National Science and Technology Development Plan
(2025–2028)
(Approved Version)

Advancing
Innovation

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I. Introduction

According to the Fundamental Science and Technology Act, a National Science and Technology Development Plan must be produced every four years, serving as the basis for formulating science and technology policies and promoting scientific and technological research and development. The content of the National Science and Technology Development Plan takes into consideration the opinions of the Academia Sinica, the scientific and technological research sector, the industrial sector, and relevant social organizations, and is subsequently reviewed and approved by the Executive Yuan following discussions at a National Science and Technology Conference. For this reason, the Executive Yuan held the 12th National Science and Technology Conference in December 2024. With the objective of “Building a Balanced Taiwan with Smart Innovations and Democratic Resilience,” the Conference sets in motion four principal topics: smart technology, innovative economy, balanced society, and net-zero emissions and sustainability. Smart technology lays the foundation for next-generation science and technology (S&T) development to promote the Five Trusted Industry Sectors and deploy cutting-edge technologies. Innovative economy guides the industrial application of artificial intelligence (AI) to accelerate twin transformation and balanced development across industries. Balanced society is one in which technology is adopted for the benefit of a diversity of people, thereby enhancing inclusion and balanced regional development. The topic, net-zero emissions and sustainability, focuses on promoting sustainable production, circular economy, and net-zero lifestyles to help Taiwan achieve net zero transformation.

The 12th conference, drawing on the foundation of the six core strategic industries, integrates the idea of the Five Trusted Industry Sectors in response to such trends and challenges as the super-aged society, rapid rise of AI, shortening of supply chains in global trade, global Net Zero by 2050, and geopolitical reconstruction under the Russia–Ukraine war and wars in the Middle East. This is to not only cement the global position of Taiwan's S&T industries and also extend their strengths to next-generation S&T fields in order to promote industrial applications and create new value.

To realize balanced development across regions, the government proposed six major regional flagship projects. In these projects, the central and local governments will work together to improve the living ecosphere, revitalize industries and living spheres in six major regions of Taiwan, facilitate public constructions, and combine the technical advantages of science and industrial parks. The projects will integrate the capacity of local industrial, academic, and research sectors, address local demands, foster S&T talents in line with key national policies, promote employment, boost local economic development, drive the overall economic growth of Taiwan, and achieve the policy objectives of building a balanced, united, healthy Taiwan. The National Science and Technology Development Plan (2025–2028) (hereinafter referred to as "the Plan"), based on the direction of national development and needs of society, is outlined below.

1.1. The Direction of National Development

The Global Risk Report 2024 from the World Economic Forum (WEF) revealed that the world is facing systematic changes in four structural forces: geostrategic shifts, demographic bifurcation, technological acceleration, and climate change. In a fast-evolving macro environment, attention to S&T research and development drives economic growth, ensures social balance and sustainable development, and facilitates the shaping of resilient competitive advantages.

Against a rapidly changing global landscape, countries are all committed to developing key technologies to bolster their national competitiveness. For example, the U.S. White House Office of Science and Technology Policy updated the critical and emerging technologies (CETs) list, outlining 18 technology areas that are of particular importance to the national security and economic development of the United States, including advanced computing, advanced engineering materials, artificial intelligence, biotechnology, clean energy generation and storage, and data privacy, data security, and cybersecurity technologies.

The U.S. government signed into law the *CHIPS and Science Act* in 2022, demonstrating a resolve to strengthen the competitiveness of America's domestic semiconductor industry. The bill provides over US$52 billion in funding to create a local chain of semiconductor industries, and simultaneously strengthening the research and development of advanced manufacturing and packaging technologies and fostering a pool of visionary talents to cement the leading position of America's technology areas.

The European Union (EU) is committed to implementing the Digital Decade and Green Deal twin transition policies. The Digital Decade policy, introduced in 2021, aims to enhance EU's digital sovereignty and competitiveness and reduce dependencies on digital technologies outside of Europe. The Green Deal initiative is focused on addressing climate change and ensuring environmental protection throughout the process of digital development. In 2021, the *European Climate Law* was adopted, setting specific objectives for achieving net-zero emissions by 2050.

Australia holds vast reserves of critical minerals, such as lithium, cobalt, and rare earths, all of which are vital resources for developing low-emission technologies. As the world transitions toward net-zero emissions, the Australian government vows to build a Future Made in Australia by strengthening the country's clean energy manufacturing to not only reduce energy costs but also produce critical impact on Australia's energy transition.

Taiwan, facing the challenges of globalization and intelligentization, will gain a foothold in its advantageous position of being known as the Silicon Island, strive to seize opportunities derived from geopolitical shifts, and focus on developing the Five Trusted Industry Sectors of semiconductors, artificial intelligence, military, security and surveillance, and next-generation communications. Taiwan will in the meantime endeavor to recruit world-class talents to build a resilient ecosystem of skilled scientific researchers; connect with advanced countries for access to their net zero technologies while keeping abreast of climate change trends and risks; venture deeper into precision health to realize the vision of a healthy Taiwan; and continuously strengthen its technological and economic capabilities to exert critical impact on the world stage.

