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Feature Article

Promotion of Pathway to Net-Zero Emissions

In recent years, the world has been stepping up its efforts to advocate for net-zero emissions. Taiwan, like many other countries, has been planning a practical pathway to reach net-zero emissions by 2050, and every agency has begun to assess and design possible pathways under the coordination of the Executive Yuan. It is necessary to modify the original 2050 reduction goals in order to expedite carbon emissions with the rest of the world and reach net zero by capping temperature increase at 1.5°C. Therefore, the EPA is currently amending relevant regulations and promoting programs like climate change mitigations and actions for low-carbon, sustainable homeland.

Preface

To strengthen climate actions, the National Development Council (NDC), along with other agencies, announced *Taiwan's Pathway to Net-Zero Emissions in 2050* on 30 March 2022. With energy, industries, lifestyle, and society as focuses for future transformation, technological research and development as well as climate legislation will be the two major governing foundations. Relevant agencies are responsible to promote 12 key strategies, including wind and solar energy, hydrogen power, forward-looking energies, electricity systems and energy storage, energy conservation, carbon capture and storage, electrification and decarbonization for transportation vehicles, resource recycling and zero waste, natural carbon sinks, net-zero emissions and green lifestyle, green financing, and just transformations. The aim is to transform to and build a sustainable society of net-zero emissions by 2050.

The EPA will particularly target resource recycling and zero waste of the 12 key strategies. It hopes to build a generation of resource recycling and sustainability with zero waste, and also promote net-zero emissions and green lifestyle, via product design, resource reuse, industry connections, and technological innovations. Transformation to net-zero emissions by 2050 is a goal that requires consolidated efforts of the entire country as it pertains to global competition and environmental sustainability, which are the new driving forces of Taiwan's long-term development.

In This Issue

(1) Implementation of the first stage of carbon controls

Carbon emission in 2020 is 1.88% less than that of the baseline year (2005), close to the goal set for the first stage of carbon controls (2% decrease). The emission factor of carbon, the amount of carbon dioxide emitted for producing 1 kwh of electricity, had dropped from 0.529kg in 2005 to 0.502kg in 2020.

(2)Revision of the *Greenhouse Gas Reduction and Manage-ment Act*

Aiming to step up Taiwan's efforts toward carbon reduction, keep up with a low-carbon economy, and construct a resilient homeland, the Executive Yuan has renamed the *Greenhouse Gas and Management Act to Climate Change Response Act* (●). Revisions also included various goals and measures to reach net-zero emissions by 2050, such as upgrading and intensifying climate governance, adding articles specifically for climate mitigation, and strengthening emission controls as well as incentive mechanisms to encourage reductions. Others included collecting carbon fees for designated uses, enhancing management mechanism for carbon footprints and also product labeling, and promoting carbon storage through capture.

(3) Management strategies for carbon reductions

1. Promoting inventory, inspection and registration for carbon emissions

The first group of emission sources required to undergo inspection and registration target include those in the power generation, steel manufacturing, oil refinery, cement, semiconductor, and thin film transistor liquid crystal display (TFT-LCD) sectors. They also include factories/plants that annually produce at least 25,000 metric tons of carbon dioxide equivalent (CO_2e). Statistics show that a total of 287 sources in 2020 were required to register their emission amounts for inspection in 2021. In total, they had emitted 223 million metric tons of CO_2e, approximately 78% of Taiwan's total emissions.

Meanwhile, the EPA has announced newly added targets. Manufacturers with factories/plants whose direct emissions from burning fossil fuels and indirect emissions from electricity usage, when combined, reach 25,000 metric tons of CO_2e or more, are required to undergo inspection and registration starting 2023.

On 19 May 2022, the EPA announced the revised directives for taking inventory of carbon emissions. It later held three meetings to explain relevant revised regulations to help small- and medium-sized enterprises understand and conduct inventory. Labor associations of all industries were asked to notify members to attend so that they can learn about inventory of carbon emissions and ascertain their own emissions based on inspection results and cut down emissions accordingly.

Moreover, the EPA is looking to train over 150 inspectors, in hopes of increasing Taiwan's capacity in carbon inspection, with two training sessions already conducted to train inspectors needed in 2022. The aim is to expand Taiwan's current pool of carbon inspectors as an early response to adjustment of carbon regulations and policies and market needs.

