

Annual Report of BSMI

Bureau of Standards, Metrology and Inspection

20
22



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Foreword from the Director General



In the face of the ever-changing international situation and unpredictable challenges of climate change and the pandemic, the Bureau of Standards, Metrology and Inspection (BSMI) promoted a number of new measures in 2022. These measures encompassed a risk-based product safety management system, improved measurement system, development of national standards in key areas, testing and certification in the field of green energy, and international cooperation. We hope that they will be effective to create an environment where consumers will enjoy products of good quality and business operators will have access to the technology required to participate in the international supply chain.

To be responsive to the global net-zero moves and facilitate green transition of industries

Net-zero emissions by 2050 and carbon reduction in industrial supply chains have become the common goal of governments around the world and international enterprises to mitigate global warming and combat climate change. The BSMI developed national standards related to environmental protection, energy conservation, and green energy technology. These standards are based on relevant international standards and can help domestic industries adapt to carbon control measures adopted by foreign countries and seize the business opportunities of green transition. In June 2022, BSMI developed a “Renewable Energy Green Market Project” to provide tailored service for business operators in purchasing green power.

In November of the same year, the Voluntary Product Certification (VPC) for outdoor battery energy storage systems was implemented to certify the safety of energy storage systems. We proactively invest in the development of measurement and inspection technologies for forward-looking energy applications to support green transition of industries and help achieve the 2050 net-zero emission target.

To identify risks related to new products and act proactively

Products with new designs and fancy functions have been placed on the market because of advances in technology, such as electric vehicles, products of lithium rechargeable batteries, multifunctional and smart products, etc. Although consumers have more choices of products with attractive features (such as convenience and automation), there are hazards associated with new technology that need to be addressed, for example, the issue of data privacy concerns of IoT devices. In addition, the prevalence of e-commerce in recent years and the diversified online sales channels pose challenges to the BSMI in its market surveillance activities. IT tools were used to monitor the safety of products sold online and cooperation with online shopping platforms were strengthened.

To expand international visibility and facilitate trade

It is of great importance for BSMI to stay internationally connected in areas of standards and conformance, which is essential for facilitating international trade, fostering innovation, protecting consumers and promoting economic growth. In 2022, awareness of compliance issues of products sold online was significantly raised via our APEC project "Public-Private Dialogue on Product Safety in Digital Trade." An agreement on mutual recognition of conformity assessment results was signed with India in May 2022 after 16 years of negotiation. It allows business operators to have the conformity assessment activities performed locally for products to be exported to the other side, thus reducing cost and enhancing predictability.

To improve the national quality infrastructure and expand public-private collaboration

Conformity assessment activities are in greater need today with the introduction of new technology and increased awareness of environmental protection. The national quality infrastructure (NQI) must be upgraded to ensure reliable and effective conformity assessment services. Cybersecurity and verification of carbon emissions are the two areas where the NQI needs to broaden its competence. Close partnership with the private sector will keep the NQI responsive to the changes and subsequently enhance the competitiveness of our industry.



Hsieh, Han Chang

Acting Director General
Bureau of Standards, Metrology and Inspection

Chapter 1

International Connection with National Standards

The ancient Chinese proverb goes: "Without a ruler or a compass, one cannot create a square or a circle." In just a few words, it precisely and faithfully illustrates the importance of using the correct tools. Similarly, standards, as the universal language of the world, serve as the most reliable communication tool among different countries. Through standards, mutual trust can be quickly established and fair competition can be ensured. The government is vigorously promoting six core strategic industries, including information and digitalization, cybersecurity, precision health, green energy and renewable energy, and national defense and strategy, and standards play an even more critical role as a bridge to enable foreign enterprises to invest in Taiwan with confidence and empower local industries with the competence to participate in the international value chain. Currently, 99.22% of the national standards (CNS) are harmonized with international standards if the relevant international standards exist. Looking to the future, we will continue aligning national standards with international standards to create a standardized environment that takes into account industrial development and consumer protection.



1. Establishing or revising national standards in key areas, taking into account the demands of core industries and customers

In response to national policies, social development, industry demands and taking into account consumer rights, BSMI supported the Forward-Looking Infrastructure Development Program and the Six Core Strategic Industries Promotion Plan in the fields of green energy, rail systems, 5G, digital infrastructure in 2022. A total of 205 CNS were developed and revised to meet the needs of consumers (such as food, clothing, housing, and transportation), specific groups (such as children, the elderly, and people with disabilities) and various stakeholders. These national standards encompass a wide range of areas including energy storage systems (EESS), solar photovoltaic systems, secondary lithium-ion batteries for electric road vehicles, hydrogen fuel quality, wind turbines, additive manufacturing (3D printing), cybersecurity for industrial automation and control systems, communication networks and systems for power utility automation, embedded software cybersecurity for smartphones, urine-absorbing aids for incontinence, medical face masks, indoor curtains and childcare products such as strollers for infants and toddlers.

2. Participating in the establishment of international standards on network communications and assisting manufacturers in earning international recognition of their technology

BSMI's project team of "International Standards Analysis and Participation in Network Communications" submitted 15 technical proposals for international standards in 2022. Among these, 9 proposals were accepted by relevant international standard organizations.

This project has a long-term commitment to supporting the participation of our experts in international standards. It creates a cooperation model where critical technologies are developed under the support of manufacturers for purpose of obtaining patents and these patented technologies will be submitted for discussion in the development processes of international standards. Manufacturers including Acer, Arcadyan, SERCOMM, and WNC benefited from such cooperation. They have utilized the intellectual property cross-licensing negotiations for their own-brand and ODM products, contributing to significant growth in intellectual property revenues after years of investment and dedication.

This project also assisted domestic manufacturers in participating in international standards meetings and taking the lead in discussions. It has successfully supported MediaTek in being selected as the vice chairman and chairman of 3GPP Radio Access Network Working Group 2 (RAN2). The project also provided manufacturers with guidance to understand the operation of meetings, building connections with other manufacturers and increase the success rate of proposals. After years of hard work, the project team not only enhanced our country's contribution to international standards but also become more influential in the development of international standards.

3. Developing 5G industry standards and certification programs, assisting domestic manufacturers in building cybersecurity capabilities

In the past year, BSMI has achieved the following results:

- (1) Development of an industry standard for "Cybersecurity Guidelines for Smart Manufacturing Industrial Automation Control Systems - Part 2: Integration and Maintenance of Service Providers."
- (2) A seminar on "Information Security Standards and Applications Forum" to help domestic industries stay informed about international cybersecurity trends.
- (3) Completion of 10 new cybersecurity testing items for 5G O-RAN interfaces and a domestic industry development report of 5G O-RAN technology to assist domestic industries in understanding the current status of 5G O-RAN technology development and international market trends.
- (4) Video conferences with US National Institute of Standards and Technology (NIST) to discuss topics including the revision of the Cybersecurity Framework (CSF) 2.0, 5G Smart Poles, O-RAN cybersecurity, and cybersecurity testing for solar photovoltaic inverters to deepen technical exchanges between Taiwan and the United States.



4. Promoting the CNS Mark certification system, collaborating with the MIT Smiling Logo to expand product sales

The CNS Mark is a voluntary product certification system that has been implemented in Taiwan since 1951 to promote national standards. Products granted the CNS Mark convey a message to the public that the quality conforms to national standards, and the quality management system run by its manufacturing factory also complies with ISO 9001. Manufacturers can expand the market and earn the confidence of customers by obtaining the CNS Mark.



The BSMI has adopted innovative approaches to promote the CNS Mark. In 2022, we actively encouraged 1,561 manufacturers to apply for the CNS Mark, supported 29 CNS Mark registered manufacturers in conducting 31 advertising and marketing campaigns and organized 598 promotion events in schools and private institutions. An additional 25 manufacturers were approved to use the CNS Mark and 33 CNS Mark certificates were issued in 2022. "Disposable plastics refuse sacks made from polyethylene" was added to the scope of CNS Mark. Updates were also made to items of "disposable dust respirators," "medical face masks," "blended hydraulic cements," "emulsion paint," "hot-dip zinc-aluminum-magnesium alloy-coated steel sheet and strip" and "unplasticized high impact polyvinyl chloride (PVC-U) pipe fittings for general uses and water supply" due to revisions to relevant standards.



Furthermore, CNS Mark products will be qualified to apply for "Made-in-Taiwan Product MIT Smiling Logo." By the end of 2022, there were 215 CNS Mark registered manufacturers with 498 CNS Mark products being authorized to use the MIT Smiling Logo.

Chapter 2

Metrology Management and Technology to Promote Upgrade of Industries



"A tiny lapse leads to a huge mistake" is a Chinese idiom that precisely reflects the pursuit of quality in metrology in modern society. The BSMI established the National Measurement Laboratories (NMLs), which is a cornerstone of the country's calibration traceability system. We participate in international metrology organizations and maintain a measurement system traced to international standards by being a signatory to the CIPM Mutual Recognition Arrangement. We further introduce advanced measurement techniques that can be applied by the industry to upgrade their products. Furthermore, for the target of net-zero emission in 2050, electric vehicle supply equipment (EVSE) is required to pass verification starting from January 1, 2023 to ensure the accuracy of electricity measurement. More than 3 million AMI smart meters were verified by the BSMI in 2022 to satisfy the demand of smart meter deployment from the electricity utility. The BSMI reviews and advances the metrology infrastructures and relevant regulations all the time to satisfy the requirements of national policies and social development.

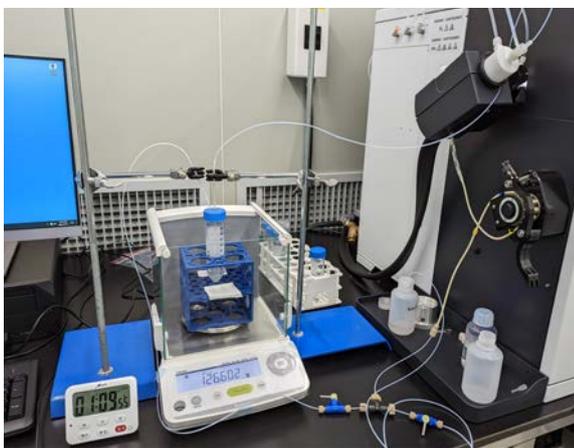
1. Improving national measurement traceability system and strengthening the metrology infrastructure for industry.

The BSMI established the NMLs in accordance with the Weights and Measures Act to undertake research and experiment, maintenance, storage, provision and calibration of the highest measurement standards in Taiwan. The NMLs ensure the accuracy and consistence of national measurement system, and provide testing and calibration services for domestic industry that can be traced to international standards.

The NMLs maintain 133 sets of measurement standard systems of 17 fields. It provided 5,292 calibration services for secondary laboratories and industries in 2022. The estimated number of testing services provided by these testing/calibration laboratories (approximately 2,200 laboratories) was about 3.93 million and the annual market value of testing was around 19.6 billion New Taiwan Dollars.

In 2022, the BSMI enhanced the capacity of national measurement standard systems to meet the demand of industrial calibration services, including:

- (1) Enhancing the measurement capability of Nano Particle Functional Property Measurement System (system code D27), Force Calibration System (N03), and Microwave S-parameters and Impedance Measurement Standard System (U02) improves the measurement uncertainty and expands the calibration capabilities. The enhanced measurement capability fulfills the measurement traceability demand in the fields of machine, 5G communication and semiconductor manufacturing, ensures the calibration service quality and reduces delivery time and cost by having the instrument calibrated in Taiwan.



- (2) Through improvement of the LINAC photon absorbed dose to water calibration system, precision of radiation doses received by the radiation oncology patients can be improved by 1%. Requirements of precise dosimetry of radiation oncology can be satisfied, and risk of overdose can be reduced. At least 1.38 million cancer patients can benefit from the improvement every year. In addition, measurement techniques of the difficulty to measure (DTM) nuclide C-14, which is usually seen in the decommissioning of nuclear power plants, have also been established in the National Radiation Standard Laboratory (NRSL). Measurement accuracy and radioactivity evaluation ability are improved, and radiation safety of the living environment of the Taiwanese people can be ensured.



