has developed a passive sampling instrument that can be installed in locations near residential environments such as roadsides, utility poles, park trees, or riverbeds. Pollution of these environments can be determined after analyzing the monitoring results, and different materials can be sampled to monitor air, water, groundwater and effluent for various types of chemicals including dioxins, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), organochlorine pesticides, polybrominated diphenyl ether, and heavy

metals such as copper, cadmium, nickel and zinc. It is a simple environmentally friendly technology that does not require much electricity. The instrument can be used to cover a broad area and continuous monitoring and sampling can be conducted at each sampling location for 7 to 60 days.

For example, the passive sampling instrument was used continuously for 42 days to detect 11.2 ng of polybrominated diphenyl ethers in indoor office air, showing a 62.5% capture and detection rate for 24 congeners. The instrument was also used continuously for 7 days to sample groundwater in wells, showing a 96% capture and detection rate for 24 chemical substances, of which trichloroethylene (TCE) was detected at concentrations ranging from 0.437 to 1.00 mg/L. In contrast, traditional manual sampling methods in the same circumstances detected TCE concentrations ranging from 2.26 to

6.91 mg/L, attesting to the effective capture capability of the new passive sampling technology. Comparing the results of manual micro-purge sampling methods and passive sampling methods, the percentage error ranged from -5.8% to 37%, which is still within reasonable limits.

The EPA stated that the establishment of passive sampling as a basic skill and ability in environmental monitoring will benefit the provision of local environmental background information, which is a popular research topic in the international arena. For example, previous assessment of river pollution often used water quality as an indicator, yet short-term single-focus manual sampling methods are

less capable of showing regional distribution of environmental pollutants and analytical information on bioavailability. Passive sampling equipment, however, was developed with biomagnification concepts by simulating biological exposure in living environments and collecting chemical samples. When anomalies occur, the new technology can make use of this information to extend the search for pollution sources. This passive sampling instrument fulfills the goals of environmental monitoring to prevent and stop illegal emissions, while also establishing a database on the environmental status on a regional scale to ensure effective command over changing trends in environmental pollution.

## Water Quality

# Water Pollution Control Zones for Rivers Lying in Two or More Municipalities Announced

Complementing changes made to administrative regions, the EPA has announced "Water Pollution Control Zones for Rivers Lying in Two or More Municipalities" according to Article 29 Paragraph 2 and Article 30 Paragraph 2 of the Water Pollution Control Act (水污染防治法). The measure took effect on 30 May 2011.

The EPA stated that according to Article 29 of the Water Pollution Control Act, municipality, city and county authorities are required to plan water pollution control zones based on the status of water pollution in their area of jurisdiction, as well as publicly announce these zones and report their plans to the EPA. Control zones straddling two or more municipalities, cities or counties shall be planned and announced by the EPA. Article 30 of the Act stipulates that pesticides and chemical fertilizers may not be used in water pollution control zones, and no garbage, septic waste, sludge, pickling or alkaline waste, construction waste or other pollutants shall be dumped in water bodies or within a stipulated distance from their banks. Moreover livestock raising is prohibited in water bodies or within a stipulated distance from their banks, which shall be determined and announced by the EPA. The abovementioned regulations shall serve as the basis of designating control zones.

Details of the newly enforced measures are as follows:

1. Control objectives: improve water pollution, ensure clean water resources, maintain living environments

and enhance public health.

2. Water pollution control zone boundaries: Watersheds along the main branches of 18 rivers. Administrative zones are delineated in detail in Chart 1 of the announcement.

3. Water bodies designated by competent authorities: See Chart 2 of the announcement.

4. Distance from the banks of water bodies as designated by competent authorities:

a. According to Article 30 Paragraph 1(b) of the Water Pollution Control Act, the distance from the banks of water bodies shall accord with riverbeds as defined in Article 6 of Regulation of River Management.

b. According to Article 30 Paragraph 1(d) of the Water Pollution Control Act, the distance from the banks of water bodies shall be the path of flow between two banks, or the path of possible flow, or land within the zone that is subject to regular flooding.

## Climate Change

## Danish Experience on CCHP Systems Shared at International Forum on Low-Carbon Communities

A number of EU countries have been at the forefront of raising the efficiency of power generation in power stations and promoting the reuse of waste heat captured during the power generation process. In order to better understand their abundant experience in this field, EPA Minister Stephen Shu-hung Shen visited Sweden, Denmark, and Germany in 2010 and 2011. His visits gave him the opportunity to invite Danish experts in the field of Combined Cooling, Heating and Power (CCHP) systems to come to Taiwan to speak at the International Forum on Establishment of Combined Cooling, Heating and Power Systems Toward Low Carbon Communities. The forum and related events were held from 9~11 May 2011.

The International Forum on Establishment of Combined Cooling, Heating and Power (CCHP) Systems Toward Low Carbon Communities and the accompanying round table meetings were attended by experts and government and industry representatives from both Taiwan and overseas. In-depth and fruitful discussions on regional CCHP technologies and operating experiences were held. The Danish experts also visited Taiwan Power Corporation's thermal power plants in Kaohsiung and Dalin, offered advice and put together a recommendation report containing suggestions for CCHP implementation.