2. Facilitating offset programs to encourage voluntary reductions

The *Regulations for Managing Carbon Offset Programs* is in place to facilitate voluntary carbon reductions and offset programs. So far there are 91 offset programs whose proposals have been approved and registered. These diverse reduction measures range from renewable energy generation, replacement of heavy oil with natural gas, switch to variable-frequency motors, increase of efficiency of air-compression systems, adoption of high-efficiency lights and chillers, recycling of methane from livestock farms' wastewater to generate power, and replacement of diesel buses with electric ones. Offset quotas can be applied according to reduced emissions actually achieved in these approved and registered programs. To date, 23.78 million metric tons of CO_2e in total have been issued as offset credits.

3. Utilizing the environmental impact assessment (EIA) mechanism to curb emission increases from development activities

The principle of offsets for increased emissions states that credits are required to be obtained to offset increased emissions after the best available technologies are adopted in the case of construction or expansion of manufacturing zones. Credits are to offset at least 10% of annual increased emissions, and offsets are to be conducted consecutively for ten years. Offsets are mandatory in the following scenarios – developers

applying to newly develop, or developed size accumulated has reached 50 hectares or more; setup of new factories/plants; and constructions of, or projects to add facilities in coal-fired or cogeneration power plants that do not use natural gas. As of the end of July 2022, there had been seven development projects having passed the EIA that were required to obtain credits to offset increased emissions based on the principle above.

As replacement of every old motorcycle with an electric one will result in an emission reduction of 2.3 metric tons of CO_2e, the EPA has set up a platform for selling and purchasing reduction benefits as offset credits are generated from these replacements. Applications to procure credits have been filed by Hsinchu Science Park Bureau (HSPB) and Hsinchu County Environmental Bureau, credits from replacing 100,000 motorcycles within two years for the former and those from replacing 400 motorcycles at NT$2,000/motorcycle for the latter. As of 20 September 2022, a total of 8,460 applications to purchase credits had been filed on the platform.

(4) Actions of climate change mitigation and low-carbon, sustainable homeland

The *National Climate Change Mitigation Action Plan* (2018-2022), approved by the Executive Yuan on September 2019, focuses on eight areas: capability building and disasters, survival infrastructure, water resources, land use, oceans and coasts, energy supplies and industries, agricultural production and biodiversity, and health. Through cross-agency collaboration, the government can enhance its basic ability to respond to climate change on the whole and integrate and strengthen mitigation results.

The report on implementing the National Climate Change Mitigation Action Plan in 2021 particularly compiled mitigation accomplishments on four key disaster and risk issues. which are extreme precipitation, heat, drought, and rising sea levels. The three teams in charge of environmental quality, accountable consumption and production, and climate actions under the National Council for Sustainable Development (NCSD) held their first team meetings in 2022. The mitigation accomplishments were presented in these meetings before being fully disclosed online for a public inquiry.

Chemicals

Chemical Substance Labeling Required to Follow Global Standards from 31 October 2023

To safely handle toxic and concerned chemical substances, the *Regulations for the Labeling and Materials Safety Data Sheets for Toxic and Concerned Chemical Substances* were revised, adding required minimum sizes for labels on containers and packaging. Another focus is to adjust specifications for the Ministry of Labors (MOL) chemical substance labels, which include disclosure methods for harmful ingredients in toxic and chemical substances, and revise the specific items to be disclosed if certain chemicals do not fall under any risk classifications. The purpose is to align with the Globally Harmonized System of Classification and Labelling of Chemicals (GHG), following its regulations on contents required to be put on labels as well as labelling requirements for individual toxic and concerned chemical substances.

Having studied EU and other international regulations, the EPA has revised the specifications for labels on containers and packaging. There are four levels based on volume sizes. Minimum label size is A5 for the top level (the biggest volume) and halved for the next level, and so on. Manufacturers or importers of toxic and concerned chemical substances are to ensure that labels on containers and packaging cannot be smaller than the required size, and should provide clear information concerning risks and dangers for the benefit of users. For specific size-related or other reasons, labels should be presented in a folded form, as hanging tags or displayed on the outer packaging.

