

Major Environmental Policies

December 2022

1. Feature Article: First School Awarded Highest Honor After 10 Years of Taiwan-US Eco-School Initiative

On 21 December 2022, the EPA held the Taiwan-US Eco-School Awards Ceremony in Yilan, showcasing mutual achievements at the same time. During the ceremony, those receiving awards as Eco-Schools included eight schools certified with a Green Flag, 23 with a silver medal, and 67 with a bronze metal. Among the awardees, Hushan Experimental Elementary School in Tainan became the first to be certified with a Permanent Green Flag, the highest honor in this initiative, as the result of eight years of continued hard work from both students and faculty.

Background

The Taiwan EPA and the USEPA have since 2014 jointly launched the Taiwan-US Eco-School Partnership Program. In 2021 the Ministry of Education (MOE) began to participate as a collaborator, actively promoting this environmental education project in all schools and campuses across Taiwan and aiming toward sustainable development.

The ceremony was presided by an EPA's Director General Tsung-Yung Liu who awarded respective schools with the Green flags, silver metals, and bronze metals. The highest honor of the three, the Green Flag has a two-year validity and hence requires application for recertification every two years in order to retain such honor. Once a school receives its fourth Green Flag, it is deemed a permanent Green Flag holder as acknowledgement for its long-lasting efforts to consistently put sustainability into action.

Accomplishments

Hushan Experimental Elementary School obtained its fourth Green Flag this year and thus became the first Permanent Green Flag holder in Taiwan. With the idea of letting children take initiatives in learning at its core, the school works on fostering civic literacy and providing opportunities for kids to take charge to look after their living environment as well as conduct relevant initiatives and independent researches. And over the years its efforts in establishing an eco-campus have influenced its faculty, students, their families, and surrounding communities, showing that it truly deserves such honor.

Other awardees included Dashan Elementary School in Miaoli and Chaocuo Waldorf Education Experimental Elementary School in Yunlin, both recognized with their first Green Flag. Students in Dashan Elementary School built special beehives to observe the relationship between the ecosystems of different species and their environments. They even promoted such action in the local communities, urging residents to practice environment-friendly organic farming. As for Chaocuo Waldorf Education Experimental Elementary School, students have effectively solved the problem of discarded rain boots at the end of every semester by organizing a marketplace for secondhand rain boots. Moreover, via collaboration with technology firms, they have incorporated

technical farming into their own curriculum and also conducted long-term projects to monitor groundwater and land subsidence, both of which are issues of high concern in Yunlin.

Micang Elementary School in Bali, New Taipei City, received its second Green Flag for its consistent work on maintaining species' habitats on campus, promoting sustainable diets and consumption, and improving waste disposal. The school also promoted conservation of red-clawed crabs, a local species, by seeking out its habitat within the local community on the Bali left bank and subsequently creating a habitat map. Another two-time Green-Flag recipient is Daan Elementary School in Taoyuan, which tackles issues like habitat protection and water resource, improving environments and equipment of its eco-pond by joining forces with a local carp conservation group to solve the problem of fish and aquatic plants often dying in the pond. Students even went on to work with the Soil and Water Conservation Bureau (SWCB) of the Council of Agriculture to establish the campus as one of the SWCB's outposts, providing an excellent venue for environmental education for students, faculty and community residents.

Three schools were awarded a Green Flag for the first time. They are Xinshi Elementary School in New Taipei City, Tainan Tzu-Chi Senior High School Elementary Department, and Evergreen Lily Elementary School in Pingtung County.

The kids in Xinshi Elementary School have composted food waste, turned branches left by tree thinning into award metals, and used different plant seeds collected on campus to design games as class materials. In Tainan, students at the Elementary Department of Tzu-Chi Senior High School are encouraged to protect the environment via various programs like Energy Conservation Monday, Water Conservation with One Chopstick, and Clean Plate Initiative. Last but not least, students of Evergreen Lily Elementary School are especially passionate about climate change issues as they were once victims of Typhoon Morakot. As a result, they strive to preserve the traditional wisdom and culture, which is deeply in tune with nature and ecosystems, to advocate respect for the environment, biodiversity conservation, and peaceful coexistence with the world as the key for sustainable development.