2. Maintaining the effectiveness of mutual recognition arrangement and enhancing international competitiveness of industries

The NMLs continue to participate in international comparisons and establish traceability both domestically and internationally, regularly accepting international third-party accreditation to ensure the conformity of Taiwan's measurement systems to international standards. There were 397 items of measurement standards registered with the International Bureau of Weights and Measures (BIPM) database by the end of 2022. Being a signatory to the CIPM Mutual Recognition Arrangement, the calibration and test reports issued by domestic testing/calibration laboratories are recognized by the 154 institutes in 101 members of the General Conference on Weights and Measures (CGPM). Exported products no longer need to be sent to other countries for testing, reducing the time and cost required for repetitive testing abroad, avoiding technical trade barriers, and enhancing the international competitiveness of the industry.



3. Promoting of industry upgrade by developing advanced metrology technology and industry applications.

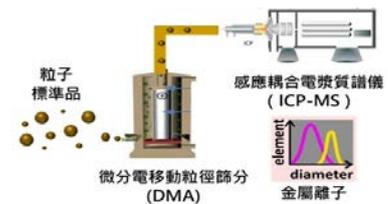
Metrology is an important quality infrastructure in modern countries and has much impact on the industry upgrade. The NML completed the research and development of advanced semiconductor processes and smart machinery-related measurement technologies in 2022, which has been introduced into industry application for further promotion of industry upgrade.

(1) Keeping the international leading position of Taiwan's semiconductor industry by introducing the advanced metrology technology in semiconductor manufacturing

- ▼ Keeping the international leading position of Taiwan's semiconductor industry by introducing the advanced metrology technology in semiconductor manufacturing

With the features size of semiconductor processes shrinking down to 2 nm-node, the NML developed the reflective small-angle scattering technology (RSAXS) to measure the line-width of 2 nm-node semiconductor processes, which performs the equal capability measured by scanning electron microscope (SEM). This technology provides fast and precise non-destructive measurement for the front end of process line.

- ▼ Promotion of semiconductor manufacturing yield by establishing impurity detection of chemicals used in semiconductor processes.



With the shrinkage of semiconductor devices down to nanoscale, the contamination control becomes critical to improve the process yield. The NML developed the inorganic cation measurement of nanoparticle in 2022. The measurement system detects the particles size ranged from 10 to 100 nm with the detection limitation down to 10 ng/kg for the inorganic cation concentration, which greatly shorten the impurity detection time and improve the detection limitation, further efficiently monitoring the particle contamination in chemicals for high semiconductor manufacturing yield.



(2) Establishing crucial measurement technology standards for smart machinery to promote technological upgrading of the machine tool industry

The NMLs actively conduct research on online calibration technology. In 2022, it developed and built high-end calibration capability for the domestic smart machinery industry to improve the measuring accuracy of various sensors, which helped the industry increase product quality and yield rates.

▼ Improvement of measurement standards related to smart machinery industry

The NMLs completed the construction of two sets of smart mechanical measurement systems, including the static weight measurement system and the gauge block interference calibration system. The calibration capability is equivalent to that of advanced countries.



● Gauge Blocks Calibration System - Interferometer

▼ Research and development of machine tool space dimensions online measurement technology

The NMLs completed the measurement uncertainty evaluation technology of the visual 3D dimensional measuring machine and shortening the time required for calibration (from one month at the original German factory to one week in Taiwan). Additionally, the NMLs completed the establishment of online geometric compensation technique measurement for five-axis machine tools, which can measure and analyze 43 geometric errors in the entire machine (three linear axes: 21 items, biaxial rotation axes: 22 items), and completing 2 demo sites. Thus, this technology can reduce calibration time from 16 hours to 4 hours and cut the cost by 50%.

▼ Developing anomalous sound detection technology for Wind Turbine Blades

An innovative technology has been developed for the detection of noise anomalies in wind turbine blades. With this technology, there is no need to stop the wind turbine for inspection. It will assist Taiwan's wind energy industry in conducting rapid non-contact inspection, offering the advantage of reduced inspection time.



4. Advancing verification tasks to ensure accurate measurement

In order to harmonize the use of weights and measuring units and protect the rights and interests of the public, measuring instruments that are regulated in accordance with the Weights and Measures Act must be verified before they can be sold or used for measurement. There are 21 types of legal measuring instrument subject to verification, including taxi meters, weighing instruments (scales), three household meters (electricity meters, water meters, gas meters), and instruments used for law enforcement purposes (such as speed control devices, breath alcohol testers and analyzers, air to liquid volumetric measuring instruments). The following activities are highlighted:

(1) Adding EVSE to the scope of verification so as to ensure fairness of trade of EV charging equipment

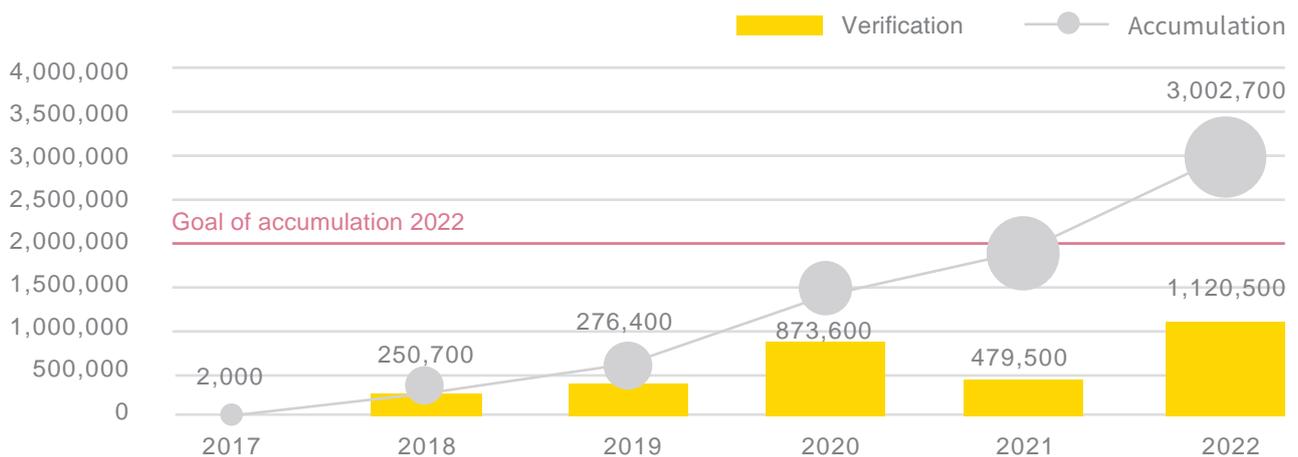
In response to the goal of net-zero emission in 2050, countries around the world are actively promoting electric vehicles to replace traditional fossil-fueled vehicles. One of the critical factors to promote electric vehicles is a well-built charging infrastructure, and thus both governments and related industrial players are speeding up to build electric vehicle supply equipment (EVSE). The accuracy of the measurements of EVSE is important to both the suppliers and consumers. The BSMI published the technical specifications for EVSE in 2022 and EVSE are subject to legal metrology control starting from January 1, 2023.



(2) Improving capacity of electricity meter verification to fulfill installation demands of AMI smart meters used in smart grid

AMI smart meters have the advantages of remote access and automatic reading. Consumers can track usage of energy anytime by smartphones or computers and they may even learn about possible high-energy-consuming appliances in their homes. In addition, for monthly larger scale electricity consumption users, they are able to choose time-of-use rate plan provided by Taiwan Power Company and use those high-energy-consuming appliances in off-peak time to cut their monthly electricity bills.

In recent years, Taiwan has actively promoted the deployment of AMI smart meters. According to the “Smart Grid Master Plan” approved by the Executive Yuan, it is planned to install a total of 3 million smart meters by 2024 and a total of 6 million smart meters by 2030. The BSMI has been strengthening the verification capacity of AMI smart meters in order to coordinate with the schedule of the master plan and the demands of verification from Taiwan Power Company. With a view to meeting the installation demands of AMI smart meters, more than 1 million and 12 thousand AMI smart meters were verified in 2022 and till now a total of more than 3 million AMI smart meters have been verified by the BSMI.



(3) Verification Mark with QR codes

After measuring instruments are verified by the BSMI, the verification information of the measuring instruments is uploaded to BSMI's database. With a view to helping consumers access the compliance information easily, QR code is added to the Verification Mark in 2022. The public only needs to use their mobile devices to scan the QR code, which will link to the BSMI's database and show the verification history data of measuring instruments. Not only does it increase the convenience of the public to access compliance information, it also improves the effectiveness of market surveillance.



5. Improving the awareness of accurate measurement and strengthening the promotion of metrology

(1) Deepening the system of good measurement management

The good measurement management system for measuring instruments is a program that guides the business operators to perform self-inspection and management. For example, the good weighing instrument markets (i.e., scales) must have public scales, which shall be calibrated regularly by using the standard weights they own. For good gas stations, they must have standard buckets and used them regularly to check the fuel dispensers and maintain records. The instrument error must be kept within 0.3%, which is stricter than the verification requirement of 0.5%. In addition, the BSMI also carries out random inspection to ensure the accuracy and fairness of the measuring instruments. Through this system, the social responsibility of business operators can be strengthened, who in turn will earn consumer trust by safeguarding the rights and interest of consumers.

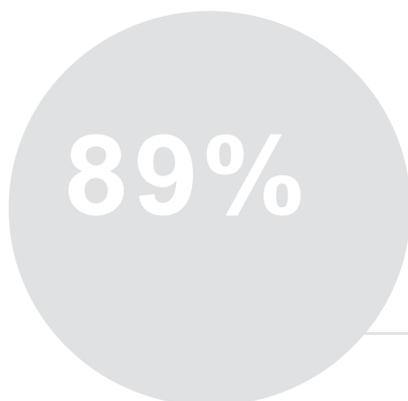
Registration rate of traditional market (using weighing instruments) is 99%.

Weighing instruments

Registered traditional market: 361

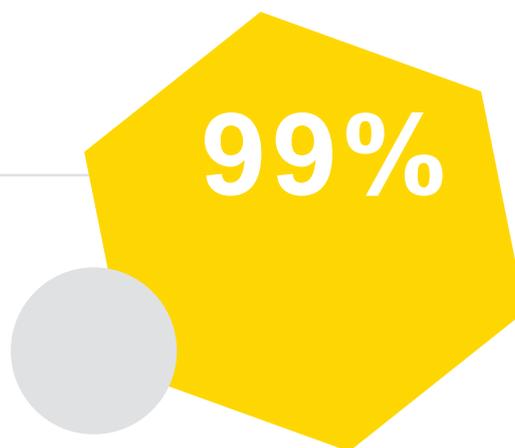
Registered convenience store: 10,526

Registered post office: 1,297



Registration rate of gasoline station is 89%.

Registered gasoline station: 2,217



BSMI continues to promote the good measurement management system to help business operators incorporate it in their daily standard operation procedures. By the end of 2022, 361 public markets have been registered as good measurement management markets, accounting for 99% of the total number of public markets. 2,217 gas stations have been registered as good measurement management of oil meters, accounting for 89% of the total number of gas stations in the country. The compliance rate of verification and inspection reached more than 99.9% in the past four years. In addition, convenience stores and post offices also adopted good measurement management system.

(2) Strengthening the cultivation of metrological technical experts in the weights and measures industry

Measurement technology is the foundation of industrial and technological development, as well as the key to the modernization of national industrial production technology and management. In order to improve the quality and technology of technical personnel in the field of measurement, and to construct an training and examination system of metrology technical personnel that meets industry needs, BSMI continues to use the website to provide relevant online service resources to cultivate measurement professionals who have theoretical knowledge and excellent skills, and to enhance the level of industrial measurement technology.