Based on the Chinese National Standard (CNS) 15030, a toxic and concerned chemical substance needs to be assigned a risk category, and related information about its risks is to be disclosed on the labels accordingly. If the

concentration of such a substance in a product reaches a level required for control, additional information of dangerous ingredients on container and packaging labels as well as bulletin boards are to be disclosed, such as their English name, Chemical Abstract Service number, and the contents weight and concentration. Not only so, either Toxic Chemical Substance or Concerned Chemical Substance is to be shown on the labels. If a toxic and concerned chemical substance is determined as not under any risk category, the revisions state that it is only necessary to put the name, harmful ingredients, warning, other additional information, as well as the names, addresses, and phone numbers of the manufacturer, importer, or supplier.

Moreover, warnings or other supplementary information should be put on labels of toxic and concerned chemical substances according to regulations concerning individual substances. And the EPA will announce what written information or images are to be included on labels based on a substance's characteristics and management purposes. For example, laughing gas is listed as a concerned chemical substance due to its abuse, so words like for industrial use only; no consumption are to appear on the labels as a warning.

A meeting concerning this revision was held in Aug. 2022. For the entire supply chains of toxic and concerned chemical substances, existing regulations on contents and specifications concerning contents and sizes of container and packaging labels have been revised, and such amendments will take effect on 31 Oct. 2023. A year of grace period will be given to enterprises.

Water Quality

EPA Celebrates 20 Years of Water Body Patrols and Looks at the Past and Future

The EPA has reached its twentieth year in its efforts to include public participation in water environment patrols. An event was organized to celebrate this anniversary and thank all the volunteers who patrol and safeguard every water environment in Taiwan. Everyone was invited to document the results of improvements in water environments as well as to look back and share notable examples of patrol team involvement in notifications of pollution incidents, ecological restoration, environmental education, and assistance in implementing the policy of reutilizing wastewater from livestock farming.

Background

Aiming to maintain the quality of water bodies and ameliorate river pollution, the EPA designated 2002 as River Pollution Remediation Year, putting together patrol teams to target rivers nationwide for remediation. Coordinating government efforts and the involvement of caring citizens, since then patrol teams have voluntarily engaged in patrols, notifications, water quality monitoring, river and bank clean-ups, environmental education, and at-source reduction of domestic wastewater. This civil force that safeguards the environment began with 25 patrol teams when the initiative was first carried out in 2002 and has grown to 468 teams today. Currently, there are 13,382 crew members across Taiwan, protecting the rivers and streams in their respective areas. Based on statistics from the last decade, volunteers, on average, conducted 74 patrols a day, and an incident of pollution or a littered site was reported for every nine patrols. On average, every day there were at least five beach or riverbank clean-ups, resulting in collecting 357 kg of garbage and 138 kg of recyclables a day.

During the last 20 years, water environment patrols have ameliorated river pollution and taken part in several commendable accomplishments. For instance, Erren River in Tainan was notorious for its severe pollution from scrap metals and wastes. Following the EPA's vigorous measures that led to the dismantling of 57 illegal smelters, local patrol teams have remained vigilant and helped to gradually lower illegal wastewater discharges. Owing to civilian river watch groups continually on the alert for the dumping of waste scrap metals along riverbanks, after discussions between the public and private sectors, various government agencies then collaborated on joint clean-

Director Su-Ming Yen (third from the right) and the invited representatives of water environment patrols

ups. Over 278,000 metric tons of waste scrap metals were removed from riverbanks between 2006 and 2013. Furthermore, local patrols have chosen certain areas for ecological restoration. For example, previously only a handful of fish species able to withstand pollution could be found in the Erren River estuary, but now it has over 30 fish species and 20 shrimp and crab species. This is a fine model of collaboration between the public and private sectors.

Incorporating environmental education into activities, instilling environmental protection awareness

The patrol teams have also incorporated environmental education into their activities, instilling an awareness of water quality protection in primary-level pupils and every household. Schools of different levels have joined the patrol efforts, such as a beach clean-up organization consisting of students from Hsinchu Waldorf Experimental School, along with their parents. Since 2015 they have striven to protect the coastal environment in Hsinchu with many beach clean-ups. Other activities include exploring coastal ecosystems, picking and analyzing beach waste, and using garbage in creative art projects. This type of mobile environmental education, with coasts as a classroom, has motivated more families and schools to join them.