The award ceremony began with a performance by the first-time Green-Flag recipient Evergreen Lily Elementary School as students, dressed in traditional indigenous attire, sang from the soul. With stalls and corresponding posters set up at the venue, the awarded schools demonstrated their respective achievements and special features. Then in the afternoon representatives from schools certified with the Green Flag for the first-time shared details of their journeys to becoming eco schools, which served as a great opportunity to exchange and learn among schools. There was also a musical seminar, where the healing power of music helped participants to appreciate the environment, bringing a beautiful end to the event.

Director General Liu noted that Taiwan has been actively promoting eco-schools, a global environmental education initiative. Now there are a total of 590 schools in Taiwan participating in the eco-school initiative. Some 400 of them have become certified, including 16 Green Flags, 148 silver metals, and 242 bronze metals. This fully showcases how environmental education has been deeply incorporated on all campuses and even extended further into families and communities.

Future prospects

The EPA will continue to keep Taiwan's eco-schools aligned with the global trend while urging groups of diverse backgrounds to participate and integrating various resources so that more schools can join the eco-school program. Besides linking up the classroom with environmental measures, future efforts will aim to bring the concept of eco-schools beyond the campus and into different areas of society and encourage all to work toward building a sustainable future.



Schools awarded with the Green Flag



Eco-schools set up stalls to demonstrate their respective achievements

2. Implementation of Net-Zero Emission Pathway Enhances the NDC's 2030 Goals

The National Development Council (NDC), in coordination with the EPA and other ministries, held a press conference on 28 December 2022 to announce phased target and key strategies concerning transition toward net-zero emission. The NDC explained that the 2030 goal has been modified from the originally proposed 20% reduction compared to the baseline year (2005) to a $24 \pm 1\%$ reduction. Taiwan's carbon reduction goals have all been set following the principles of the United Nation's Framework Convention on Climate Change (UNFCCC) and the Paris Protocol, which delegate mutual responsibilities with different weights for each country based on respective individual capacities. Factors considered in the formulation of reduction goals include references on international circumstances, domestic policies, Taiwan's historic trends of carbon emission, trends of Taiwanese corporations returning with investments here, overall economic growth and increases in electricity consumption.

The government has continued to formulate relevant policies ever since President Tsai Ing-Wen announced Taiwan's goal of net-zero emission by 2050 on Earth Day 2022 (April 22). Taiwan's Pathway to Net-Zero Emissions and Strategies in 2050, announced on 30 March, covers transformation in four areas, which are energy, industry, lifestyle, and social transformations, as well as two governing foundations, which are technological development and climate legislation.

The 12 key strategies include wind and solar energy; hydrogen energy; forward-looking energy; electricity system and energy storage; energy conservation; carbon capture, utilization, and storage; electrification and de-carbonization of vehicles; resource circulation and zero-waste; natural carbon sinks; green lifestyle; green finance, and just transformation. Through collaboration across ministries and public and private sectors, all of the above are being implemented by various ministries according to the directions specified in the Pathway to Net-Zero Emissions. Approximately 50 meetings were also held to discuss and exchange opinions with different fields. On 28 December 2022, the NDC announced the Action Plan of the 12 Key Strategies in Transformation Toward Net-Zero Emissions along with relevant ministries, signifying that Taiwan's journey of transformation is well underway. Moreover, the Action Plan will also serve as the government's foundation for initiating ongoing communication throughout society, continuously seeking better ways and putting them into practice.

3. 2022 Shows Best Air Quality Monitoring Results

The 2022 air quality monitoring data compiled by the EPA shows a downward trend of concentrations of all air pollutants for the fifth consecutive year. The average number of days with Air Quality Index (AQI) of 100 or less, meaning in the categories of Good and Moderate AQI, exceeded 93.9% in 2022 (see chart), the best recorded so far. At the same time, the number of days with AQI above 100 (Unhealthy categories) continued to drop.