By the end of 2022, there have been a total of 124 Class A and 2,344 Class B qualified metrology technical personnel. Among them, approximately 650 metrology technical personnel worked at self-verification business operators approved by the BSMI or organizations commissioned by the BSMI to conduct verification of measuring instruments. Moreover, metrology technical personnel have been employed by 210 enterprises out of 476 measuring instrument enterprises engaged in instrument manufacturing and repairing.



In order to make good use of the resources from the private sector, the BSMI launched the “Pilot Program: Acceptance of the Self-Testing Records of Good Gas Stations for Oil Meter Verification” and revised the “Directions for the Evaluation of Weights Owned by Business Operators” in 2022, expanding the acceptance of testing reports signed by metrology technical personnel, enhancing the value of certificates of metrology technical personnel.

(3) Disseminating metrology knowledge and raising awareness of metrology:

- ▼ Organizing a series of forums to celebrate the 35th anniversary of the National Measurement Laboratory (NML) and promoting metrology technology

The NML was established in 1987. A series of forums was organized to celebrate the 35th anniversary of the NML in 2022. The forums consisted of four seminars: "Safety for Smart Products and Systems," "Metrology Development for Net Zero Emission and Sustainability," "Digital Transformation and Application on Metrology," and "Semiconductor Inspection and Metrology." At these seminars, key research and development indicators for metrology standards were presented with the aim of implementing metrology standards in industrial practices to facilitate Taiwan's industrial upgrading. 680 attendees participated in the four seminars.



- ▼ Organizing Promotional Activities and Publishing Professional Journals

The BSMI collaborated with the National Science and Technology Museum (the NSTM) to hold the promotion activity of "520 World Metrology Day" in May and another one of "2022 Taiwan Science Festival" in November, using games and teaching aids to help people experience the application of measurement in life. Moreover, BSMI held training camp for teachers to expand the use of metrological teaching plans and aids.

In addition, in order to disseminate measurement knowledge, the NML continued to provide training courses in relevant professional fields in 2022, and published a bimonthly measurement information magazine to promote measurement standard information services, and conducted in-depth discussions on measurement standards, measurement technology, measurement industry trends, and market information and trends.

6. Improving national measurement traceability system and strengthening the metrology infrastructure for industry

(1) Implementing verification and inspection of legal weights and measures instruments

To ensure the accuracy of measurement and protect the rights and interests of the people, legal weights and measuring instruments must pass verification before they can be used for measurement. In 2022, the BSMI completed verification of more than 5.62 million legal weights and measuring instruments, of which about 3.61 million were household meters related to people's daily lives (including about 2 million electric meters, 1.17 million water meters and 440,000 gas meters).

In order to ensure that the legal weights and measuring instruments in use remain accurate, we carried out random inspection or special inspection on legal weights and measuring instruments that have been certified and in use, for example, inspection project on scales in public markets before the three traditional festivals. Noncompliant scales are not allowed to be used. In 2022, we completed inspection of more than 71,000 legal weights and measuring instruments. 299 units were found noncompliant (the noncompliant rate was about 0.42%).

Based on the risk assessment, we coordinated and planned the inspection of weights and measuring instruments used by recycling sites, farmers' associations, and public grain purchasers across the country to ensure that the sales comply with regulations. All of the 13,280 weights and measuring instruments inspected were found to be compliant.

(2) Using web crawling tools to monitor measuring instruments sold online

With the changes to consumer behaviors in favor of shopping online, more cases of noncompliance of weights and measuring instruments sold online are found than those sold in physical stores. The BSMI used web crawling tools to identify noncompliant listings of weights and measuring instruments, and worked with the online shopping platforms, including Shopee, Bid-Yahoo and PChome, to help sellers learn about relevant requirements. In 2022, there were 9,726 web listings of noncompliant measuring instruments removed.



7. Integrating smart meter reading and promotion, laying the foundation for smart city development

(1) Promoting the achievements of data-integration smart meters

The BSMI completed the specifications on the information format and data format of the communication interface of smart meters, and held three briefing sessions to explain the specifications to the industry and collect opinions from all stakeholders, in order to reach a consensus.

We also participated in the 2022 Smart City Exhibitions in Taipei (3/22~3/25) and Kaohsiung (3/24~3/26) to showcase the smart meter reading, 5G smart poles, real-flow laboratories and big data analysis application scenarios. The various achievements, such as smart meter reading detection, information integration and transmission, and information security detection technology were introduced to the public by way of interactive activities.

A small-scale demonstration site (an apartment building with 5 units + 6 stand-alone buildings) was completed to illustrate how smart meter readings are integrated in a building. A building complex will be completed later. These three styles are representative buildings in Taiwan and the success of incorporating smart meters in a building can encourage more deployment of smart meters in new buildings.

(2) Building the capacity of smart meter reading testing

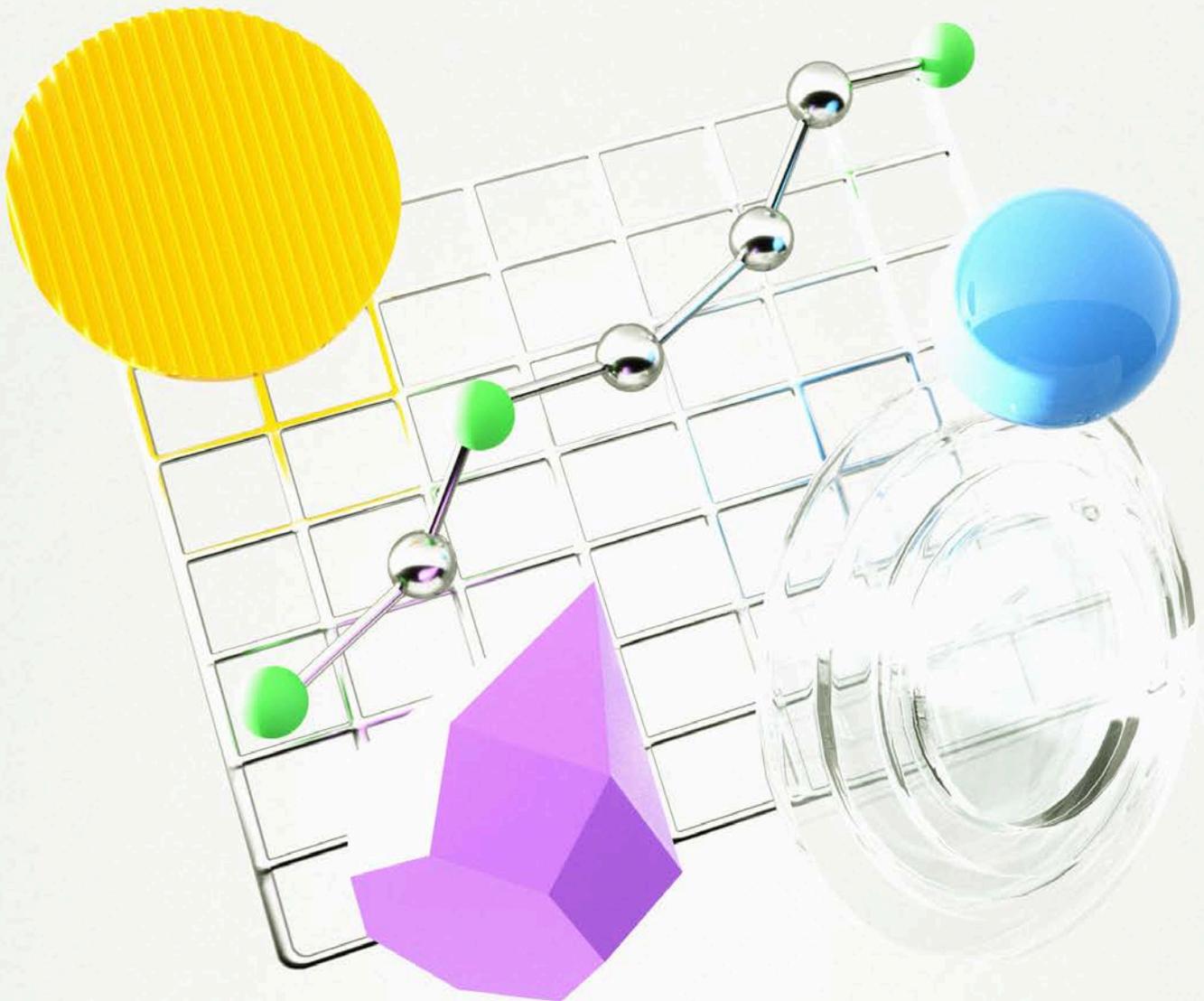
The BSMI developed one set of smart meter reading capacity, including 5G simulation testing, smart water meter real flow testing and testing procedure, smart gas meter data acquisition technology (meter rack function design, graphic control software and flow testing), assisted smart water meter manufacturers to complete environmental and electronic performance testing (including 6 times of disturbance flow testing, 1 time of static magnetic field testing, 1 time of surge noise testing, 1 time of AC/DC voltage variation testing), and tested 7 types of water meters.



In addition, the BSMI assisted smart gas meter manufacturers to complete the interference testing operation of 1 type of gas meter, providing the industry with an understanding of the future testing procedure. Manufacturers can use the test results to improve their products.

Chapter 3

Product Safety Management, Protection of Consumer Rights



Technology has always come from human nature, and human needs promote product innovation and diversification. The continuous innovation of commodities drives human economic activities. BSMI in its capacity as a guardian of consumer safety has adopted risk-based approaches to monitoring the safety of consumer products, from pre-market end and post-market end. The activities implemented by the BSMI adheres to the principle of "Protecting Consumers' Rights and Leading Industry Development." They can be classified into regulatory regime and voluntary regime.

Regulated Regime

1. New products were added to the scope of regulated products

(1) Children's products

To assist parents in enhancing the convenience of caring for infants and young children, there is a growing variety of children's products available in the market, such as carry cots, children's chairs, reclined cradles, etc. In order to prevent infants and young children from accidents when using unsafe products, BSMI regulated a number of children's products in 2022.

▼ Children's chairs and stools

Date of entry into force: December 1, 2022

inspection standards: CNS 16045

inspection items:

exposed wood parts; hazardous sharp points or edges; small parts; the paint and surface coating on the product of lead content; safety of attached toy accessories; scissoring, shearing, or pinching of products that fold; circular holes in rigid materials; labeling, protective components; strength; stability



▼ Carry cots and stands

December 1, 2022

CNS 16083

material hazards (organic materials and chemical hazards), mechanical hazards (protective function; entrapment hazards; hazard from moving parts; entanglement hazards; choking and ingestion hazards; suffocation hazards; hazardous edges; points and corners; stability; structural integrity), labeling



▼ Infant bath seats

October 1, 2022

CNS 16024

general requirements (hazardous sharp points or edges; lead content in coating; latching; locking and other mechanisms; scissoring, shearing, and pinching; openings; protective components; labeling) and performance requirements (stability; restraint systems; static load; specific requirements for suction cups; leg openings and attachment components)



▼ **Reclined cradles**

November 1, 2022

CNS 15982

chemical properties, construction (shrinkage; finger entrapment; moving parts; edges, points and corners; small parts; cords, ribbons and parts used as ties; springs; locking mechanism for folding system; reclining system; angle and height of seat unit; locking mechanism for carrying handles; stability; static strength; durability of reclined cradle with carrying handles; strength of carrying handle locking mechanism; slippage of reclined cradle; restraint system; warning message



(2) PVC tiles

Due to plasticizers being a type of endocrine-disrupting chemical, which interferes with the hormonal balance in living organisms, it can lead to feminization in male infants and increase the risk of breast cancer in female infants. In 2020 and 2021, the BSMI tested 50 PVC floor tiles, and the results showed that 28 of them did not meet the national standard requirements for plasticizer content. To safeguard the safety of infants and toddlers, plastic floor tiles are subject to mandatory inspection beginning on January 1, 2023.