Volunteering for the patrol is a big help in implementing government policy

Moreover, people volunteering for patrols have also been a big help in implementing government policy. For example, deeply troubled by occasional pollution and odors in ditches caused by pig excrement, patrol teams in central and southern Taiwan monitored for improper discharges of livestock wastewater by conducting regular surveillance and water quality testing. Following the EPA's policy to reutilize livestock wastewater, since 2018, volunteers, assisted by environmental agencies, have used their local networks to match livestock farmers who can supply digestate to farmers in need of agricultural fertilizers. The patrol teams also monitor the application of fertilizers to ensure that digestate made from pig excrement is used properly on farmland instead of entering rivers and polluting water bodies.

For the last 20 years, the EPA has launched river patrols to put a stop to pollution, combining the energy of communities, organizations, and schools and turning them into protectors in every corner. Public participation has also largely altered people's environmental awareness. The Director of the EPA's Department of Water Quality Protection, Su-Ming Yen, noted that in the past, polluters engaging in illegal dumping and discharging, when stopped, would retort by saying their activities were not of anyone else's concern as the environment belonged to no one. But nowadays, patrol teams nationwide have formed a tight network of protection, and people can confidently stop polluters by asking them not to destroy the environment as it is a public good.

Environmental Monitoring

18 Countries Jointly Promote Atmospheric Mercury Monitoring at the 11th APMMN Annual Meeting

On 2 Nov. 2022, the Eleventh annual meeting of the Asia-Pacific Mercury Monitoring Network (APMMN) was jointly hosted by the EPA Deputy Minister Chih-Hsiu Shen and the USEPA Acting Assistant Administrator Jane Nishida. Attendees were made up of over 50 government officials and scholars from 26 institutes in 18 partner countries, such as the US, Japan, Australia, and the UN Environment Programme (UNEP). During the event, Environment and Climate Change Canada presented the worlds latest equipment that passively samples atmospheric mercury. The Center for Environmental Monitoring and Technology of National Central University reported on the APMMNs current implementation, while experts from the US National Atmospheric Deposition Program explained calculation of national mercury deposition as well as the status of atmospheric mercury monitoring in partner countries.

To protect human health and the environment from the anthropogenic emission of mercury and its compounds, the UNs Minamata Convention on Mercury entered into force in 2017. Considering that atmospheric mercury monitoring is one of the essential tasks of the Minamata Convention, the Taiwan EPA and the USEPA jointly launched the APMMN in 2012 to respond to the Minamata Convention. The efforts to assist partner countries in the Indo-Pacific region to build capacities related to atmospheric mercury monitoring began in 2016, and so far the APMMN has analyzed 1,220 samples of rainwater. Results show that the mercury concentration in rainwater in the APMMNs Indo-Pacific partner countries has gradually dropped in the past three years, which is evidence of the partner countries implementation of the convention.

EPA Deputy Minister Chih-Hsiu Shen (second from the right in the top row) and the USEPA Acting Assistant Administrator Jane Nishida (second from the left in the top row) co-chair the meeting

As environmental monitoring is a long-term and significant mission, Deputy Minister Shen particularly praised and thanked all the partner countries for their outstanding contributions toward long-term atmospheric mercury monitoring over the past 11 years. In August this year, the Center of Oceans and Atmosphere of the Commonwealth Scientific and Industrial Research Organisation (CSIRO) in Australia became an official partner. It completed the first sample on 28 Oct., an important step toward enhancing the southern hemispheres capacity in atmospheric mercury monitoring. Through the APMMN, the Taiwan EPA hopes to improve regional atmospheric mercury monitoring with the USEPA and the Indo-Pacific partners and together carry out the Convention, building a sustainable world for future generations.

Air Quality

Amendment of Offset Principles Provides Diverse Offsetting Options for Air Pollution Emitters

To provide more options for development projects to offset their air pollution and effectively cut down emissions from developmental activities, on 2 Nov. 2022, the EPA amended and announced relevant offset principles for emissions produced by developmental activities. The amendment added offset sources categorized as stationary, mobile and fugitive and provided a mechanism for developers to cooperate with other public or private premises or government agencies. The amendment is expected to help accelerate the implementation of air pollution control strategies and allow developers to obtain offsets for the emissions they produce, thus reaching a win-win for economic development and environmental protection.