1.2. The Society's Needs

With due consideration to national development, society's needs, and balanced development across regions, for this Plan, the opinions of expert scholars, opinion leaders, and the general public are gathered during interministerial discussion meetings, topic group meetings, regional preparatory meetings, and roundtable discussions. The section below introduces the four major aspects of the opinions collected, including smart technology, innovative economy, balanced society, and net-zero emissions and sustainability. The opinions will serve as the basis for ministerial departments to develop and propose measures to reinforce the connection between S&T policies and the needs of all sectors of the society.

1.2.1. Smart Technology

The key opinions on this aspect are grouped into four categories: Industrial transformation should be based on technological innovation; to enhance international competitiveness, the development of cutting-edge technology should be reinforced; as a response to geopolitical shifts, international democratic partnerships should be strengthened; and the fostering of visionary talents should be internationally aligned. Details are described as follows:

(1) Industrial transformation should be based on technological innovation.

Industries in Taiwan are facing geopolitical challenges and challenges brought on by emerging technologies that are fast-evolving. To overcome these, national strategic and R&D resources should be reinforced. The constraints of spectrum resources and international standards, as well as international cybersecurity threats and lack of autonomous defense capability are other problems the industries face. For this reason, the development of compound semiconductor and advanced chip technology should be accelerated. This is achieved by building a national AI computing technology and equipment development center to reinforce the development of core technologies and applications; research and develop 6th generation (6G) wireless technology; develop intellectual properties and standards; promote air–sea network integration; and optimize cybersecurity defense capabilities by creating a reliable digital ecosystem and simultaneously accelerating defense transformation and dual-use technology R&D. Such overarching technological innovation is conducive to driving industrial transformation and bolstering the country's competitiveness.

(2) To enhance international competitiveness, the development of cutting-edge technology should be reinforced.

Taiwan's quantum hardware technology is not yet mature. The space industry has yet to achieve breakthroughs in respect of technology readiness and orbital launch capability. Our ocean monitoring capability and biodiversity protection are inadequate; interdisciplinary integration of biomedicine and health is lacking, and medical resources are scant; technologies to achieve net zero and low-carbon emissions are still in the nascent development phase; digital infrastructure and data management systems must be improved continuously. To overcome these challenges, Taiwan should focus on quantum computers, among other key technologies; implement medium/low Earth orbit (MEO/LEO) satellite manufacturing and orbital launch technologies; refine basic marine research and strengthen real-time monitoring capability; develop biomedical technologies through trans-disciplinary innovations; conduct in-depth exploration of frontier energy and negative emissions technologies; and optimize data management systems and data sharing mechanisms to build a well-equipped digital infrastructure environment. The foregoing measures are expected to reinforce Taiwan's venture into cutting-edge technologies and comprehensively enhance our international competitiveness, thereby propelling us toward sustainable development goals (SDGs).

(3) As a response to geopolitical shifts, international democratic partnerships should be strengthened.

The United States' semiconductor curbs on China, intensified competition in the era of AI, the "red supply chain" threat, the risk of loss of core technologies, and IC- and AI-related cybersecurity problems have created significant challenges for Taiwan's semiconductor and drone industries and core technologies. Taiwan should promote innovative chip applications and tech diplomacy with international democratic partners; and nurture a local IC design ecosystem by engaging with system operators and chip design engineers and by fortifying democratic partnerships. Meanwhile, Taiwan should expedite the formation of drone industry clusters and promote technological R&D and industrial transformation to strengthen its influence in that domain. We must protect our core technologies through a multifaceted approach, implement chip cybersecurity vulnerability assessments, and work with think tanks in democratic partner countries to build a dialogue platform for consolidating consensus on international collaborations. By establishing an industrial ecosphere and deepening international collaboration and talent development, we will promote technological innovations and the commercialization of high-value IC to realize the transformation of semiconductor and drone industries.

(4) The fostering of visionary talents should be internationally aligned.

Talent is foundational to national development. Against such challenges as scarce skilled professionals, pay gap, and disinclination to pursue a PhD degree, as well as fierce global competition and increased flow of talent, the recruitment and retention of foreign professionals is urgently required. We should focus on investing in the quality of higher education, education research, and internationalization, assist universities to pursue world-class status and develop research centers, and promote a bilingual learning environment. We should implement education that drives the nurturing of visionary talents, guide educational institutions to promote interdisciplinary learning, and facilitate international bilateral exchange of visionary talents to support channels for international cooperation in research and development. By enhancing the quality of higher education, we hope to foster a pool of interdisciplinary talents needed for the future to bolster our international competitiveness and effectively combat challenges that arise from environmental changes and industrial development.