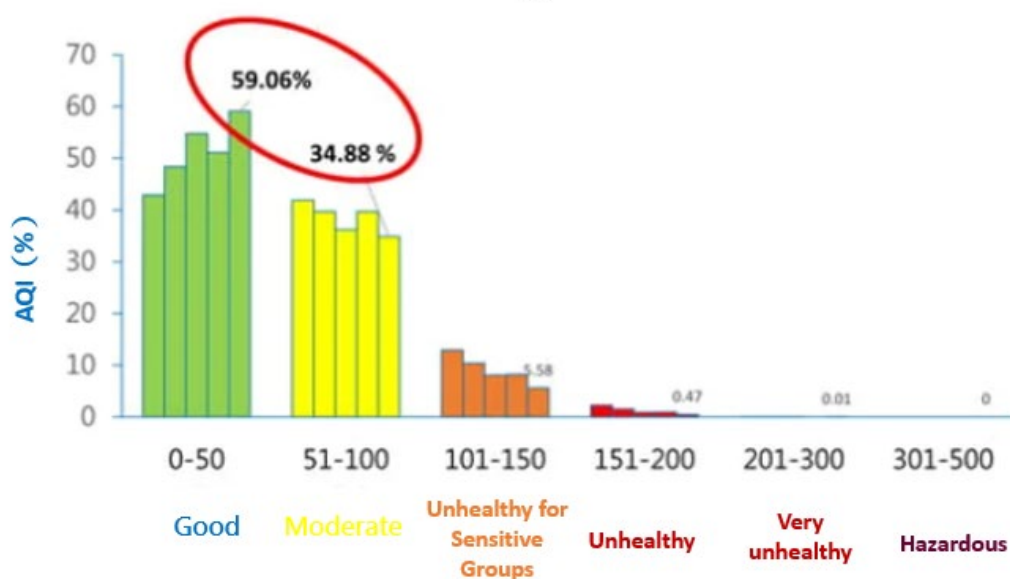
Other than continual drop of the average ozone concentration, the number of station-days with unhealthy AQI has been lowering year after year. In 2022, station days with unhealthy AQI mostly occurred in September mainly because of transboundary ozone from outside of Taiwan. And from

January to November 2022, the national PM_{2.5} concentration was 12.5 µg/m³ on average. It is estimated that the average annual concentration will be lower than 13 µg/m³ for the first time, and it will also be the third consecutive year for it to reach the ultimate goal of an average annual concentration of 15 µg/m³, as set by the Executive Yuan-approved Air Pollution Control Plan (2020 to 2023).

The EPA pointed out that 2022 had the best result of air quality improvement in recent years due to having had more rainy days than previous years, as rainwater is effective at pollutant removal. Not only so, both the central and local governments' active implementation of the Air Pollution Control Plan (2020 to 2023) has also led to reduced concentrations of transboundary pollutants. Since 2016, air pollution has dropped by 30%, in which state-run enterprises have slashed 46% of their own air pollution, the percentage of gas-burning boilers has increased from 24% to 73% thanks to promotion for highly polluting boilers to switch to natural gas, and the efforts to phase out old vehicles. In 2022, more than 9,000 large, old diesel vehicles had been phased out, resulting in 40% of such vehicles phased out since 2017. Moreover, starting 2020, a total of 1.685 million old motorcycles have been phased out, accounting for 35% reduction of old motorcycles from the road.

Regarding sources of fugitive pollution, airborne dust in Zhuoshui River has been reduced by over 90%, with dust incidents occurring only twice in 2022. Additionally, the EPA has enhanced overall controls and reviewed 111 sets of regulations since the announcement of the revised *Air Pollution Control Act* (空氣污染防制法) on 1 August 2018. In 2022, efforts continued in legislative amendments to strengthen response measures targeting seasonal air pollution, tighten emission standards for tape, cement, and other industries, and adjust the system of regular inspections. The EPA's other means to lower emissions of air pollution include providing access for developers to trade and offset emission credits, extending the period of subsidization, and applying high technology to law enforcement. All this is carried out in hopes of creating a win-win situation for both the economy and the environment, safeguarding air quality, and protecting public health.

Good and Moderate AQI, exceeded 93.9% in 2022



4. Public and Private Organizations Awarded for Green Procurement and Consumption to Achieve Net-Zero Emissions

On 26 December 2022 an award ceremony was held by the EPA to acknowledge support and endeavors of government offices and private organizations in green procurement. It was also the first time that government agencies and private organizations with excellent performances were jointly honored. Awardees included 36 government agencies and 213 private corporations that had outstanding performance in green procurement in 2021, green shops with continuous excellent performances up till 2021, organizations that have obtained the Green Mark for 20 years consecutively, and enterprises in the service industry certified with the Green Mark in 2021.