The amended *Offset Principles for Air Pollutant Emissions Produced from Developmental Activities* will provide clearer basis for calculating offsets. Offset sources include the improvement of pollution-control equipment and manufacturing processes at factories, replacement of old vehicles with electric ones, vessels in port areas using shore power, installation of pollution-control equipment by food and beverage enterprises, using bacteria to degrade agricultural residues, and so on. After passing environmental impact assessment reviews, developers should submit plans to obtain offsets for the air pollution emission they produce to the EPA for approval. Only after the approval can they implement the offset measures. This is to ensure that the planned measures are implementable in reality, and to clarify the follow-up supervision and inspection mechanism. If developers commission government agencies to find offset sources, they do not need to submit the aforementioned plans for obtaining offsets. Government agencies will issue them relevant supporting documents directly.

In addition, the amendment added a mechanism for developers to reach cooperation agreements with other public or private premises or government agencies, so as to provide developers with more channels to implement the pollution offsetting measures. Take for example the replacement of old vehicles with electric ones, the government matchmaking platform can assist developers to fund and obtain the air pollution reduction benefits of the public's replacement of old vehicles as offsets, thereby achieving the triple-win situation in which enterprises provide funds, the government provides a matchmaking service, and the environment is improved.

Moreover, based on the simulation of localized air quality models, the amendment revised the offsetting means and ratios between secondary air pollutants (fine particular matter and ozone) and primary air pollutants (nitrogen oxides, sulfur oxides and non-methane hydrocarbons) to make the means and ratios of offsetting more in line with the air pollution improvement benefits obtained through offsets.

Recently, many large international manufacturers have been placing orders with Taiwanese companies while overseas Taiwanese companies continue to return to Taiwan to expand production capacity. This has led to accelerated development of domestic industrial parks and a great increase of pollutant emissions. After the amendment, the offset principles will help improve the air quality by requiring development projects located in areas of poor air quality to obtain offsets that account for 1.2 times the emission produced when they implement offsetting in the future. As a result, not only will the development projects not exacerbate the air quality of the area with additional emissions, but they will help generate more air pollution reduction benefits.

Waste Management

Temporarily Stored Waste to Be Cleared by 2032

To solve problems relating to industrial waste disposal, the EPA, the Ministry of Economic Affairs (MOEA), the National Science and Technology Council (NSTC), the Ministry of the Interior (MOI), and the Council of Agriculture (COA) jointly took inventory of waste and its flow, analyzed the occurrences and causes of illegal dumping, and proposed solutions vis-a-vis the issue of insufficient processing capacity and the issue of strengthening management. It is expected that waste in temporary storage will be completely disposed of by 2032.

The EPA, MOEA, NSTC, MOI, and COA met to discuss the problems regarding the disposal of industrial waste. In regard to construction waste, the EPA and MOI will jointly handle it with the MOI responsible for listing and tracking the flows of construction spoil, while the EPA responsible for tracking the flows of construction waste, listing enterprises of certain scale for control and requiring them to submit waste disposal plans and to report the flows of waste. As for the home remodeling industry, supporting documents should be submitted regarding the origins and destinations of the materials utilized and checked by environmental protection authorities at the backend to ensure proper disposal.

In addition, to accelerate the

Promoting to separate combustible waste and turn them into SRF

disposal of construction waste, the EPA is promoting the recycling of construction materials by sorting out materials, such as bricks and concrete blocks, and sending them to spoil storage sites or reusing them as land-filling materials. The EPA is also working with port authorities to promote the use of these materials as land-filling materials in port areas. At present, Taipei Port is accepting spoil from private constructions for landfilling. Moreover, the EPA is assisting boiler and cement kiln owners in reusing waste wood, increasing disposal capacity by 179,000 metric tons per year. An equilibrium between waste wood generation and disposal capacity is expected to be reached by the end of 2022.

As for combustible waste found in illegal waste dumping cases, the EPA has urged industrial competent authorities to release land designated for environmental protection use in existing industrial and science parks for the establishment of waste processing facilities. For newly established industrial and science parks, industrial competent authorities are requested to plan for the establishment of waste processing facilities in the development stage as part of the environmental impact assessment.