1.2.2. Innovative Economy

The key opinions on this aspect are grouped into five categories: The adoption of AI should be accelerated to drive the digital transformation of industries; traditional industries should transform innovatively to promote balanced development across industries; supply chain resilience should be strengthened to ensure energy supply; micro-, small and medium-sized enterprises (MSMEs) should accelerate their twin transformation to bolster international competitiveness; industry–academia collaboration on talent development should be strengthened to stimulate the development of a talent ecosystem. Details are provided below.

(1) The adoption of AI should be accelerated to drive the digital transformation of industries.

Approximately 30% of Taiwanese enterprises have adopted AI. The index of AI adoption in Taiwan's industries, particularly the manufacturing sector, requires continuous improvement. There are enterprises that have integrated generative AI in their business operations, but they lack awareness in respect of AI strategy and risk management. In particular, their "adaptability to AI regulatory changes" remains to be improved apropos of AI monitoring and using responsible AI products in order to ensure compliance with international AI regulations.

AI technology has developed rapidly around the world. In order to facilitate the technological upgrading and transformation of enterprises against this backdrop, we should accelerate the implementation of AI applications in all sectors of the industry, promote locally trusted large language models (LLMs) and applications, develop and disseminate AI application tools, ramp up smart manufacturing and applications, create an industrial AI startup ecosystem and related strategic measures, and refine AI laws and regulations while establishing a diverse and innovative environment for AI development in order to assist enterprises with technological strengthening and commercialization, catalyze the widespread application of AI, and drive the digital transformation of industries.

(2) Traditional industries should transform innovatively to promote balanced development across industries.

Industries are increasingly structured toward semiconductor and information and communications technology (ICT) industries. Recently exports of electronic components and ICT products have increased year-on-year, reaching 60.6% of total exports, with the output of semiconductors and ICT accounting for 16% and 18.5% of Taiwan's gross domestic product (GDP), respectively – this shows the proclivity of Taiwan's industries toward semiconductors. In the future, we should pay attention to traditional industries that show potential and to Taiwan's food self-sufficiency and resiliency. Given the future global demand trend, we should invest technological innovation resources in all sectors to nurture more medium-sized enterprises, and by distinguishing them by industry or region, establish innovative models for academia–research collaboration on R&D, launch technologically innovative applications, and facilitate balanced development across industries.

(3) Supply chain resilience should be strengthened to ensure energy supply.

Against the China–U.S. trade competition and the restructuring of global supply chains, the resilience of Taiwan's supply chain becomes key to maintaining security and development. Under the impact of climate change and increased investments by science park-based companies, the stability and safety of our energy resources have garnered widespread attention. To build a reliable supply chain system, ensuring resilient energy resources is imperative. Taiwan should establish an autonomous, responsive supply chain system and elevate—by adopting such strategies as strengthening the industrial supply of critical energy resources, upping the security of supply chains with innovative technologies, and reinforcing the integrity of the advanced semiconductor supply chain—Taiwan's central role in the global supply chain, which helps Taiwan to forge stronger ties with the democratic camp, thereby strengthening both its international competitiveness and position as a trusted partner in the global democratic technology alliance.

(4) Micro-, small and medium-sized enterprises (MSMEs) should accelerate their twin transformation to be more internationally competitive.

Amidst the global trends of digital and net-zero transitions, large international corporations have successively formulated strategies to reduce carbon emissions. MSMEs need support in the form of technology, funds, and talent; therefore, their twin transformation is progressing slowly and, given the impact of international net zero and decarbonization laws, their international competitiveness needs improvement. In the future, through public–private collaborations, we should establish systems and mechanisms for the digital and net zero transformation of MSMEs; provide universal tools that help MSMEs conduct carbon inventory, as well as carbon footprint tools, consultation and counselling services, and financial support; implement innovation, R&D, transformation strategies among other measures; and optimize transformational tools and mechanisms to facilitate the twin transformation of SMEs.

(5) Industry–academia collaboration on talent development should be strengthened to stimulate the development of a talent ecosystem.

Under the impact of population aging, declining birth rate, the rapid expansion of the S&T industry, and fierce competition for foreign professionals, key industries (e.g., the Five Trusted Industry Sectors) in Taiwan are in dire need of talents. The National Development Council (NDC) projects that the workforce will see a shortfall of 480,000 workers by 2030. Taiwan urgently needs industries, the government, academia, and research institutes to work together toward reinforcing the interdisciplinary talent development and recruitment mechanism. We should utilize the capacity of industries and academia to train talents and build a diverse talent ecosystem; expand international cooperation in critical areas to enlarge the international network of talents; and strengthen the talent development system between industries, the government, academia, and research institutes to promote talent demands and matching. These strategic measures will trigger industrial demands for interdisciplinary talents, thereby guiding the education system and training industries to move toward an interdisciplinary talent development model.

1.2.3. Balanced Society

The key opinions on this aspect are grouped into three categories: A super-aged society needs smart care, smart healthcare, and technology-powered disease prevention to achieve holistic and age-friendly health care; to realize social inclusion, strenuous effort is needed to strengthen equality in all aspects, including culture, ethnicity, gender, and age; regional disparities should be addressed by achieving regional balance through local revitalization, smart transportation, and smart housing initiatives. Details are provided as follows:

(1) A super-aged society needs smart care, smart healthcare, and technology-powered disease prevention to achieve holistic and age-friendly health care.