The EPA began promulgating the Green Mark system in 1992, implementing green procurement in the public sector in 2002, and extending its efforts to private enterprises in 2007. Years of promotion and endeavors have resulted in NT\$11.1 billion of green procurement in the public sector in 2021, a NT\$800-million increase from 2020. Green procurement and consumption have reached NT\$50.3 billion for private enterprises and organizations as well as NT\$58.7 billion for the general public. Combining the results in the public sector, the total expense on green procurement amounted to NT\$120.2 billion in 2021, an increase of 4% compared to the amount in 2020.

Green procurement in 2021 resulted in conserving 25.7 million KWH of electricity, equivalent to 500,000 households' power usage for a month; cutting down 104,346 metric tons of carbon emissions, same as the amount of carbon absorbed by trees in 282 Daan Forest Parks during a year; and lowered use of virgin pulp by 11.68 million kilograms, equivalent to sparing 233,405 trees. All have contributed to protecting the environments.

Among the awardees this year, there were 121 private companies and organizations whose expenses on green procurement exceeded NT\$50 million each, a record high. For example, combined amount registered of Chong Hwa Pulp Corporation and another ten companies reaches over NT\$1 billion. And 20 enterprises, including Taisyou International Business Co., were honored for increasing options of environment-friendly products and expanding their scope of green procurement with their continuous applications and support of the Green Mark and manufacturing of quality green products. Not only so, a total of 18 green stores, including E-Life Mall, received the award for their long-term efforts in promoting green products under categories of electronics, re-tails, construction materials, and bathroom equipment, which has greatly helped the public to put green consumption into practice.

Moreover, the EPA has been actively promoting green service, so the ceremony honored enterprises in the service industry that became certified with the Green Mark within the past year, 54 in total, to generate more exposure and raise public awareness of the Green Mark in the service industry. Statistics show that there are 124 enterprises in the service industry with Green Mark certifications to date, and 101 of them are hotels. Such is the evidence of local consumers' strong acknowledgement and support for environment-friendly service, which will help expand the market of green consumption.



The first time that government agencies and private organizations with excellent performances were jointly honored.

5. Cup Rental Logo Selected with Service Ready for Launch

The EPA has stipulated that chain convenience stores and fast food restaurants are to provide rental service of reusable cups, starting 1 January 2023. Along with this initiative, an event was held in November 2022 for the public to vote for the best design of reusable cup logo, and the winning one would be used starting 1 January 2023. In the future, stores following all the guidelines and regulations will be able to receive this logo, indicating an excellent reusable cup rental service is available. With this logo, consumers can easily take advantage of this service.

As the reusable cup rental is ready for launch, the design of its own logo has also been selected and determined and will be included in the Guidelines of the Excellent Reusable Cup Service as part of the labeling system. People now can easily locate and utilize this service by identifying the logo with zero worries on cleaning!

The EPA thanked the participating enterprises and all local environmental bureaus for their support of the reusable cup policy. Prior to the service being kick-started in 2023, 20 local environmental bureaus had already run trial services in advance, and a total of 833 stores and premises in 16 counties and cities have installed rental stations and are already operating. Among these enterprises, 7-11, MOS Burger, McDonald's, and Kentucky Fried Chicken had already been approved for the use of the logo back in December 2022. Now that the service to rent reusable cups is available, people have another option besides bringing their own beverage cups.

Plastic and waste reduction is the mutual goal and trend of all nations. To achieve it, in Germany restaurants and dining venues offering take-out service are required to offer rental service of reus-

able containers starting 2023, while there are private rental service of reusable cups in other countries as well. From 1 January 2023, chain convenience stores and fast-food restaurants in Taiwan are mandated to provide rental service of reusable cups in at least 5% of their stores. The percentage will be increased to 10% in 2024 and 30% in 2025, allowing more convenient and available access to this service.

The EPA-formulated Guidelines of the Excellent Reusable Cup Service cover six areas concerning the service, such as materials and labeling, borrowing and return, cleaning, inspection, awareness communication, and excellent service logo, all of which aim to ensure the sanitation and quality of the service system.

Once again, the EPA stressed that only through joint efforts of the government, enterprises, and the public to reduce garbage with changes of lifestyle and consumption behaviors can environmental improved become actualized. With the continuous push for bringing beverage cups, consumers now can choose to rent reusable cups and help protect the environment even when they forget to bring their own cups.