In addition, the EPA has requested that industrial competent authorities assist enterprises to complete the establishment of 12 waste processing facilities so as to gradually increase the overall processing capacity year by year. It is expected that an equilibrium between waste generation and processing capacity will be reached by 2023. Prior to that, the EPA has devised short-term response measures, including formulating operation guidelines for waste storage in public landfills or in other off-plant sites and requesting local environmental protection bureaus to provide land in public landfills or requesting the MOEA to provide land designated for environmental protection use in industrial parks to help store industrial waste temporarily.

After the processing facilities promoted by the aforementioned competent authorities are gradually established, the temporarily stored waste will be effectively disposed of. The EPA will also continue to promote waste-to-fuel conversion by diverting industrial waste that cannot be recycled effectively due to its material value but has high calorific value to appropriate disposal channels, increasing the overall disposal capacity for industrial waste.

Environmental Inspection

Implementing Offshore Wind Power with a View to Reducing Environmental Impact

If Taiwan is to catch up and become a major green energy country amid the world's commitment to developing green energy applications, offshore wind power is an indispensable piece of the puzzle. To ensure that developers live up to their environmental impact assessment (EIA) pledges, the EPA continues to review relevant EIA supervision and control measures on a rolling basis so as to align with international practices and safeguard the environment.

Offshore wind power is a brand-new form of development for Taiwan. After compiling consultation results on the *Policy Assessment for Offshore Wind Power Development* of the Ministry of Economic Affairs and conducting EIA reviews for potential sites in the second stage of development, the EPA has proposed to use technological tools for the implementation of EIA supervision. For example, drones are used to monitor the positions of ships remotely, the placement of bubble

curtains, and the ships' Automatic Identification Systems (AIS) are used to ascertain the progress of construction in the sea. The EPA also cooperates with other government agencies, such as the Bureau of Energy and the Ocean Conservation Administration, to strengthen EIA supervision. The EPA is also assisted by scholars and experts to inspect protection measures taken by developers to fulfill the EIA requirements of offshore wind power projects, and to safeguard the environment by collecting concrete evidence of violations on which to base charges.

Developers of the third stage block development of offshore wind power in Taiwan are gradually sending documents to be reviewed by the EPA. The EPA will continue to pay attention to relevant issues so as to establish a consistent benchmark for EIA pledges. After the reviews are passed, the EPA will also carry out EIA supervision and require all development projects to implement their EIA pledges. Thus, the environment will be taken into account while the economy continues to develop, and as the power supply remains stable.

Ecolabeling

Moving toward Net-Zero Emissions by 2050 as Green Mark Turns 30

In 2022, Taiwan Green Mark entered the thirtieth year of its implementation. As Taiwan strove toward net-zero emissions by 2050, a celebration themed Before 30/After 30 was organized by the EPA to demonstrate the fruitful results of the past three decades. Invited to a retrospective on the outstanding accomplishments were those with important roles in the promotion of the Green Mark, such as enterprises that had applied for the Green Mark consecutively for 20 years and members of the review committee. A commitment was made as Taiwan looked forward to the next 30 years and to build a future of net-zero emissions by 2050.

The origin

Launched in 1992, the Green Mark centered around the principles of recycling, low pollution, and resource conservation. Since then, enterprises have been designing and making products with the ideas of lowering environmental pollution and resource consumption in mind, consequently providing the option of environment-friendly products for consumers while shopping. According to the EPAs statistics, 80% of the public has purchased Green Mark-certified products, which shows that, for enterprises, the Green Mark not only creates business opportunities but also contributes to carbon reduction.

The EPA's Green Mark promotion van on a six-county/city tour to introduce the Green Mark and importance of environment sustainability, Deputy Minister Shen in front of the van outfitted with interactive games

EPA Deputy Minister Chih-Hsiu Shen noted that net-zero emissions by 2050 is a common goal for the whole world, including Taiwan, and that individuals can create a future of green living just by making small lifestyle changes. This actually aligns with the Green Marks principles, allowing the government and citizens to search for environment-friendly lifestyles together.