(3) Bluetooth headphones

In response to concerns regarding potential hearing damage resulting from excessive use of smartphones and other audio devices, headphones are required to comply with requirements for electromagnetic compatibility of multimedia equipment (CNS 15936), safety (CNS 15598-1) and limits of hazardous substances (CNS 15663:2013 Section 5). The measure will come into effect on January 1, 2024.

(4) UV Disinfection (Sterilization) appliances

Due to the increased use of UV disinfection (sterilization) lamps with a focus on "disinfection" and "sterilization" during the pandemic, there is a high risk to health hazards resulted from misuse of consumers. To address this concern, the national standard (CNS 60335-1:2014) were updated to include requirements for human presence detection devices and timer protection switches. It also requires that products be equipped with immediate power cutoff protection in cases where UV radiation could pose a hazard. Additionally, a clear and legible warning labels or symbols shall be affixed to the products to ensure that consumers of all ages are aware of the correct usage procedures.

2. Inspection standards were amended to address hazards associated with multifunctional products

(1) Multi-functional protective helmets

Multi-functional protective helmet equipped with “Bluetooth players,” “digital cameras,” or “machine with rechargeable lithium batteries” may pose safety concerns due to the embedded lithium batteries. Protective helmets for motorcycle/bicycle riders and passengers, or player of skates, skateboards and rollers skates are subject to mandatory inspection. The measure came into effect on June 1, 2022 and requires that the position of lithium batteries shall avoid impact-prone areas.

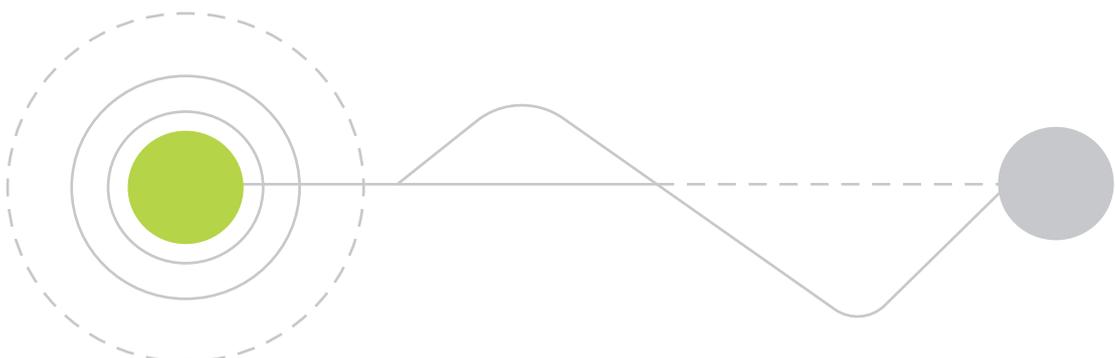


(2) Polyvinyl chloride (PVC) pipes

PVC Plastic Pipes are common commodities in construction projects and daily life, mainly used for transporting regular fluid, conveying drinking water for daily use, and protecting wires or cables for power distribution. PVC pipes were regulated in 1972 and the conformity assessment procedure is "Batch Inspection" or "Registration of Product Certification." Along with the revision of inspection standards “CNS 1298: Unplasticized polyvinyl chloride (PVC-U) pipes” and “CNS 4053-1: Unplasticized polyvinyl chloride (PVC-U) pipes for water supply,” the conformity assessment procedure of batch inspection was replaced by "Type-Approved Batch Inspection," a simplified batch inspection. These changes entered into force on July 1, 2022.

(3) Cement

"Portland Cement" and "Hydraulic Cement" are regulated products. The inspection standard “CNS 61: Portland Cement” was revised in terms of the composition of "additive content" (including reducing the chloride ion limit of Portland cement to 240 ppm), "ignition loss," "maximum value of insoluble residue," "fineness and specific surface area" and "packaging and labeling" and other items to contribute to the goal of circular economy. Both imported and domestically manufactured cement are required to comply with the revised standard after June 1, 2022.



3. Market surveillance activities monitor the continuous compliance of products sold on the market

(1) Physical/online market checks and testing of purchased products

- ▼ To ensure that regulated products comply with mandatory requirements and to prevent the sale of unsafe products in the market, the BSMI checks products sold in physical stores and online markets to see whether they bear the Commodity Inspection Mark.
- ▼ In 2022, a total of 76,123 items (including 45,606 items from physical stores and 30,517 items from online markets) were checked. These products were prioritized based on the records of violation, public reports, and incident reports. They included automobile cigarette lighters, chargers, LCD writing tablets, sunglasses, power banks, surveillance cameras, power supplies, speakers, hair straighteners, and electric cookers.
- ▼ To further ensure the safety of products on the market, the BSMI plans and carries out annual testing projects of products (including non-regulated) purchased from the distribution locations (including online).
- ▼ In 2022, testing projects were conducted for 2,331 items (including 1,815 items of regulated products and 516 items of non-regulated products), covering products related to public concerns, products used for specific seasons or festivities, and products of popularity. They included toys, liquid toys, household pressure cookers, automatic coffee machines, wall-mounted basins, and general household liquefied petroleum gas pressure regulators.

(2) Optimizing market surveillance programs

▼ Using web crawler to identify listings selling non-compliant products

In response to the prevalence of online transactions, the BSMI uses web crawler technology to strengthen the supervision and management of products sold online, and actively searches for web listings that may sell non-compliant or unsafe products. In 2022, the top nine online shopping platforms, such as Shopee, Ruten, Yahoo Auctions, Yahoo Shopping, PChome, Rakuten, MOMO, ETMall and Buy123, were targeted under this approach. The content of product web listings was analyzed to identify those failing to disclose the compliance information, which were removed by the shopping platform at the request of the BSMI. The BSMI also tracks and checks high risk sellers who were reported repeatedly or with records of violation.

In 2022, products prioritized for this program were those we received more reports (USB car chargers, hair curlers, power banks, monitors, etc.), requested by public associations for more strengthened surveillance (car seats, electric bicycle lithium batteries and chargers, etc.) and with large amount (sunglasses, etc.). 20,511 product listings were removed in 2022.

▼ **Incident reports**

In order to collect information on incidents and to prevent similar incidents from occurring again, the BSMI adopted "Regulations for Reporting Incidents Caused by Commodities Subject to Inspection", which requires the obligatory inspection applicant notify the BSMI within 3 working days after the date of obtaining information on the incidents involving their products. In 2022, the BSMI received 120 product incident reports and investigated causes of incident. For unsafe products, the companies were asked to take corrective actions.

A majority of products involved in the reported incidents were home appliances (82 reports), followed by electronic products, other products, and gas appliances. The top five products are dehumidifiers, washing machines, air conditioners, power banks and tablets. These products will be prioritized in the annual market surveillance programs.

▼ **Disclosure of information on unsafe products**

The BSMI actively collects information on recalled products published by foreign countries, such as that of the Consumer Product Safety Commission (CPSC) and Safety Gate: the EU rapid alert system for dangerous non-food products. The information was translated into Chinese and published on Product Safety Information Website. In 2022, 1,222 pieces of translated information were published on the website. For products recalled in Taiwan, the BSMI received 4 cases of voluntary recalls issued by the business operators in the year. In addition, 460 cases of fines for non-compliant products were also published on the website.

4. Collaboration with online shopping platforms

In response to the popularity of online shopping, where there are difficulties in identifying sellers, the BSMI collaborates with e-commerce platforms to establish a mechanism to ensure the safety of products sold online.

(1) Raising seller's awareness of regulated products

The BSMI requires major online shopping platforms to guide sellers to its web page of regulated product search engine. Sellers can get to know the inspection requirements of products by keyword searching or entering the HS codes.

(2) Reminding sellers of the obligation of selling regulated products

For high-risk or high non-compliance rate products subject to inspection, sellers are reminded to confirm that the products bear the Commodity Inspection Mark and clearly describe the brand, model, and compliance information in the product listings. For products of public concerns, the e-commerce platforms will require sellers to disclose compliance information before posting the products. This proactive disclosure helps buyers identify safe products.

(3) Removing listings of unsafe products and enforcing management of sellers with repeated violation

For products that are reported to have caused incidents by domestic or international media (e.g., buckyballs), e-commerce platform operators will be required to promptly review listings of the same products upon receipt of notice from the BSMI. Those without documents demonstrating compliance with safety requirements shall be removed. The BSMI will also inform e-commerce platforms of sellers with repeated violation and they will take more stringent management approaches to these sellers by suspending their accounts or adding negative comments.

Voluntary Regime

1. Voluntary product certification (VPC) program for products with emerging technologies

(1) 5G smart poles

The BSMI published "5G Smart Pole System Technical Specifications," which includes general requirements, information interoperability and communication interfaces, structural safety, environmental reliability, electrical safety, electromagnetic compatibility, information security, power supply systems, performance, and 5G micro base stations, which are used to certify 5G smart poles. We collaborate with city/county governments to adopt these specifications in their project of deploying 5G smart poles and work with industry alliances to provide field certification, which boosts the overall industry ecosystem in Taiwan, and promotes the application of innovative technologies and economic development.



(2) Electric vehicle charging system

On January 13, 2022, the BSMI amended the VPC requirements for electric vehicle charging system, by expanding the scope to add AC charging systems and components. The certification requirements are harmonized with relevant international standards. This move aims to promote the development of Taiwan's electric vehicle industry, enhance product quality, and ensure the safety of charging equipment for public and construction use.

(3) Lithium cell and battery systems in energy storage systems

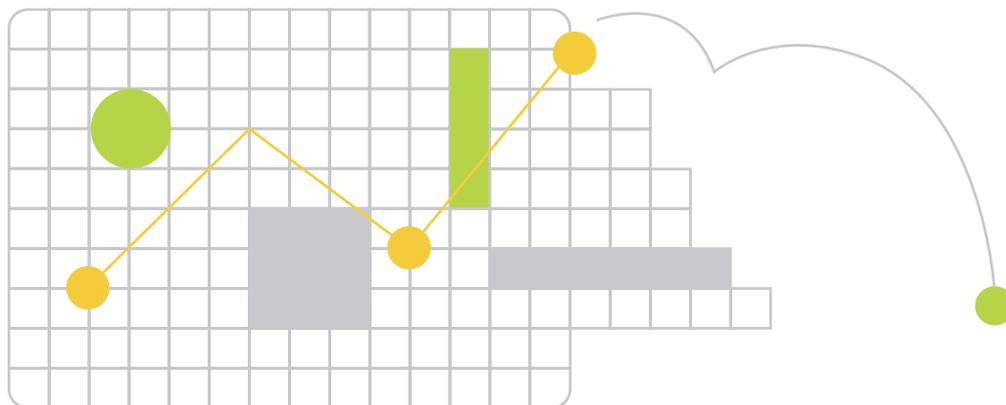
In light of the rapid growth of the global energy storage product market and the increasing diversification of lithium battery applications, the BSMI announced the VPC program for cells, battery systems, and small-scale residential energy storage battery systems on May 16th, 2022, to support national green energy policies and to address the need for renewable energy and grid stability.

(4) Lithium batteries for electric vehicle

In response to climate change and the need for energy conservation and carbon reduction, Taiwan actively promotes vehicle electrification. This effort is a collaborative initiative across government agencies with the goal of achieving full electrification, smart technology integration, and the capacity of production of key components for electric buses by 2030. To ensure the safety and quality of lithium batteries for electric vehicles, the BSMI published CNS 16160 for the safety of lithium batteries used in electric vehicle power systems in 2021, which is harmonized with international standards. Based on this standard, the BSMI implemented VPC for lithium batteries for electric vehicles on August 16th, 2022.

(5) Elevator control system equipment

Considering the trend of digitization in remote monitoring of elevators, we implemented VPC for elevator control system equipment on October 14, 2022 to certify that the elevator equipment comply with information security requirements. The certification is adopted by Construction and Planning Agency under the Ministry of the Interior in their inspection programs.