6. Plastic Blister Packaging to Be Announced as Mandatory Recyclables

To increase the recycling efficiency of flat plastic packaging materials and reduce the impact of plastic waste on the environment, the EPA announced the draft amendment of Item 8, Item 12 and Table 1 of Item 1 of the *Scopes for the Articles and the Packaging and Containers Thereof and the Enterprises Responsible for Recycling, Clearance and Disposal* (物品或其包裝容器及其應負回收清除處理責任之業者範圍), which will list inner plastic trays and blister packaging as mandatory recyclables.

More and more packaging materials and methods are being invented and used in the market. Common ones include inner plastic trays used inside a commodity package and blister or clamshell packaging that covers and displays merchandise, such as blister packaging sealed to paper backer boards commonly used for toothbrushes and toys, and plastic trays commonly used to separate food inside food gift boxes. They are all of non-biodegradable nature. Classified as W type plastics, they differ greatly in material and category and must be sorted and processed at a higher cost. As they have not been announced as mandatory recyclables, recycling and processing enterprises are unwilling to recycle them, resulting in most of them being processed or disposed of as mixed garbage.

To gradually reduce the amount of domestic plastic waste and improve the recycling efficiency and quality of plastic packaging, inner plastic trays and blister packaging are expected to be announced as mandatory recyclables and will be referred to as “flat packaging material” along with flat plastic containers that have been previously announced as mandatory recyclables. Following the announcement of the amendments, presumably after May 2024, enterprises that manufacture or import flat plastic packaging materials or import articles that contain flat plastic packaging materials shall be registered as responsible enterprises according to the regulations. They shall report the operating or importing volume and pay the recycling, clearance and processing fees on their own initiative.



Flat plastic packaging materials

1. flat plastic containers



2. inner plastic trays



3. blister packaging



The flat plastic packaging materials to be announced as mandatory recyclables

7. Circular Procurement Promoted Via Rental Services for Sustainable Consumption

On 12 December 2022, the EPA held a press conference in POPOP Taipei to promote sustainable consumption and production in efforts to reduce the environmental impacts from consumption. Among invited attendees were domestic enterprises that provide excellent rental services. Besides the premiere of a promotion video on sustainable procurement, the “Guide on Sustainable Procurement” was preannounced during the event with Rifat, a well-known Turkish influencer, present as the ambassador to advocate sustainable procurement.

Past consumption and production followed the models of a linear economy, leading to resource depletion and carbon emission that has put the Earth under the heightened threat of climate change. Data released by the International Energy Agency (IEA) in 2022 shows that in 2021 global carbon emission reached 36.3 billion metric tons, setting a new historic high. Moreover, the UN’s statistics demonstrate that global resource use has tripled since 1970 with a prediction that by 2060 it will be 1.5 times the present use. The world is now heading toward a shortage of natural resources.

The EPA has been advocating the idea of using instead of owning, and now there are available rental services provided by various enterprises. They range from utensils, clothing, electronic products, motorcycles and vehicles, to furniture, and adopt business models aiming for a circular economy. The circular procurement policy, stipulated this year, includes providing procurement guidelines and formulating mutual supply contracts. Public sectors like government offices and schools will take the lead to implement relevant measures and be the first to put in practice the

business model that promote using instead of owning, renting instead of buying. This way a supply chain for circular services can be gradually established with enforcement on environmental education to promote green consumption. With forces on the consumption end joining together, enterprises would be motivated to put modulization, easy disassembly, and easy maintenance into consideration at the stage of product design and also develop services like extended warranty and maintenance. It will extend products' service life and cut down resource assumption.

“My awareness and understanding of environmental protection began here in Taiwan,” said Rifat, who was greatly impressed by garbage sorting here as Taiwanese participate in environmental protection, starting in their own homes. Also, he shared experiences on maintenance and rental of camera equipment, with which he has had the most personal connection on environmental protection. Friends often told him to purchase new equipment when old ones broke down, yet he preferred maintenance as he thought what he has owned is sufficient and would not want to have more and then leave them used as well. With many rental platforms emerging in recent years, it is convenient and with less burden to rent equipment to satisfy his occasional needs for more advanced gear.

Emphasizing the importance of individual actions, Rifat stated that Taiwan has limited land space and limited resources compared to the enormous amount of garbage generated on a daily basis. He encouraged everyone to strive for a better and more sustainable future and would work on spreading the awareness of sustainable procurement.