Taiwan officially became an aged society in March 2018 and is projected to become a super-aging society by 2025. Evidence-based intervention involving smart technology is needed. From prevention, medicine to health and care, we must integrate and establish the most appropriate healthcare system and support system, creating a case-centered service model integrating health care and long-term care. We also need to develop geriatric care products and services. Furthermore, we should provide a variety of home-based healthcare service models, and improve community healthcare service networks, linking them to healthcare resources in real time so that people have access to holistic health care. Communicable diseases are evolving rapidly, yielding increasingly more new variants. A precision, high-performing, intelligent disease prevention, monitoring, and response system is required to catalyze the research and development of drugs for infectious disease prevention and increase Taiwan's resilience against disease outbreaks.

(2) To realize social inclusion, strenuous effort is needed to strengthen equality in all aspects, including culture, ethnicity, gender, and age.

An inclusive and prosperous society has become a value shared across the Taiwanese society. To achieve this goal, we must actively use digital, smart, and multimedia technologies to ramp up the preservation, revitalization, and promotion of our cultural heritage; and develop cultural industries based on the characteristics of various ethnic groups so that ethnic cultures native to Taiwan can be protected and promoted, and the world can bear witness to Taiwan's soft power that is its culture. We must proactively strengthen the application of digital and smart technologies; improve living spaces and support networks for the elderly population; reinforce support for the employment of middle-aged and older adults and enhance the digital literacy of new immigrants; and also increase women's willingness and opportunities for them to participate in R&D in order to achieve gender equality in R&D.

(3) Regional disparities should be addressed by achieving regional balance through local revitalization, smart transportation, and smart housing initiatives.

Due to inherent factors, regional disparities in terms of industries, healthcare, digital resources, education, transportation, and other relevant resources, exist across northern, central, southern, eastern Taiwan, and offshore islands. This has led to unbalanced development across regions, leading to regional disparities. The adoption of S&T tools will be an effective solution. For example, developing a local revitalization support system to revive local industries can help reduce the regional disparities in economic development; a smart, safe transportation system to improve the quality of pavements and roads will in turn reduce the regional disparities in transportation resources. Use of technology, interdisciplinary collaboration, developing innovative solutions, and investing in new technologies are other solutions to challenges of housing safety, social safety, and public health.

1.2.4. Net-Zero Emissions and Sustainability

The key opinions on this aspect are grouped into four categories: Actions in response to climate change should include utilizing net zero emission technology, expediting regulatory amendments, developing biodiversity, and enhancing climate adaptation capability; to achieve net-zero emissions, just transition for different individuals, groups, industries, and regions should be ensured, and net-zero green lifestyles implemented; industries should be assisted in achieving green designs and a circular economy in order to catalyze the green transformation of supply chains and promote sustainable development in line with international regulations; actions to achieve net-zero emissions should include developing different green energy and energy-saving technologies and ensuring stable power supply to realize a safe and sustainable living environment. Details are described as follows:

(1) Actions in response to climate change should include utilizing net zero emission technology, expediting regulatory amendments, developing biodiversity, and enhancing climate adaptation capability.

As a response to the state of climate emergency declared following a spate of climate disasters and abnormal weathers and to the new ways of life in the post-pandemic era, we must vigorously ramp up collaborative efforts across departments, disciplines, and industries and speed up regulatory amendments in response to climate change, and conduct an inventory of climate scenarios in various areas (e.g., agricultural production, biodiversity, infrastructure, and health). We should incorporate innovative net zero emission technology, new energy sources, and climate adaptation technology; adopt a net zero emission analysis platform; simulate the pathways that six main departments (energy, manufacturing, transportation, residential and commercial, agriculture, and environment) will take to reach Net Zero by 2050; and integrate industrial, governmental, academic, and research resources to draw up various technological plans. At the same time, we should strengthen our disaster early warning system, improve climate change-related infrastructure, combine Internet of Things, AI and big data technologies to develop a smart monitoring, early warning, and real-time response system, and promote a R&D ecosystem for climate adaptation to comprehensively enhance Taiwan's ability to tackle climate-related challenges.

(2) To achieve net zero emission, just transition for different individuals, groups, industries, and regions should be ensured and net-zero green lifestyles implemented.

To promote net-zero transition and ensure fairness in the process, it is necessary to take an inventory of the net-zero skills gap and provide training and employment guidance accordingly. We should establish an effective dispute handling mechanism, communicate with stakeholders, and reduce the impacts of net-zero transition through innovative research and policy changes, thereby ensuring equal development in respect of worker skills, industrial transformation, regional balance, and people's basic needs. Regarding net-zero lifestyles, we need to promote low-carbon diets and green consumption practices by updating and optimizing the Green Lifestyle Information Platform; and develop green building technology, increase the power resilience of public facilities, and expand public transportation networks and low-carbon city plans. Furthermore, we should support the decarbonization of healthcare systems and the green transformation of recreational industries; encourage people to lead green lifestyles; and simultaneously launching cross-department collaborations through social science studies and surveys to resolve problems that people experience in real life, and ensure that different opinions are considered during policymaking, thereby transforming our society into a just and inclusive one.