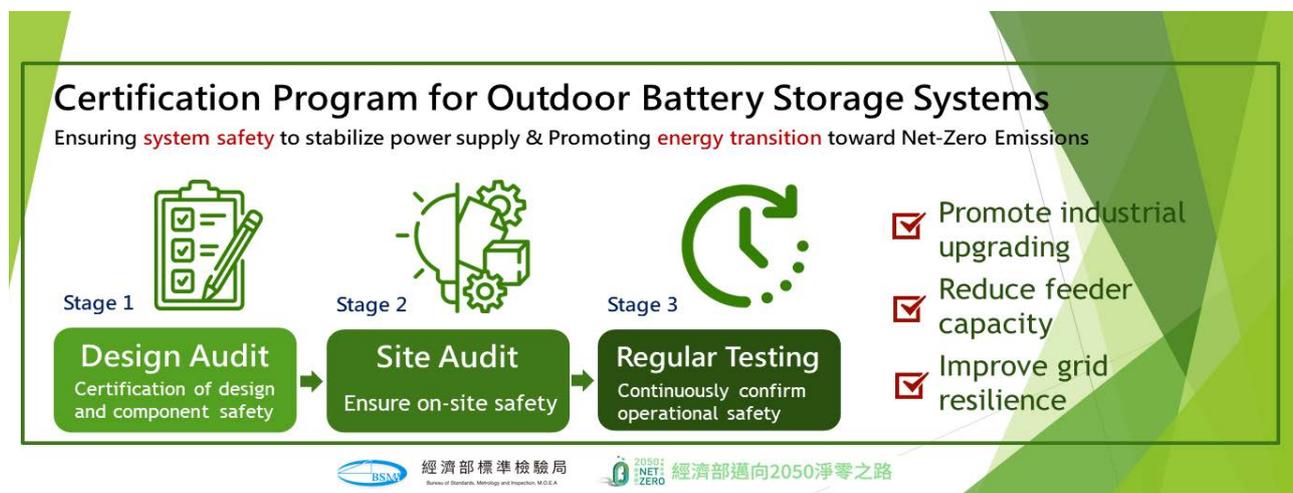


2. Verification of outdoor energy storage facilities

In light of the challenges posed by global warming and extreme weather events, energy conservation, carbon reduction, and sustainable development have become a shared direction for countries worldwide and international businesses. Many have pledged and taken actions towards achieving net-zero emissions by 2050. To meet these net-zero emissions goals, development of renewable energy sources and the establishment of energy storage systems play key roles.

Solar power, wind power, hydroelectric power, and other forms of power generated by renewable energy are unable to adjust their electricity generation in accordance with real-time electricity demand due to their intermittence nature. While they can help achieve carbon reduction goals, they may lead to power supply instability. Therefore, the assistance of energy storage systems is needed to stabilize the power supply and regulate electricity, much like how reservoirs can prevent flooding and provide a continuous water supply.

However, when the temperature of lithium batteries used in energy storage system increases, it may trigger thermal runaway. This can lead to uncontrolled release of heat from the batteries, resulting in the risk of flames or explosions. Furthermore, there have been multiple international incidents involving fires in energy storage system used by lithium batteries, which highlights the urgent need to ensure safety of energy storage systems.



● The Three-Step of Verification Process for Battery Energy Storage System

To ensure the safety of energy storage systems, the BSMI has developed the verification program based on international standards and international verification practices. This verification program involves 3 stages of processes, including "Design Review" before construction, "Site Review" after completion of construction, and "Periodic Test" every 2 years. In addition to safety standard testing for energy storage equipment, the energy storage system is required to obtain sign off from electrical and fire technicians before it can pass review by the BSMI.

3. Establishing testing capacity for the new version of standards

(1) Valve discharge volume of liquefied petroleum gas containers

The testing equipment for valve discharge volume of liquefied petroleum gas containers is constructed in accordance with the requirements specified in Section 4.6, CNS 1324: 2022, regarding its safety device discharge volume. This equipment is primarily used to test the discharge volume of safety devices on steel bottle valves.

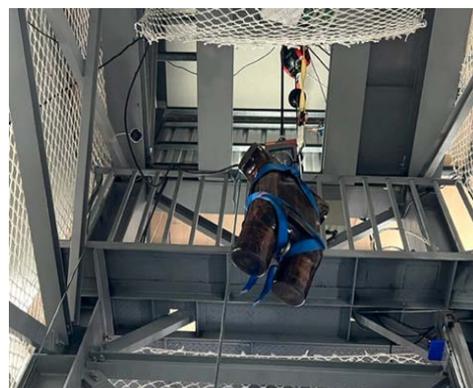


(2) Hooks and shackles

This test method is conducted in accordance with Section 10.1, CNS 5394:2016 and Section 11.2, CNS 3542:2016. It uses a 100-ton horizontal tensile testing machine to perform guaranteed load (resistance to deformation) tests on two types of products: hooks and shackles. Upon completion of the test, the permanent deformation of the hook's mouth opening should be less than 0.25%, and the distance between the crown of the shackle and the pin shall not increase by more than the greater of 0.25% or 0.5mm.

(3) Full-body harness laboratory

"Class A full-body harnesses with energy absorbing lanyard or lanyards & energy absorbers" will be regulated in 2023. Taichung Branch of the BSMI acquired testing equipment (safety nets, angle gauge, test torso, cantilever cranes, quick release devices and mobile safety guardrails) to meet the testing required by CNS 14253-1 and CNS 14253-6.

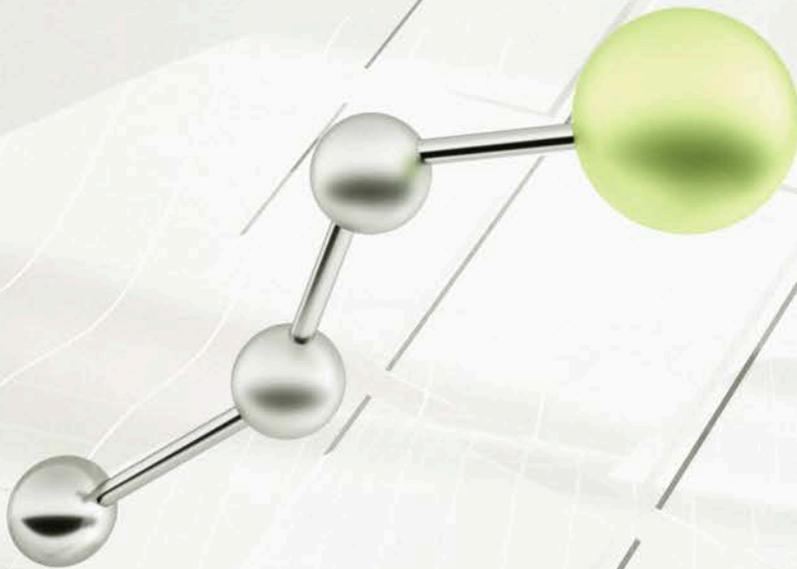


4. Testing and certification program on smart care assistive devices for Individuals with disabilities and the elderly

Due to the trends of aging population, insufficient caregiving manpower, and declining birth rates in Taiwan, the elderly and individuals with disabilities increasingly rely on assistive devices, health care products, and related aids to meet their daily needs. Consequently, the corresponding assistive device industry is experiencing robust growth. The BSMI developed standards, testing and certification programs for assistive devices under the collaboration with expert institutions, including Metal Industries Research & Development Centre, Cycling & Health Tech Industry R&D Center, and Taiwan Testing and Certification Center. The BSMI also organized campaigns to encourage innovative design of assistive devices.

Chapter 4

Accelerating Industrial Energy Transition by Green Energy Testing and Certification



1. Promoting the issuance and trading of Taiwan renewable energy certificates (T-RECs)

(1) Status of issued and traded T-RECs:

Total installed capacity reaching 806 MW. 1,876,228 T-RECs were issued over the past five years, corresponding to 940,000 tons of carbon reduction. Among them, 1,667,564 T-RECs (1.66 GWh) were traded by green power wheeling.

(2) Matching green energy supply and demand

▼ Green energy matching and trading platform

A “Green Energy Matching and Trading Page” was created on the official website of the T-REC Center. This service combines green energy open bidding for registered buyers and sellers, offering a transparent platform for the trading of green energy and T-RECs. In November 2022, the “Green Energy Matching Marketplace” online service, integrating the existing green energy bidding features on the official website, was introduced. After registration, members not only can inquire about the supply and demand information from buyers and sellers, but also receive matching notifications based on the matching criteria set by the seller or buyer on a regular basis. This provides businesses with a more convenient way to purchase green electricity.

▼ Promoting diverse applications of T-RECs

Following the “Pilot Program of Trading Renewable Energy Certificates for Multiple Users in Single Electricity Account Number,” we introduced the “Green Lease Program,” which allows the landlord to procure green energy and T-RECs for its tenants. By the end of 2022, BSMI have successfully assisted several owners of commercial buildings, such as Cathay Dunhua Xinyi Building, Cathay Financial Center, Cathay Life Insurance Company Building, and Cathay Dunhua Commercial Building under Cathay Financial Holdings Group, in procuring green energy.

▼ Supporting businesses with green energy market campaign

From July to November of 2022, 5 Green Energy Markets were held in the northern, central, and southern regions of Taiwan, with more than 600 people from 100 businesses participating. These events have successfully resulted in the signing of power procurement agreements between renewable energy retailers and 11 organizations, including Productivity Center and Shyeh Sheng Fuat Steel Corporation. Green Energy Market also assisted several companies, such as Winkler Partners Law Firm and L'Oréal Taiwan, in obtaining T-RECs.

▼ Promoting affordable green energy

Taiwan Sugar Corporation and the Industrial Development Administration have completed the process of leasing the land for developing solar projects. 30% of the green energy produced is reserved for bidding by small and medium-sized enterprises on the “Green Energy Trading Platform.” In addition, BSMI announced a special operation procedure for this to assist small and medium-sized enterprises in procuring green energy.

(3) Connecting T-RECs to international systems and applications

▼ Organizing international forums

The BSMI organized a forum on “Utilizing Renewable Energy Certification to Facilitate APEC Regional Renewable Energy Growth,” with speakers from Australia, Japan, Mexico, New Zealand and the United States to share the latest development of renewable energy certification in the region. We also participated in the annual Asia Renewable Energy Market Forum (REM Asia 2022), engaging with stakeholders in the Asia-Pacific region and exchanging views about the renewable energy certificate market.



2. Project certification on offshore wind farms

Offshore wind farm projects are required to be reviewed by the BSMI before they apply for permits from the Energy Administration. The BSMI amended “Directions for Demonstration and Guidance on the Review of Offshore Wind Farm Project Certification” to simplify the review process in 2021. The review covers all stages of the project development to ensure that the construction of offshore wind farms complies with safety and quality requirements. As of December 31, 2022, we have completed review of Formosa 1, Taipower Phase I, Yunlin Yunneng (Phase 1), and Changfang (Phase 1) wind farms.

One of the crucial goals for Phase 3 zonal development of offshore wind farms is to build the capacity of testing key components of offshore wind turbines. In order to support the development of relevant industries, BSMI plans to establish (i) non-destructive inspection capability for steel structures and composite materials, (ii) inspection capability for large-scale fasteners, (iii) testing technology for resin and composite materials, as well as (iv) supervision technology for the production of electrical cables and transformers. In 2022, we completed the testing capabilities for non-destructive inspection of steel material corrosion, dynamic fatigue testing of fasteners, and mechanical property testing of hardened epoxy resin, providing domestic stakeholders with relevant testing and certification services and assisting them in entering offshore wind turbine industry supply chain.

3. Establishing standards, testing and certification systems in energy storage sector

In support of the action plan under the "Six Major Core Strategic Industries Promotion Program," BSMI develops relevant standards and establishes testing and certification systems in the energy storage sector, to provide a local testing environment for energy storage cabinets and electric vehicles that is in line with international standards.