Furthermore, invitees at the press conference were many enterprises under the three major categories providing rental options besides purchase, which are food and beverages, home appliances, and technology and electronics. Their rental services cover reusable food containers, beddings, household appliances, home furniture, electronic products, and lighting, etc. The EPA hoped to attract more product and service providers as well as consumers to participate in the promotion of sustainable consumption and production.

8. Improved Management Thoroughly Tracks Reuse Products

The EPA has amended the *Management Regulations for Reuse of Industrial Wastes* (事業廢棄物再利用管理辦法) specifically for eight reuse products including pavement materials. Revisions include regulations and limitations on usage sites, quality standards (Table 1), and inspection frequencies. Flows of these wastes and reuse products are to be thoroughly track in order to ensure proper reuse.

The *Management Regulations for Reuse of Industrial Wastes* was announced on 19 January 2012 and was later revised once. This amendment was implemented with the aim of properly managing reuse products and tracing their final destinations.

Focusing on operation and management of reuse products, the amendments specifically target reuse products as base- or bottom-grade aggregate materials, pavement materials, aggregates for road constructions, bricks, cement products, mixed concrete cement, controlled low strength materials (CLSMs), and asphalt concrete. Use of these products are prohibited in environmentally sensitive areas (ESAs) and must comply with leaching standards concerning the usage of recycled aggregates in the environment, as well as undergoing inspections with mandated frequencies.

Other details include limiting sales targets, mandating to equip all clearance and transport machinery with GPSs, tracking clearance and transport with manifests, and registering the last usage locations.

Table: usage site, quality standards of reused products

Usage site	Quality standards		
	Inspection Method	Test Items (Unit)	Standard value
Not belong to the prohibited use sites mentioned in the remarks	leaching standards concerning the usage of recycled aggregates in the environment	Lead (mg/L)	≤ 0.1
		Cadmium (mg/L)	≤ 0.05
		Chromium (mg/L)	≤ 0.5
		Copper (mg/L)	≤ 10
		Arsenic (mg/L)	≤ 0.5
		Mercury (mg/L)	≤ 0.02
		Nickel (mg/L)	≤ 1
		zinc (mg/L)	≤ 50

9. Net-Zero Technology Development Plan Unveiled at Environmental Technology Forum

The EPA organized the 2022 Environmental Technology Forum and Achievement Presentation on 5 December 2022. Diverse issues related to environmental protection tasks were discussed, including the seasonal air pollution hazards and health protection issues of public concern. With more than 250 people attending the event, experts and scholars shared the achievements of their environmental technology research. In his speech, EPA Minister Tzi-Chin Chang stated that the EPA had proposed a plan for net-zero emission technology development for 2023 to 2026, with relevant funding already approved by the Executive Yuan.

The 2022 Environmental Technology Forum and Achievement Presentation covered a wide range of issues, including noise prevention, green products, chemical safety, monitoring of environmental agents, emerging pollutants in drinking water, recycling of consumer electronic wastes, and treatment of soil and groundwater pollution. The discussions not only demonstrated the close link between the technology research and development and the EPA policy guidelines, but also showed the practical application of the technologies in people’s lives. Members of the government, industry, academia and the public were able to participate together in the exchanges as forward-looking and innovative technologies obtained through technology development plans were shared. At the end of the forum, prizes were given to outstanding exhibits in the event.

In his speech, Minister Chang pointed out that in response to the global trend of pursuing net-zero emission, the pressure of reducing carbon in supply chains and the negative impact of extreme weather, the National Development Council announced on 30 March 2022 Taiwan's *Pathway to Net-Zero Emissions in 2050*. In addition to policy promotion, the development of net-zero technologies is also a must for Taiwan in order to reach the 2050 goal. The development of net-zero technologies should be goal-oriented and linked closely with the entire net-zero emission pathway and

scheduled with suitable quantitative indicators. It is hoped that through net-zero emission technology plans, technologies relevant to net-zero benefit analysis and evaluation, resource circulation and carbon reduction and net-zero green living transformation can be developed to realize the long-term vision of transitioning to net-zero emissions. The EPA had proposed the net-zero emission technology development plan for 2023 to 2026, which encompasses the integrative evaluation of the reduction benefits of the net-zero pathway, resource circulation and carbon reduction technology projects, and demonstration and promotion projects of technologies relevant to net-zero green living transition. Relevant funds had been approved by the Executive Yuan.