(3) Industries should be assisted in achieving green designs and a circular economy in order to catalyze the green transformation of supply chains and promote sustainable development in line with international regulations.

Green transformation and sustainable development have become a global trend in industrial development. Industries will need to enhance their green designs and manufacturing capability, and integrate smart operations and renewable applications to reduce environmental impact and improve production efficiency. Greater exertion is needed to foster interdisciplinary professionals especially in the fields of green design and circular economy. On the one hand, we should promote a sustainable consumer market, for which it is necessary to ramp up green product certifications while keeping abreast of international green laws, and develop green marketing and consumption models to meet market demands. On the other hand, demands for the R&D of low-carbon technology and recycled materials should be met by developing a high-value material circulation technology to reuse various types of resources, such as plastic, aluminum, and agricultural waste. Furthermore, local industries need to speed up their green transition by developing low-carbon circular demonstration cases based on the characteristics of local resources, while SMEs should be assisted in completing green transition and expanding into international markets.

(4) Actions to achieve net-zero emissions should include developing different green energy and energy-saving technologies and ensuring stable power supply to realize a safe and sustainable living environment.

With the transformation of Taiwan's energy structure, the increased expansion of renewable energy has affected the stability of power grids. It is necessary to develop smart electrical grids, energy storage systems, regulations, and testing standards, taking cost and safety into consideration to ensure the resilience and safety of the electrical grids. The pressure of the net zero goal and global climate actions has continuously driven demands for low-carbon electricity. We should intensify efforts to develop renewable energy sources, including offshore wind energy, solar energy, geothermal energy, and bioenergy, to tackle challenges in technology and land use problems. In addition, more incentives and technical support are required to promote development. Regarding energy-saving technology, we should facilitate the research and development of high-performing electrical equipment and energy conservation technologies, and enhance power conversion technologies to reduce energy loss. We need to strengthen the safety and energy performance testing of AI computing and commercial equipment to ensure green energy transition.

In summary, the Plan is aligned with the government's major policies and policy implementation direction to increase the depth and breadth of S&T policies. Various ministries and agencies have collectively developed strategies and measures, focusing on four aspects of needs. The ultimate aim is to achieve the objective of "Building a Balanced Taiwan with Smart Innovations and Democratic Resilience."

II. Status and Review of Current National Science and Technology Development

2.1. International Trends

Technological development has become a core driver of global economic growth and social advancement. The WEF's Top 10 Emerging Technologies of 2024 report reveals that AI for scientific discovery, carbon-capturing microbes, and elastocalorics cooling, among other emerging technologies, are driving operational change across all sectors of industry. These technologies not only increase productivity but are also a catalyst of new business models and opportunities. However, the United Nations also indicated that the widening digital divide is posing a significant challenge, while technological disparities between developing and developed countries may further exacerbate social inequalities. The International Institute for Management Development's World Digital Competitiveness Ranking 2024 is defined into three factors, Knowledge, Technology, and Future Readiness, and reports that each country exhibited significant difference regarding the ability to engage in digital innovation and develop digital technologies and the extent of digital transformation. Some countries such as Singapore, Switzerland, Denmark, and the United States achieved higher ranking position in the Technology and Future Readiness factors, whereas countries mostly located in Central and South America and Africa lagged behind – these countries are in urgent need of substantial investment and greater digital competitiveness. An overview of the technological trends of major countries is provided below, detailing the current technological development of the United States, China, European Union (EU) countries, South Korea, Japan, Singapore, and Israel.

(1) United States

The United States has continued to cultivate emerging technologies such as AI to maintain its global competitive advantages. In January 2021, the country established the National Artificial Intelligence Research Resource (NAIRR) Task Force, releasing the Strengthening and Democratizing the U.S. Artificial Intelligence Innovation Ecosystem report in January 2023 to promote accessibility to resources for democratic AI research, expand the scope of involvement in AI research and development, and enhance America's competitiveness in this key technology area. In June 2022, the United States House of Representatives proposed the American Data Privacy and Protection Act (ADPPA) to protect personal information privacy. In August of the same year, the United States Congress passed the CHIPS and Science Act, fortifying the role of the National Institute of Standards and Technology (NIST) in the development of AI-related hardware and encryption technologies and in the formulation of safety standards.