(1) Developing national standards for energy storage system

The following national standards were published in 2022:

Automatic electrical controls – Part 1: General requirements

Electrical energy storage systems (EESS) – Part 2-1: Unit parameters and testing methods – General specification

Electrical energy storage systems (EESS) – Part 3-1: Planning and performance assessment of electrical energy storage systems – General specification

Electrical energy storage systems (EESS) – Part 5-2: Safety requirements for grid-integrated EES systems – Electrochemical-based systems

(2) Establishing safety testing laboratory for large-scale energy storage system

In the year 2021, BSMI secured the forward-looking infrastructure budget and planned to establish a 360kW/360kWh safety testing laboratory for energy storage system at the Miaoli Tongluo Science Park within a span of 4 years and 8 months. This laboratory will be equipped to conduct tests in accordance with international standards, such as IEC 62619, UL 1973, ECE R100.02, UN 38.3, and UL 9540A. The construction started on October 10, 2022, with an expected completion by the end of 2023 and commencement of operation in 2024. In the future, the facility will be capable of conducting safety and combustion tests for electric buses and lithium battery packs in energy storage cabinets.

(3) Developing technical specifications for outdoor battery storage systems

In response to the widespread deployment of energy storage systems and associated safety issues, the BSMI consulted international standards and published the "Technical Specifications for Certification of Outdoor Battery Energy Storage System" on August 22, 2022. The technical specifications include design verification (component safety requirements), site audit (on-site testing requirements), and operational requirements (periodic testing requirements).

(4) Establishing the testing laboratory for interoperability of smart grid and home energy management systems

As Taiwan government has set a target of 20% renewable energy generation by 2025, Taipower Company is planning to introduce distributed hybrid energy storage systems to mitigate the impact of the intermittency of renewable sources on electricity grid. By then, a significant number of distributed energy sources and energy management facilities, such as Home Energy Management Systems (HEMS), will be introduced. BSMI is establishing a testing laboratory for interoperability of smart grids and HEMS, with the aim of developing interoperability standards, testing technology, and product certification for domestic HEMS, smart appliances, solar inverters, and electric vehicle charging equipment. In 2022, we implemented the "Development of Interoperability Standards and Testing Technology for Distributed Energy Integration and Control Systems," and has achieved the following outcomes:

- ▼ Completion of 5 draft standards and 15 National Standards Technical Committee meetings, which proposed draft national standards for smart meters (based on IEC 62056-3-1), power energy management systems (based on IEC 62746-10-3), low-voltage electrical distribution equipment (based on IEC 60947-4-3, IEC 60947-5-2, and IEC 60898-3).
- ▼ **Establishing a testing service platform for CNS 16014 smart home device interconnection protocol:**
BSMI developed CNS 16014 "Interconnection Protocol for Devices in Smart Home," which serves as the foundation for the communication among smart home appliances. The first testing service platform, covering smart home appliances, network converters, and network gateways, was established. By the end of 2022, it had provided testing and certification services for 115 cases, including 1,862 types of products from 20 domestic manufacturers. This platform assisted in implementing the policy of "air conditioning in every classroom."
- ▼ Assisting in establishing a testing laboratory for common smart inverter protocol: BSMI assisted the Taiwan Product Testing and Verification Center (ETC), a non-profit organization, in obtaining the accreditation from the SunSpec Alliance, a U.S. Distributed Energy Industry Consortium. This accreditation allows ETC to provide domestic testing of solar and distributed power equipment, helping Taiwan manufacturers obtain international certificates and expand their market in the U.S.
- ▼ Establishing Cybersecurity and Interoperability Testing Capabilities for Electric Vehicle Charging Equipment

The Ministry of Transportation and Communications has been planning to widely deploy public charging stations, with an estimated 6,500 stations across Taiwan by 2025. In addition, the net-zero path policy mandates 100% of new vehicles to be electric in 2040. The number of charging stations and charging management systems across Taiwan is expected to multiply several times. Without proper cybersecurity protection, these charging facilities could be vulnerable to cyberattacks resulting in potential national security risks. The BSMI developed the “Technical Specifications for Electric Vehicle Supply Equipment cybersecurity Testing” and established testing capabilities to assist manufacturers in enhancing product cybersecurity resilience.

On the other hand, a large number of electric vehicle charging equipment lacked charging management systems, resulting in instability in the power grid. The testing capabilities for international Open Charge Point Protocol (OCPP) of electric vehicle charging equipment was established to ensure the interoperability between different brands of charging equipment and to reduce the impact on the power grid via smart management.

(5) Promoting standardization, testing and certification program for solar photovoltaics

- ▼ Following the government’s goal of 20 GW installation capacity by 2025, we have included high-efficiency solar photovoltaic module in the scope of voluntary product certification (VPC) scheme, aiming to assist the development of domestic solar photovoltaic industries and help them enter the international market. The Technical Specifications for Taiwan High-Efficiency Solar Photovoltaic Module (referred to as PV Taiwan+) requires an annual increase of 5W in module maximum output power with testing parameters exceeding international standards. Starting from 2022, we have raised the annual increase in module maximum output power to 10W, accelerating the improvement of domestic solar photovoltaic module technology.

As solar photovoltaic projects using VPC modules are eligible for a 6% increase in FIT (Feed-in Tariff) rate, the vast majority of domestic projects currently use VPC certified modules. The total registered solar module capacity on the Solar Photovoltaic Module Registration Platform has reached 1.86 GW (registered from January to December of 2022). By the end of 2022, domestic manufacturers have obtained a total of 186 VPC certificates, including 25 certificates for M6 cells and 4 certificates for M10 cells.

▼ Promoting VPC for solar photovoltaic inverter to safeguard the grid-connection security of solar projects

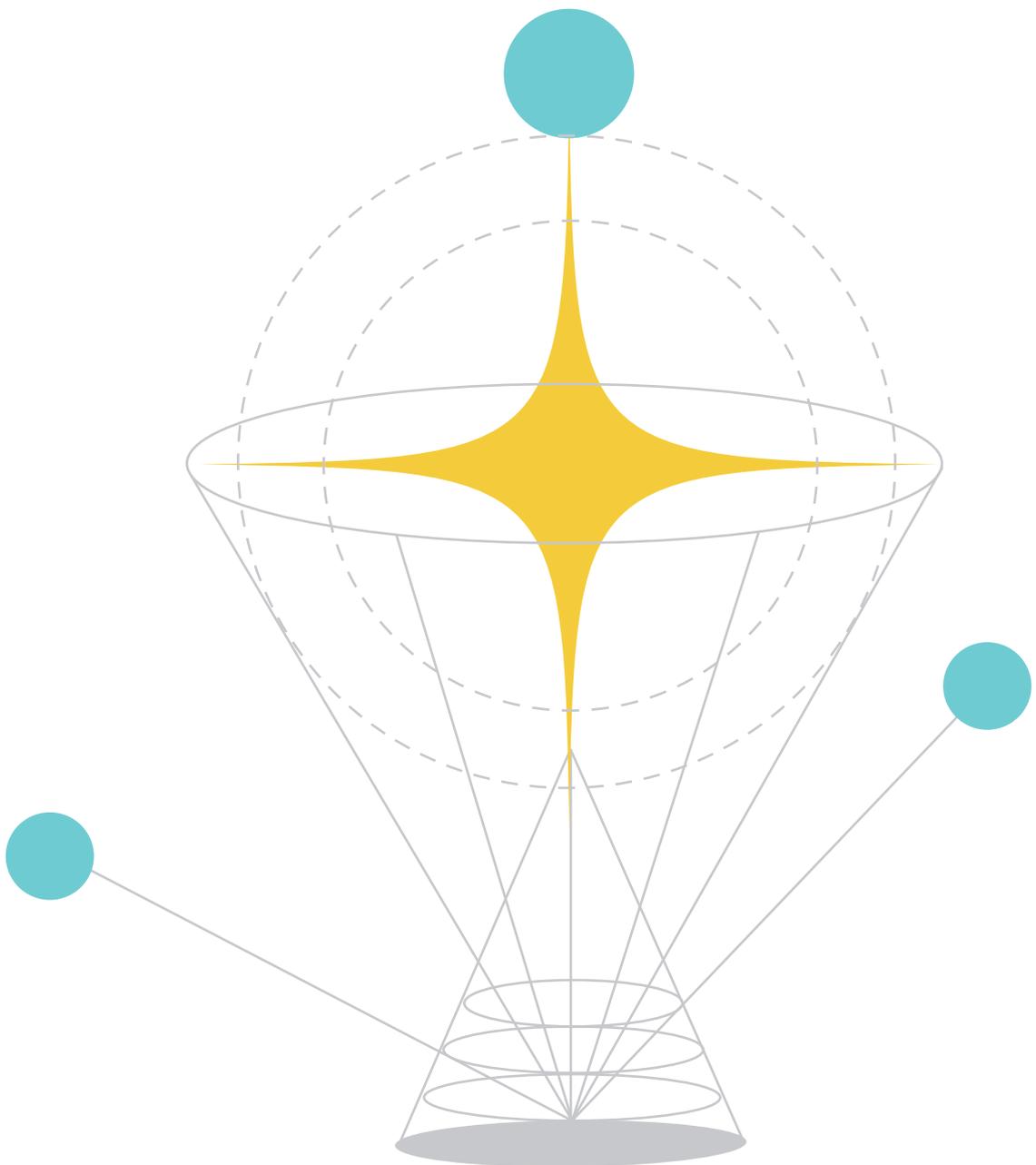
The BSMI announced the testing standards (including safety, grid connection, and electromagnetic compatibility) for the voluntary product certification of solar photovoltaic inverters. The requirements for safety and electromagnetic compatibility are in line with international standards, while grid-connection capability follows the existing requirements of TaiPower Company. As of December 2022, a total of 141 VPC certificates were issued.

We also promoted VPC of smart inverters to enhance the stability of grid-connection of solar photovoltaic systems. Under the “Standardization, Metrology, Testing and Certification Program for Next Generation Energy Technology,” implemented from 2019 to 2022, the BSMI have established the testing capabilities of EMC and grid-connection testing for MW-level smart inverters.

▼ **Promoting cybersecurity testing for solar photovoltaic inverter to ensure the operational security of solar photovoltaic projects**

The BSMI published “Technical Specifications for Cybersecurity Testing of Solar Photovoltaic Inverter and Monitoring Unit” based on an analysis of the cybersecurity design of VPC certified solar photovoltaic inverters and IEC 62443 “Industrial communication networks - IT security for networks and systems.”

In addition to existing testing items (safety, grid connection, and electromagnetic compatibility), cybersecurity testing requirements were added to certify solar photovoltaic inverters under the Voluntary Product Certification Program.



Chapter 5

International Cooperation and Exchange, Assisting Industries in International Expansion





The different roles that BSMI takes in our national quality infrastructure have yielded a variety of international cooperation activities, which help us achieve goals both internally and externally. Internally, we engage our partner countries in exchanges of information, practices and experts to maintain a safe and fair society, as well as to support sound development of industry. Externally, we spare no efforts to facilitate export of our products by reducing unnecessary conformity assessment costs. We also participate actively in the limited number of international organizations of which we are a member to enhance our visibility in the international community in this area.

1. Establishing and deepening bilateral cooperation and exchange

To reduce industry certification costs, avoid repetitive tests, and facilitate trade, BSMI has signed mutual recognition agreements for electrical and electronic products and tires with countries such as the United States, Canada, Australia, Singapore, New Zealand, Japan, and the Philippines, offering testing, inspection and certification services for Taiwanese products exported to these countries.

Taiwan has actively promoted the "New Southbound Policy" since 2016. In support of this policy, BSMI reached out to product safety regulators in ASEAN countries to explore cooperation on mutual recognition of conformity assessment results. After 16 years of negotiations, Taiwan and India successfully signed the "Agreement between the Taipei Economic and Cultural Center in India and the India-Taipei Association, Taipei on Mutual Cooperation in the Field of Standardization and Conformity Assessment" on May 18, 2022. This Agreement promotes mutual recognition of product test reports and factory inspection reports issued by each other's conformity assessment bodies. It provides a more convenient trade environment for businesses from both countries.