As the nation faced the challenges of achieving net-zero emissions by 2050, Deputy Minister Shen pointed out that the government has proposed transformation in four areas: industries, energy, lifestyle, and society. Transformation in the area of lifestyle is closely tied to peoples daily life involving food, clothing, housing, transportation, education, entertainment, and shopping. And it is necessary to combine the implementation of the Green Mark in order to practice a truly green lifestyle.

Annual reduction of 100,000 metric tons of carbon thanks to Green Mark

Statistics on the Green Marks environmental benefits in 2021 show that 28.48 million kWhs were saved annually, sufficient to provide electricity of 510,000 households for a month. Use of virgin pulp was lowered by 11.877 kilograms, equivalent to sparing 237,342 trees, which is eight times of the number of trees in Daan Forest Park.

There have been over 20,000 products certified with the Green Mark over the years, according to the EPAs statistics. At the anniversary celebration, invited guests include representatives from four enterprises that have applied for the Green Mark for more than 20 years. One of them was the household cleaning products brand, See Mild Biotech. The company said that, since it obtained the Green Mark, the government has taken the lead in product procurements and assisted in promoting. As a result, it has always enjoyed stable sales with capabilities to continually upgrades their products, which helped in achieving its mission.

Champion, a company that manufactures construction materials, began applying for the Green Mark in 1996. Efforts in researching and developing products made with recycled materials for 14 years have contributed to cutting down emission of 22,700 metric tons of greenhouse gases. Its largest client is the government, which actively supports the use of Green Mark-certified building materials, and well-performing construction companies that use lots of its products in various projects. In recent years, there have been quite a few environmentally conscious consumers.

Finally, CHC Resources, which reuses the steel industry's byproducts such as slags and blast furnace cement as building materials, elaborated that, by replacing cement, its own products can lower costs as well as emissions because of reduced mining. This is also the reason its products are favored in projects of public constructions and famous buildings. With annual production that reuses 3 million metric tons of slags, the environmental benefit is equivalent to reducing 2.24 million tons of emissions generated from cement production, which is also equivalent to the total carbon absorbed by 5,760 Daan Forest Parks.

Promoting green living via van tours

For the Green Marks 30th anniversary, the EPA has specially outfitted a van with eye-catching designs and had it tour around Taiwan to promote green living with local environmental bureaus. On the van there are easy-to-operate, interactive games that show people how to make simple changes in life and become more environment-friendly , such as replacing single-use items with green products for personal consumption.

Moreover, in December a Roundtable Forum on the occasion of the 30th anniversary of Green Mark will be held, with experts and scholars in various fields invited to have in-depth discussion on net zero by 2050 and green living. The public is also welcome to take part, and through all this the EPA hopes to encourage more people to continue doing the right things for the planet and together reach the goal of net-zero emissions by 2050.

Waste Management

Taiwan Shares Achievements at Solid Waste Global Meeting in Singapore

Director Ing-Ing Lai of the EPA Department of Waste Management and Resource Recycling Office led a delegation to attend the 2022 International Solid Waste Association (ISWA) World Congress in Singapore from 21 to 23 September and gave a talk on Taiwan's policies and development of resource recycling. The aim was to facilitate Taiwan's participation in international exchanges and collaboration on resource recycling issues. The 30-plus-member delegation included those from 12 research institutes and enterprises in the waste recycling and reuse industries in Taiwan.

Aligning with the world, Taiwan aims to complete transformation toward net-zero emissions by 2050, and one of the key strategies is resource recycling and zero waste. In 2021, the recycling rates for general wastes and industrial wastes in Taiwan were 62.5% and 85.4%, respectively.

Such achievements make up the foundation on which resource recycling is promoted, with sustainable consumption and production, greater efficiency of resource use, and increase of value in waste disposal as the aim. The strategies planned and adopted include green design and at-source reduction, energy and resource reutilization, smooth recycling networks, and innovative technologies and systems. Having been invited to this year's ISWA World Congress, the delegation went on to share Taiwan's various experiences and further connected with other nations by delivering feature speeches and setting up Taiwan Pavilion, which showcased Taiwan's experiences.