Regarding other areas of emerging technologies, the U.S. White House updated and expanded the CETs list in February 2024, identifying the following 18 CET areas: Advanced Computing; Advanced Engineering Materials; Advanced Gas Turbine Engine Technologies; Advanced and Networked Sensing and Signature Management; Advanced Manufacturing; Artificial Intelligence; Biotechnologies; Clean Energy Generation and Storage; Data Privacy, Data Security, and Cybersecurity Technologies; Directed Energy; Highly Automated, Autonomous, and Uncrewed Systems (UxS), and Robotics; Human-Machine Interfaces; Hypersonics;

Integrated Communication and Networking Technologies; Positioning, Navigation, and Timing (PNT) Technologies; Quantum Information and Enabling Technologies; Semiconductors and Microelectronics; and Space Technologies and Systems. The list serves to protect the security of American consumers and simultaneously strengthen U.S. leadership and competitiveness in international standards development. To strengthen the U.S. semiconductor industry, the NIST's CHIPS for America program released the Building the U.S. Semiconductor Workforce: Progress Report in November 2023. Regarding biotechnology, the White House Office of Science and Technology Policy published the Bold Goals for U.S. Biotechnology and Biomanufacturing in March 2023, outlining five action areas to strengthen climate change solutions, food and agriculture innovation, supply chain resilience, human health, and cross-cutting advances.

The United States Congress proposed the Digital Equity Act in March 2021 to ensure that every community has access to digital skills and technology and stands to benefit from the digital economy. In May 2022, the U.S. Department of Commerce launched the Internet for All initiative, which aims to build Internet infrastructure and impart digital skills. In January 2024, the U.S. Department of Housing and Urban Development proposed to revise the Community Development Block Grant (CDBG) to encourage investments in vulnerable communities. The U.S. Congress also proposed the *Health Equity and Accountability Act* in April 2022, requiring the U.S. Department of Health and Human Services to take actions to reduce health inequality.

Following his inauguration as the 47th President of the United States on January 20, 2025, President Donald Trump reiterated the importance of energy and natural resource development, vowing to enhance the United States's economic and national security and military preparedness. His energy policy greatly encourages the development of domestic energy resources, particularly the exploration of natural resources – oil, natural gas, and coal – on Federal lands and waters, to solidify the United States as a global energy leader. The policy is also focused on strengthening the domestic supply chain, specifically in regards to the production and processing of rare earth and non-fuel minerals to reduce the country's external dependency.

The policy also covers regulatory management, stressing the streamlining and relaxation of requirements related to energy development to eliminate undue regulations and ensure that all regulatory requirements related to energy are grounded in clearly applicable law. In particular, several environmental mandates and regulatory barriers, such as the electric vehicle mandate, are canceled to safeguard the American people's freedom to choose. Meanwhile, the policy gives priority to projects that facilitate the construction of energy infrastructure, and revokes a number of climate change-related executive orders deemed to impose undue restrictions on energy development, for example: Executive Order 13990 of January 20, 2021 (Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis); Executive Order 14008 of January 27, 2021 (Tackling the Climate Crisis at Home and Abroad); Executive Order 14027 of May 7, 2021 (Establishment of the Climate Change Support Office); Executive Order 14030 of May 20, 2021 (Climate-Related Financial Risk); and Executive Order 14082 of September 12, 2022 (Implementation of the Energy and Infrastructure Provisions of the Inflation Reduction Act of 2022).

In summary, the Trump administration's energy policy is committed to reducing external dependencies, strengthening the domestic energy self-sufficiency, and rebuilding American leadership in the global energy market to promote economic growth and national security.

(2) China

The Cyberspace Administration of China released the "14th Five-Year Plan for National Informatization" in December 2021, emphasizing the need to accelerate digital development, use information technology to boost economic and social advances, and promote the simultaneous development of new forms of industrialization, informatization, urbanization, and agricultural modernization. In February 2023, the State Council issued the "Plan for the Overall Layout of Building a Digital China." The plan points out that building a Digital China is important for the development of China, and proposes that by 2035, China will be at the global forefront in terms of digital development, and its digital progress in the economic, political, cultural, social and ecological fields will be more coordinated and resilient.

In September 2022, the Ministry of Science and Technology of China issued the "14th Five-Year Plan for National High-tech Industrial Development Zones," setting the goal, for 2025, of creating technologically autonomous innovative high-tech industrial development zones, attracting talents, enhancing industrial competitiveness, and promoting new development plans and policy innovation. In December 2022, China's National Intellectual Property Administration published the "Opinions on Accelerating the High-quality Development of the Intellectual Property Service Sector," which set out plans to achieve, by 2030, comprehensively optimized development environment, enhanced industry contribution, sounder service system, and an intellectual property service sector with stronger supporting function in the economy.

In June 2022, the National Development and Reform Committee released the "Implementation Plan for New Urbanization in the 14^{th} Five-Year Plan," setting out the tasks of achieving, by 2025, increased urbanization rate of the registered population, improved quality of urbanization for rural migrants, and a completed layout of the "two horizontal and three vertical" urbanization strategy. In April 2024, the Office of the Central Cyberspace Affairs Commission issued the "Digital Village Development Guideline 2.0" to implement the digitalization of rural areas and promote the revitalization of local industries. In June 2022, the National Development and Reform Committee released the "14^{th} Five-Year Plan for National Health," which aims to build a more comprehensive healthcare system by 2025 to enhance the country's capacity to respond to health crises.