As EPA Minister Stephen Shu-hung Shen has pointed out, Denmark is a world leader in the exploitation of renewable energy sources such as wind power and waste heat. Denmark has vast experience in building combined heating and power (CHP) systems which use waste heat from power plants or refuse incinerators. These CHP systems integrate electricity supply and demand to a fine degree, and also fulfill the nation's commitments to reducing greenhouse gases. Drawing upon the rich experience of advanced nations in the EU and actively seeking bilateral technological exchanges are expected to be of benefit in promoting the installation of regional CCHP systems at Taiwan's power stations and incinerators in the coming years. The Europeans also have valuable experience to offer in the fields of multi-fuel power station technology and waste heat recovery technology.

Ministry of Economic Affairs Vice Minister Huang Jung-Chiou gave a speech at the forum in which he expressed the hope that within a few years there will be demonstration waste heat recovery and CCHP systems set up in Taiwan's industrial parks. He also envisioned that, after careful consideration of costs and legal requirements,

CCHP technology could be applied to reducing the costs of supplying hot water and air conditioning in schools, hotels, and communities.

The Danish experts who attended the forum gave presentations on the topics of "Setting Up CCHP Systems: the Danish Experience" and "Using Ultra Super Critical (USC) Multi-Fuel Furnaces to Raise Energy Efficiency" in which they shared their knowledge of Denmark's development of clean energy policies and related technologies. As Ms. Else Bernsen from COWI Group pointed out, before 1970 over 99% of Denmark's energy was derived from imported sources. It wasn't until the formulation of energy development policies in the 1970's that called for the vigorous development of renewable energy and clean energy technologies that Denmark's power generation moved away from centralized power plants towards distributed energy centers. Combined heat-and-power also began to be supplied to designated regions in order to raise overall energy efficiency and lower power generation costs. A landmark was passed in 1997, after nearly 30 years of continuous effort, when Denmark became self-sufficient in energy. From 1980 to 2005, while Denmark's GDP grew 56%, its energy consumption grew at only 3%, and CO<sub>2</sub> emission volumes have been falling year-on-year.

Mr. Paolo Danesi from Denmark's Burmeister & Wain Energy presented an analysis of the feasibility of using multi-fuels. The advantages of using multi-fuels include added diversity of fuel supply that raises energy efficiency and reduces the impact that variances in fuel prices can have on operating costs. He also mentioned that a part of the overall promotion of regional CCHP systems in Denmark has involved installing CCHP systems at metropolitan refuse incinerators to reuse the large amounts of heat that they produce, effectively turning them into small-scale

regional energy centers. The experience the Danes have had in implementing this policy may well become useful reference material when Taiwan comes to transforming metropolitan refuse incinerators into energy centers.

The conference and the associated activities gave the Taiwan delegates a deeper understanding of the development of clean energy technologies in Denmark, which should help promote novel ways of looking at energy use, energy conservation and carbon reduction. This will involve a comprehensive review of Taiwan's regional cooling-heating-power policies and CCHP/cogeneration development and operations at existing energy enterprises. Other measures in the pipeline intended to ensure that CCHP plays a full role in achieving maximum

overall energy efficiency targets include:

- Integrating CCHP into smart grid applications.
- Conducting more accurate evaluations of electricity demand.
- Upgrading existing infrastructure.
- Implementing the regional energy and resources utilization demonstration plan at thermal power stations (such as at the one in southern Taiwan), incinerators (such as the one in Beitou, Taipei), and at the Bali Wastewater Treatment Plant, near Taipei.
- Capping the price of energy at reasonable levels.

## News Briefs

### Standards Announced for Soil Pollution Assessment, Inspection and Testing Data Review Fee

The EPA has announced the Soil Pollution Assessment, Inspection and Testing Data Review Fee Standards (土壤污染評估調查及檢測資料審查收費標準) in accordance with Articles 9 and 55 of the Soil and Groundwater Pollution Remediation Act (SGPRA), which stipulate that soil pollution assessment, inspection and testing data must be approved through a professional review process. After the Standards take effect, enterprises must ask their local environmental protection bureau to review their case in accordance with Article 9 of the SGPRA and must pay a review fee as stipulated in the Standards. Fees will not be charged for submission of additional reference materials according to Article 8 of the SGPRA.

### Class 4 Toxic Chemical Reporting Regulations Revised to Strengthen Flow Management

The EPA revised Article 5 of the Toxic Chemical Substance Handling and Release Management Regulations (毒性化學物質運作及釋放量管理辦法) on 1 June 2011 regarding the

management of Class 4 toxic chemical handling records. The frequency of records and reports has been modified to require daily records and monthly reports. This measure greatly tightens management of the flow of toxic substances.

### EIA Task Force Advises Conditional Approval for National Biotechnology Park Development Project

The EPA convened the third preliminary taskforce meeting on 20 May 2011 for the review of the National Biotechnology Research Park Development Plan Environmental Impact Statement submitted by Academia Sinica. After three hours of preliminary review, the task force came to a consensus, advising conditional approval of the environmental impact assessment. Academia Sinica is still required to submit additional information on the research and analysis of high levels of arsenic in the area as well as management plans for the operation of an ecological research area. After the requested information and management plans are confirmed by the task force, a final decision will be made by the EIA Review Committee.

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