Minister Chang further stated that in response to the diverse aspects of challenges requiring the application of environmental technologies, and to ascertain the existing gaps in the development strategies of environmental technologies in Taiwan in order to set the medium and long-term overall technological development strategies and guidelines, the EPA is planning the mid-term technology promotion strategies and governance goals. It will draft the *Environmental Sustainability Technology White Paper* based on the six major environmental fields of the National Environmental Protection Plan, namely resource circulation, net-zero emission, governance of atmospheric environments, watersheds and soil, chemical substance management, and environmental resource investigation and monitoring, as core subjects for the overall strategy planning. It will also propose annual technology development plans for each subsequent year.

10. Marine Air Quality Monitoring Cooperation between EPA and OAC

In 2022, the EPA cooperated with the Ocean Affairs Council to monitor the air quality over the ocean, extending the scope of Taiwan’s air quality monitoring from land to sea. The primary monitoring results show that the low-sulfur vessel fuel policy implemented since 2020 has yielded good results. Sulfur dioxide concentration has been significantly reduced. It was also discovered that vessels that reduced speed when entering or leaving ports also led to reduced pollution emission. Relevant results will be gradually applied in the drafting and promotion of marine air pollution prevention policies.

Currently, standard air quality monitoring equipment has been installed on Coast Guard ships stationed at Tamsui in New Taipei, Taichung and Tainan and has been monitoring PM_{2.5}, sulfur dioxide and nitrogen dioxide since October 2022. Taking the Tamsui flotilla as an example, the average sulfur dioxide concentration measured onboard was 0.68 ppb, better than the 1.37 ppb measured at the nearby land-based Tamsui monitoring station. This shows that the better diffusion conditions at sea made air quality over the ocean better than that in land areas.

In addition, looking at the changes in sulfur dioxide concentration at four coastal land-based monitoring stations in Tamsui, Keelung, Mailiao and Xiaogang, the average was 1.93 ppb in 2021 and 1.52 ppb in 2022, which are better than the 3.5 ppb recorded in 2021 of neighboring Busan port in South Korea. In addition, they were also better than 3.51 ppb, the average concentration measured at the four stations in 2018, a 60% drop. The reason is likely due to measures implemented in Taiwan since 2019, including the promotion of “use of low-sulfur fuel only by vessels on international routes between international commercial ports” and the “tightening of restrictions on the composition of fuels used by mobile and stationary pollution sources.” These measures comprehensively reduced the sulfur content of the fuels used by both vehicles on land and vessels at sea

from 3.5% to 0.5%, resulting in significant environmental improvement after their implementation.

The general traveling speed of vessels is about 20 knots. But according to studies, the energy consumption and air pollution emission are at the lowest if the average speed of vessels is reduced to 12 knots. Hence, the EPA has been cooperating with port authorities in recent years to promote the reduction of vessel speeds when entering or leaving ports. However, according to data, vessels only reduced speed by 56% and 43% when entering or leaving ports, respectively, showing that there is still room for improvement. In addition, according to the monitoring results of this project, the concentration of nitrogen dioxide measured in October by the Tamsui flotilla at the port exit was 15.32 ppb, higher than the average 9.55 ppb measured five nautical miles off the shore. One of the reasons was that vessels did not reduce speed when entering or leaving the port. All these information will serve as reference for the EPA when formulating incentive or prevention measures to promote the reduction of vessel speeds when entering or leaving ports.

Taiwan is a maritime country with living environments prone to both land-based and marine pollution sources. Understanding the air quality in marine areas will help policy makers form more effective prevention strategies targeted at various pollution sources. It is hoped that the cross-field cooperation will continue, leading to an improvement in environmental quality.



The EPA cooperate with the OAC to monitor the air quality over the ocean

**Major Environmental Policies
R. O. C. (Taiwan)**

Publisher
Tzi-Chin Chang, Minister

Editor-in-Chief
Tsung-Yung Liu

Executive Editors
Shiuan-Wu Chang; Ning-Hsin Chung; Miao-Ling Chen;
Shao-Wen Chang; Ken Lee; Jason Hoy

For inquiries or subscriptions, please contact:

Major Environmental Policies

Department of Comprehensive Planning
Environmental Protection Administration
83, Sec. 1, Jhonghua Rd., Taipei 100, R.O.C. (Taiwan)
tel: 886-2-2311-7722 ext 2705
fax: 886-2-2375-4262

Contents Copyright 2023