China strives to peak carbon emissions before 2030 and reach carbon neutrality by 2060. In November 2021, China's Ministry of

Industry and Information Technology released the "14^{th} Five-Year Plan on Industrial Green Development," outlining the plans to advance the green and low-carbon transition of its industrial production, widely apply green low-carbon technology and equipment, greatly enhance its energy efficiency, and comprehensively strengthen green manufacturing, thereby laying a foundation for its industrial sectors to peak carbon emissions by 2030. In June 2022, the National Development and Reform Committee issued the "14^{th} Five-Year Plan for Renewable Energy," detailing plans to build clean, low-carbon, high-performing energy systems.

(3) European Union

In April 2021, the European Union launched the Digital Europe Programme, applying digital technology in business, civic, and public management to support the twin (digital and green) transformation of industries and SMEs, and to promote the development of super computers, AI, and cybersecurity, among other key areas. The programme received an overall budget of over €7.9 billion and incorporated semiconductors in September 2023. In July 2024, the European Commission published the State of the Digital Decade Report, stressing the need for increased investment in digital skills and infrastructure. To regulate the development of AI, the European Commission proposed the Artificial Intelligence Act in April 2021. The act took effect on August 1, 2024 and is set to be fully applicable as of August 2, 2026. It classifies AI applications by different risk categories, and an European AI Office is established to oversee the implementation of the act and ensure compliance by member states.

Regarding innovation economy, in July 2022, the European Commission passed the New European Innovation Agenda, which aims to position Europe at the forefront of the deep tech innovation and start-ups and promote innovation to bring down GHG emissions, to make Europe's economies more digital, and to guarantee Europe's food, energy and raw materials security. In December 2023, the European Innovation Council (EIC) published the EIC 2024 Work Programme, detailing funding in three main schemes: EIC Pathfinder (€256 million) for multi-disciplinary research teams to undertake visionary research with the potential to lead to technology breakthroughs; EIC Transition (€94 million) to turn research results into innovation opportunities; and EIC Accelerator (€675 million) for start-ups and SMEs to develop and scale up innovations with the potential to create new markets or disrupt existing ones. The EIC also provides access to Business Acceleration Services, and engages with the European Investment Bank to restructure EIC Fund so that the fund is granted greater flexibility to manage the portfolio of start-up investments.

With respect to balanced society, the European Parliament and European Council announced a Directive of November 2022 on "Improving the Gender Balance among Directors of Listed Companies and Related Measures" to promote, through policy measures, gender balance among directors of listed companies. This directive is also one of the core objectives of the European Commission's Gender Equality Strategy 2020–2025. In May 2023, the European Parliament and European Council released the Directive 2023/970 of May 2023, strengthening the enforcement of equal pay laws. The directive underlines a respect for the principle of equal pay for equal work or work of equal value between men and women, prohibits gender-based pay discrimination, and promotes pay transparency.

As regards net-zero emissions and sustainability, the European Parliament and European Council promulgated the Carbon Border Adjustment Mechanism (CBAM) in May 2023, imposing a carbon price on carbon intensive products imported to the EU and encouraging cleaner production in non-EU countries. The mechanism will come into effect in 2026, with a transitional phase of 2023 to 2025; initially it will only apply to a certain number of carbon intensive products, including cement, steel, aluminum, and fertilizers; importers of goods are not required to purchase certificates, but they are required to report GHG emissions embedded in their imports. After 2026, importers will have to register with the national authorities and buy CBAM certificates at a price calculated according to the emissions level. In June 2024, the European Council adopted the EU Nature Restoration Law, setting targets for restoring EU's land and sea ecosystems – specifically, at least 20% of the EU's ecosystems by 2030 and all ecosystems in need of restoration by 2050. The new law requires all member states to submit a restoration plan and progress report regularly.

(4) South Korea

In September 2022, the Ministry of Science and ICT (MSIT) announced Korea's National Digital Strategy. With the objective of turning South Korea into a leading country in the digital era, the strategy proposes a new digital order to preserve the universal values of freedom, human rights and solidarity. In April, 2023, the MSIT introduced the Competitiveness Enhancement Strategy for Hyper-Scale AI, detailing plans to create South Korea into a world-leading innovative AI center and service platform. Since then, the government has brought into being a number of dedicated task forces charged with overseeing such matters as AI ethics forum, AI legislation preparation, and responses to hyper-scale AI, to brace for social changes, increase technology acceptance, and promote the universal application of AI in activities of daily living. On December 26, 2024, South Korea passed the Basic Act on the Development of Artificial Intelligence and the Establishment of Trust, which is set to take effect on January 24, 2026. This act will be applicable to matters involving AI, enforcing sanctions on non-compliance and providing measures for dedicated organizations and industrial promotion.