Minister Grace Fu of Singapore Ministry of Sustainability and the Environment (second from right in the front row) visits Taiwan Pavilion at the ISWA World Congress

With the theme of "Don't Waste Our Future," the 2022 ISWA World Congress invited solid waste experts from around the world to discuss waste recycling, human health, environmental security, etc. Foreign ideas and measures on issues relating to sustainable development and social and economic impacts can serve as important references for Taiwan as it formulates policies. Setting its eyes on net-zero emission, the EPA will actively push for resource recycling and strive to build a zero-waste generation with sustainable resource utilization.

Director Ying-ying Lai (second from left in the front row) and her delegation visit Representative Francis Kuo-Hsin Liang (center in the front row) at the Taipei Representative Office in Singapore

During the two-day event, delegation members participated in meetings and learned about other nations' measures, achievements, and future plans for resource recycling. Moreover, a Taiwan Pavilion was set up by the delegation to showcase the Taiwan government's resource recycling policies and results. Also on display were innovative environmental technologies utilized by Taiwan's enterprises, including plastic recycling, reuse, and circulation, production and application of solid renewable fuels (SRF), disposal of hazardous wastes, recycling of heavy metals, incineration, and mechanical electrical maintenance. Besides technological exchanges with enterprises and experts from other countries to keep up with the latest global technological trends, delegation members were able to explore possibilities for future collaboration and discover new business opportunities in resource circulation.

Environmental Education

Taiwanese Delegation Participates in 2022 Global Environmental Education Partnership Meeting

The Global Environmental Education Partnership (GEEP), jointly launched by the Taiwan EPA and the US EPA, held the 2022 Global Environmental Education Partnership Meeting in Tucson, Arizona, USA on 10 October. Thirty-four government officials, environmental education experts and scholars of non-government organizations from eleven countries gathered to exchange ideas and share their valuable wisdom, toward strengthening environmental education cooperation networks.

Jointly organized by the Taiwan and US EPAs and the North American Association for Environmental Education, the gathering was the first physical GEEP meeting held since the Covid-19 pandemic broke out three years ago. Besides those from Taiwan, participants included government representatives, experts and scholars from American Samoa, Australia, Botswana, Cameroon, Mauritius, the Netherlands, Palau, South Africa, the United Kingdom, and the United States. During the meeting, experts and consultants examined and discussed the future strategies, goals and implementation methods of the GEEP, and participants shared their experiences in developing and running regional environmental education centers.

In addition to promoting global environmental education and establishing global partnerships, the GEEP also attaches great importance to improving the abilities of regions to respond to environmental changes and to strengthening of cooperation networks. Thus, in 2019 Taiwan established the Asia-Pacific Regional Center (APRC) under the GEEP structure. The APRC is in charge of promoting environmental education and establishing exchange networks in the Asia-Pacific region so that partners can learn and share with each other, and work towards a sustainable future. The Taiwanese delegation to the meeting was led by Hsuan-wu Chang, Director of the Department of Comprehensive Planning of the Taiwan EPA, accompanied by APRC representatives Professor Tzu-chau Chang and Professor Hurng-Jyuhn Wang, along with four young environmental leaders from Taiwan.

In the meeting, Director Hsuan-wu Chang said that Taiwan is in line with the world and plays a unique role in issues such as trade, health care and the environment. As to the issue of global climate change, Taiwan is also advancing with the world toward net zero emissions, and places emphasis at the same time on the power of cooperation and the importance of enhancing environmental education. Thus it is important for countries, while playing their own role, to also establish partnership relations with others. From the experience of organizing the 2021 Asia-Pacific Environmental Education Forum, Taiwan has learned how partnerships facilitate more dialogue and help to disseminate valuable knowledge. Exchanges and cooperation between partners will continue to strengthen further through the GEEPs APRC.

Professor Tzu-chau Chang, Project Director of the APRC, made a presentation on APRC achievements to consultants from other countries. His presentation was of assistance to the continual strengthening of environmental education efforts in the Asia-Pacific and African regions, including the future development and operation of the GEEP Africa Hub, thus strengthening a global environmental education network in which all countries can learn from each other.

Selected and awarded by the Taiwan EPA, the four young environmental leaders were subsidized to be a part of Taiwan's delegation to the forum. They have experiences in leading and implementing environmental actions with respect to climate change, plastic reduction in daily life, net-zero carbon emissions and the marine environment. They took part in group discussions with experts and consultants to stimulate more ideas and interest in environmental education.

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