The BSMI also engaged with government bodies of partner countries in a number of joint activities. Below are some featured events.



(1) Thailand:

In 2022, we exchanged information on product safety regulations and experience in implementing QR Codes, which built close connection between staff members of both sides and provided insights for BSMI to optimize its QR Code labeling system.

(2) New Zealand:

The BSMI and Ministry of Business, Innovation and Employment (MBIE) convene the TBT Committee Meeting every 2 years under the TBT Chapter of the Economic Cooperation Agreement signed between Taiwan and New Zealand. The 4th TBT Committee Meeting was held in 2022. Both sides exchanged views on container recycling symbol, certification of organic products, QR code labeling and electric vehicle supply equipment. The two sides agreed to work together on issues involving regulatory cooperation and risk assessment at both bilateral and regional level.

(3) Japan:

The BSMI held meetings with Ministry of Economy, Trade and Industry (METI) and National Institute of Technology and Evaluation (NITE) to discuss product safety issues each year under the Memorandum of Understanding (MoU) signed in 2016. The meeting held in 2022 touched on many topics, including newly regulated products, regulation of online products, and investigation into incidents of washing machines and lithium-ion batteries.

(4) Paraguay:

BSMI and National Institute of Technology, Standardization and Metrology (INTN) signed the Agreement on Technical Cooperation in 2021 and held the second working level meeting in 2022. At that meeting, both sides shared their standards development and policies for regulation on electric vehicles, and agreed to hold courses in the field of product safety and metrology. The courses for product safety was held in September and October 2022. The courses for metrology are to be held in 2023.

(5) Philippines:

BSMI provided the Bureau of Philippine Standards (BPS) three "IEC Standard Capacity Building Programs" on secondary batteries, smartphone chargers, and building wires in November 2022. BPS participants provided positive feedback about the courses, and the courses help build friendship between experts of both sides.

(6) Malaysia:

BSMI held an informal meeting with the Department of Standards Malaysia to discuss the feasibility of collaboration. Additionally, BSMI engaged in mutual exchange and sharing of inspection system with Standards and Industrial Research Institute of Malaysia (SIRIM), exploring possible ways of cooperation in the future.

2. Participation in activities of international/regional organizations

(1) World Trade Organization (WTO)

The BSMI operates the TBT Enquiry Point as required by the WTO Agreement on Technical Barriers to Trade (TBT). Five main functions are given by this enquiry point:

- ▼ To disseminate and translate TBT notifications circulated by the WTO Secretariat;
- ▼ To assist regulatory authorities in submitting TBT notifications and responding to comments and inquiries made by other WTO Members and business operators;
- ▼ To assist domestic stakeholders in providing comments on adopted or proposed measures by other WTO Members and to respond to their inquiries;
- ▼ To convene domestic inter-agency TBT committee meetings and coordinate views with different regulatory authorities on issues discussed at the WTO/TBT Committee meetings; and
- ▼ To maintain domestic on-line TBT notification database.

The BSMI has established a mechanism for screening WTO/TBT notifications since 2020. We screen notifications issued by the top 14 export destinations for Taiwan on a bi-monthly basis. Notifications involving products that account for 5% or more of our exports to that country or where the country accounts for 5% or more of our global exports of the products are screened, and relevant associations and regulatory authorities are invited to provide comments on whether the notifications have significant trade impact. In 2022, 399 notifications were identified after the screening process and comments were submitted to the European Union and the United States. To enhance businesses' understanding of the importance of TBT notifications, an online seminar was held to gather suggestions on the screening mechanism.

(2) Asia-Pacific Economic Cooperation (APEC)

The BSMI is one of the contact windows for the Sub-Committee on Standards and Conformance (SCSC) in Taiwan. The main responsibilities of BSMI as a SCSC contact window is as below:

- ▼ Attending the SCSC meetings twice a year;
- ▼ Coordinating relevant SCSC activities in Taiwan; and
- ▼ Proposing and implementing APEC projects that are beneficial to Taiwan with like-minded APEC members.

In August 2022, the SCSC hosted its first physical meeting since the outbreak of Covid-19. The most important achievement made in 2022 by the BSMI was the completion of the self-funded project "Public-Private Dialogue on Product Safety in Digital Trade." During the pandemic period, more and more products were sold on the e-commerce platforms. As it is convenient to sell products on the e-commerce platforms, the chance that untested or unsafe products being put on the market increased. This brings a tremendous challenge to APEC economies. To ensure the safety of products sold online and to encourage discussion among government agencies, e-commerce platforms and consumer groups, the BSMI proposed the self-funded project "Public-Private Dialogue on Product Safety in Digital Trade" in 2021. A virtual workshop, being part of the project, was delivered in 2022, which attracted 118 participants from 11 APEC economies.

(3) International/Regional Standardization Organizations

BSMI sent representatives to participate in meetings such as the Third Generation Partnership Project (3GPP) to secure critical intellectual property rights for our country and attended Ideographic Research Group meetings of ISO/IEC JTC1/SC2/WG2 to enhance the international circulation of characters needed in our information systems. Furthermore, BSMI conducted video conferences with the US National Institute of Standards and Technology (NIST) to discuss topics on the revision of the Cybersecurity Framework (CSF) 2.0, 5G smart poles, O-RAN cybersecurity, and cybersecurity testing for solar photovoltaic inverters to deepen technical exchanges between Taiwan and the United States.

(4) International Organizations of Metrology

▼ General Conference on Weights and Measures (CGPM)

The BSMI participated in the 27th CGPM Meeting held virtually in November 2022. Representatives from three national measurement laboratories also joined the online meeting. The meeting discussed the future 4-year work plan and budget of the International Bureau of Weights and Measures, the leading measurement technology planning of the Consultative Committees, mutual recognition agreements, and cooperation with other international organizations of metrology. The international trends and directions in metrology we gained from the 27th CGPM provide guidance for the roadmap of our national measurement laboratories and align us with international standards, enhancing the international visibility of our metrology efforts.

▼ Consultative Committees, International Committee for Weights and Measures (CIPM)

The BSMI participated in four Consultative Committees ("Photometry and Radiometry," "Length," "Acoustics, Ultrasound and Vibration," and "Time and Frequency") under the CIPM as an observer. BSMI is also a member of the Executive Committee, chairperson of the Technical Committee and co-chairs of Working Groups at the Asia Pacific Metrology Program (APMP). We facilitated connection between CIPM and APMP.

▼ **International Committee of Legal Metrology (CIML) and Asia Pacific Legal Metrology Forum (APLMF)**

The BSMI participated in the 57th CIML Meeting held in October 2022 as an observer and the 29th APLMF Meeting in November 2022 as a full member. From participating in the meeting, we were able to follow the latest development in legal metrology and to actively participate in the development of international technical specifications by the CIML Technical Committee and in the Asia-Pacific region. The information provided valuable references for updating our legal metrology regulations and technical specifications to be in line with international standards.

▼ **Asia-Pacific Metrology Program (APMP)**

The BSMI participated in the 2022 APMP General Assembly in November 2022 to understand the development of International System of Units (SI Units) and the advancement of measurement technologies of other National Measurement Institutes (NMI). The National Metrology Laboratory also attended the Assembly and actively engaged in technical exchanges with other NMIs, which helped our national measurement standards to be synchronize with international practices. In 2022, our representatives served as members of the APMP Executive Committee and chairpersons of the Medical Metrology Focus Group, Material Metrology Technical Committee, and Ionizing Radiation Technical Committee.

3. International experience gaining, supporting industrial expansion

(1) Safety and performance testing of energy-efficient tires

Many countries have been progressively enacting mandatory regulations and grading labels for tire efficiency, the BSMI visited the Electrical and Electronics Institute in Thailand and factory of Maxxis International (Thailand) in November 2022. During the visits, we exchanged views on safety and performance testing techniques for energy-efficient tires.

(2) Electric vehicle charging equipment

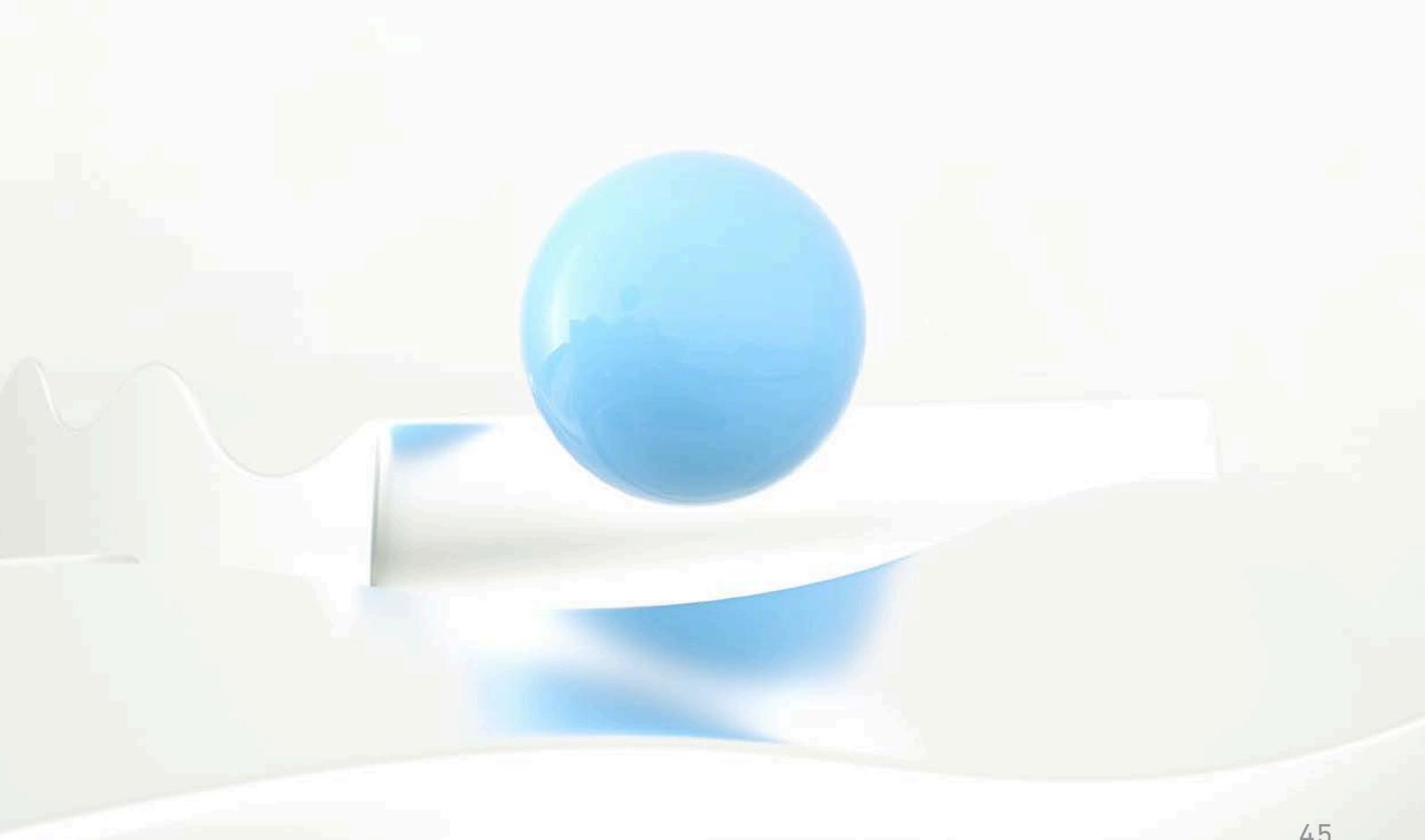
The BSMI visited Delta Electronics (Thailand) Co., Ltd. and TÜV SÜD's laboratory in Thailand in November 2022 to engage in discussions and share insights regarding charging standards and equipment, charging infrastructure and energy management, the electric vehicle ecosystem, and the supply chain. These exchanges contributed to the formulation of future relevant electric vehicle safety regulations and policies.

4. Facilitating the export of fishery products to other countries

Given the increasingly stringent hygiene and safety requirements for imported food internationally, the traceability and inspection of fishery products have become critical areas of focus. BSMI has implemented a voluntary Hazard Analysis and Critical Control Points (HACCP). With collaborated efforts from other government bodies, the BSMI issues health certificates to fishery products for export to other countries.

In 2022, there were 86 HACCP certified fishery processed products establishments. Among them, those registered by foreign governments in the approved lists include 37 by the European Union, 26 by Brazil, 45 by Vietnam and 14 by Russia.

Due to the diversity of international trade in fishery products, the hygiene management regulations and customs documentation requirements of importing countries, the BSMI issued 3,045 health certificates for 41 countries in 2022. These certificates effectively helped our processing plants ensure the quality of fishery products and expand foreign markets.



Chapter 6

Important Events



Inspection Project on Weighing Scales



- ▼ **Time:**
Before Chinese New Year, Dragon-Boat Festival, and Mid-Autumn Festival in 2022
- ▼ In response to the significant increase in consumption during important festivals, the BSMI conducted “Inspection Project on Weighing Scales” at traditional markets, large-scale retail stores, supermarkets, and tourist attractions around the country. In total, over 22,800 weighing scales were inspected to ensure fair transactions and protect the rights and interest of both buyers and sellers.

2022 World Metrology Day - Development of Digital Transformation and Sustainable Measurement Standards



- ▼ **Time:** May 18, 2022
- ▼ This event was organized in response to the annual theme of 2022 World Metrology Day “Measurement in the Digital Era” as announced by the International Bureau of Weights and Measures (BIPM). The seminar was conducted in a virtual format and featured distinguished speakers, including Dr. Wynand Louw, President of the International Committee for Weights and Measures (CIPM), Dr. Takashi Usuda, Secretary-General of CIPM, Assistant General Manager Chen, Tsan-Lin from Hiwin Mikrosystem, and Director Chen Yen-Hao from the Taiwan Institute of Economic Research. Through a dialogue between academia and industry, the participants understood the crucial role of measurement technology in response to international trends in digital transformation and sustainable development.

2022 Smart City Expo Showcasing 5G Smart Pole Standards and Testing Results (Taipei and Kaohsiung venues)



- ▼ **Time:** March 2022
- ▼ The exhibition saw the participation of 450 companies, with nearly 1,500 booths, attracting over 100,000 visitors. The BSMI participated in this exhibition to promote research achievements on 5G smart pole projects, including 5G Smart Pole certification system and the application of innovative technologies.

Opening of Childcare Center at the Taichung Branch of BSMI



- ▼ **Time:** August 1, 2022
- ▼ The Taichung Branch of BSMI opened a childcare center in accordance with the "Implementation Regulations Governing Mutual Aid Style Educare Services in Workplaces." The educare center is designed with the principle of maximizing the use of space, creating indoor and outdoor childcare areas that can accommodate 30 children and 6 educare givers. This effort aims to build a "happy and childcare-friendly workplace" for our colleagues, enabling them to access nearby childcare services and reducing the challenges of juggling children and office work.

Groundbreaking of Wetland Traction Testing and Certification Facility for Energy-Saving Tires



- ▼ **Time:** September 13, 2022
- ▼ The BSMI implemented "Project of Establishing Performance and Safety Testing and Certification System for Energy-Saving Tires" from 2021 to 2024, aiming to establish domestic testing capacities and certification system for "wet traction," "rolling resistance," and "noise measurement." The Automotive Research & Testing Center is commissioned to implement this project. The groundbreaking ceremony of testing track and certification platform for wet traction (including track preparation, water sprinkling system, and electrical equipment) was held on September 13, 2022. It is expected to be completed by 2023, with the goal of enhancing the competitiveness of the domestic tire industry and enabling consumers to purchase energy-efficient tires that meet the relevant standards.

Series of 2022 Children's Product Safety Awareness Activities



- ▼ **Time:** November 18, 2022
- ▼ BSMI regulated 32 types of children's products in 2022 to protect the safety of children. A series of activities on "Safety Awareness of Children's Product Safety" were held to inform the public of the safety requirements for children's products and introduce new regulated children's products. These events were successfully concluded with the participation of 471 people. Acting Director General Hsieh of BSMI presented certificates of appreciation to the sponsoring organizations and relevant personnel.

Visiting the Bureau of Digital Services of Tokyo Metropolitan Government, Kansai Electric Power Company, and related testing and certification companies in Japan



- ▼ **Time:** November 2022
- ▼ BSMI is planning and developing the standards as well as testing and certification infrastructure for the 5G smart poles in Taiwan. In order to keep up with the international trends in 5G smart pole development, we visited Japan to engage in discussions with relevant agencies and companies on the latest standards and certification systems, and the installation and management of proof-of-concepts sites of 5G smart poles. This helped BSMI promote 5G smart pole testing and certification system, accelerate the deployment smart poles, and enhance Taiwan's industrial technology and international competitiveness.

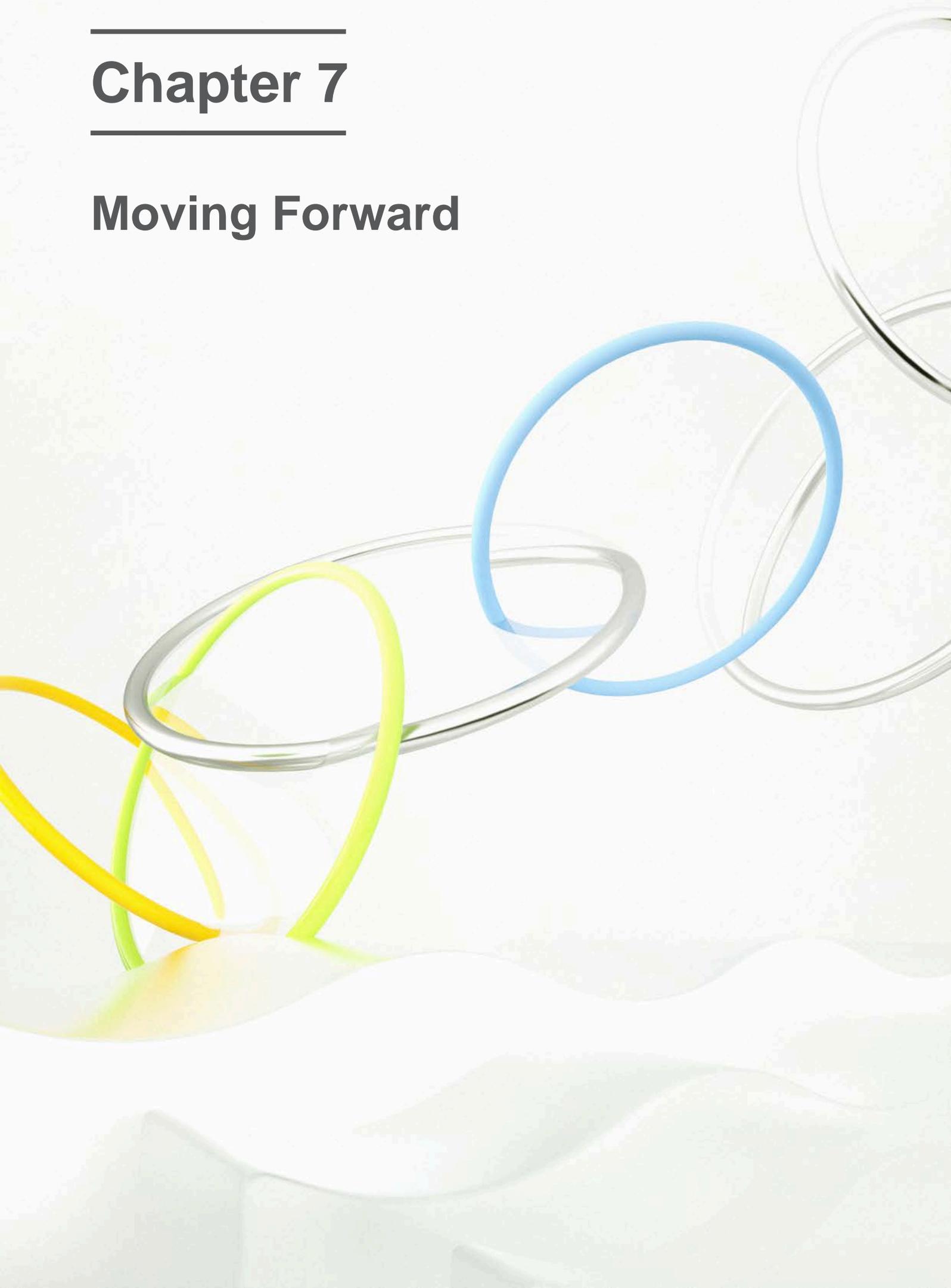
The 6th Taiwan-Japan Working Level Regular Meeting on Product Safety and Technical Exchanges



- ▼ **Time:** December 2022
- ▼ Under the framework of the “Memorandum of Understanding for Exchange and Cooperation on Strengthening Product Safety between the Taiwan-Japan Relations Association and the Japan-Taiwan Exchange Association,” both sides have been taking turns to host regular meetings since 2017. In 2022, both sides shared the information on newly regulated products, tools used to monitor the safety of products sold online, and investigations of incidents involving washing machines and lithium batteries.

Chapter 7

Moving Forward



In the face of the impact of the pandemic, economic transformation, and social development trends, the BSMI will continue to uphold its mission of "leading industry development and protecting consumer rights." The BSMI have planned five pillars of governance for the year 2023 based on the existing achievements, we hope to assist industries consolidate their foundation, create a favorable international environment, and safeguard consumer safety and rights.

Five Pillars of Governance in 2023:

Setting standards for key governing fields, deepening links between industry and international arena

- ▼ Developing national standards in relevant fields in line with policies and industry demands.
- ▼ Actively participating in the development of standards in emerging sectors to support international industry links.
- ▼ Enhancing the CNS Mark certification system, creating a niche for the industry.

Promoting national metrology system to motivate industry upgrade

- ▼ Enhancing the measurement management system to support policy and industry development.
- ▼ Strategically advancing measurement technologies to lead industrial technology upgrades.
- ▼ Maintaining international mutual recognition agreements to ensure the equivalence between international and national measurement standards.
- ▼ Ensuring the accuracy of measurement and maintaining fair trade.

Enhancing product safety management and creating a win-win situation for the industry and consumers

- ▼ Strengthening the management of high-risk products to create a safe consumer environment.
- ▼ Utilizing information technology to enhance product management efficiency.
- ▼ Effectively managing cooperation with non-governmental organizations to enhance resource utilization.

Deepening testing and certification capabilities in green energy sector to accelerate net zero transformation

- ▼ Developing a robust renewable energy certificates and trading platform to meet the industry's green transformation needs.
- ▼ Optimizing offshore wind power standard testing and verification capabilities to strengthen the domestic industry's supply chain niche.
- ▼ Developing testing and verification capabilities for large-scale solar photovoltaic modules and components to promote the progress of solar energy.
- ▼ Establishing a one hundred fifty meters wind measurement tower and wind speed LIDAR calibration field to align with the trend of larger wind turbines.
- ▼ Enhancing energy storage system testing laboratories to establish energy storage policies and industry development foundations.
- ▼ Developing smart grid system integration standards and testing capabilities to ensure the stability of green energy supply.
- ▼ Expanding domestic carbon certification organization capabilities to support corporate green sustainability.

Actively promoting bilateral and multilateral cooperation to lay the foundation for industry internationalization

- ▼ Actively participating in international affairs to safeguard domestic industry interests.
- ▼ Implementing and expanding cooperation agreements to support industries in seizing international opportunities.
- ▼ Strengthening the export competitiveness of domestic fishery industry players.

Annual Report of BSMI, 2022

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