Regarding innovation economy, the Ministry of Economy and Finance announced the New Growth 4.0 Strategy Promotion Plan in December 2022 to transform South Korea into a world-leading country and secure leadership in future technologies, digital transformation and strategic industries. The plan encompasses three key areas: (a) New technology areas for future development, (b) New everyday life areas characterized by digital everywhere, and (c) New market areas for securing the competitive advantages. The government is also building infrastructures for the reform of the country's R&D system and for talent development, international cooperation, financial support, and regulatory innovation. In June 2023, the MSIT announced Korea's National Quantum Strategy, setting a three-stage objective for the development of quantum technology. The country envisions becoming the nexus of the global quantum economy by 2035 and strengthening its national defense capability. Korea's Fifth Science and Technology Master Plan (2023–2027), announced in December 2022, is also centered around smart technology, innovation economy, balanced society, and net-zero emissions and sustainability. It envisions a future led by science, technology, and innovation and aims to strengthen national R&D strategies, foster an innovative S&T ecosystem led by the private sector, and address national challenges with S&T, particularly the areas of carbon neutrality, digital transformation, healthcare, and disasters.

(5) Japan

In April 2022, the Cabinet Office of Japan announced the AI Strategy 2022, which aims to realize Society 5.0 and contribute to SDGs based on the principles of dignity, inclusion, and sustainability. The government established five strategic objectives: Building a technological infrastructure to deal with imminent crises such as pandemics and disasters; developing human resources for the AI era and attracting human resources from around the world; becoming a top runner in the application of AI and achieving enhanced industrial competitiveness; establishing technology systems to realize a sustainable society with diversity; and promoting international collaboration to achieve leadership in the field of AI and accelerate AI research and development and achievement of SDGs. In June 2024 following the Cabinet's approval of the Priority Policy Program for Realizing Digital Society, the Digital Agency proposed the vision of realizing a global digital society with six objectives: enhancing social productivity and competitiveness through digitalization; promoting digitalization for healthcare and education; vitalizing local areas; creating a digitally inclusive society; developing digital human resources; and promoting international collaboration on Data Free Flow with Trust (DFFT).

Regarding innovation economy, in June 2023, the Cabinet announced the Integrated Innovation Strategy 2023 as the third annual strategy of the Sixth Science, Technology and Innovation Basic Plan. The strategy is focused on promoting the development of advanced science and technology, enhancing the knowledge base and human resource development, and creating an innovation ecosystem. Meanwhile (also in June 2023), the Ministry of Education, Culture, Sports, Science and Technology issued the White Paper on Science, Technology, and Innovation 2023, highlighting the government's support for science, technology, and innovation to address global challenges, such as the pandemic, global warming, declining birth rate, and population aging. The White Paper details three policy cornerstones, namely, the enhancement of knowledge base and human resource development; creation of innovation ecosystem, and strategic promotion of advanced science and technology. These policies are interconnected, driving a virtuous cycle of innovation and economic growth.

Regarding balanced society, the Cabinet Secretariat revised the Comprehensive Strategy for the Vision for a Digital Garden City Nation in December 2023. The goal of the strategy is to make Japan a “society where everyone can live in convenience and comfort wherever they are in the country” and to revitalize local areas through the use of digital technology. This strategy is pivoted around three main conditions—digital infrastructure development, the development and securing of digital human resources, and a digital society where no one is left behind. Specifically, it involves the formulation of the Digital Lifeline Development Plan, promotion of using My Number Cards, and creation of a platform for developing digital human resources and job training programs focused on the digital field. In June 2024, the Cabinet Office issued the 2024 White Paper on the Ageing Society, proposing to realize a universal “society in which all citizens are dynamically engaged.” The white paper outlines six major strategies, including strengthening women’s participation in all areas, ensuring their safety and bridging gender-based wage gap, supporting female entrepreneurs and leaders, and addressing isolation problems among women.

With respect to net-zero emissions and sustainability, the Cabinet Office released the Basic Policy for the Realization of GX in February 2023, providing a roadmap in response to the exacerbation of climate change and natural disasters. Through the policy, Japan pledges to reduce greenhouse gas (GHG) emissions by 46% in 2030 and achieve net-zero GHG emissions by 2050 to promote green transformation under the energy crises. The roadmap is composed of four parts: decarbonization initiatives toward green transformation (GX) based on the premise of ensuring a stable energy supply; realizing and implementing "pro-growth carbon pricing concept"; strategy for global actions; and promoting GX for entire society. In June 2023, the Ministry of Economy, Trade and Industry revised the Basic Hydrogen Strategy from the perspective of S+3E—Security, Energy Security, Economic Efficiency, and Environment. The revised strategy is focused on building domestic and international supply chains for Japan, and strengthening the country's industrial competitiveness in the areas of hydrogen production, hydrogen supply, decarbonized power generation, fuel cells, and direct use of hydrogen in steel and chemical products, among others.

(6) Singapore

In December 2023, the Singaporean government announced the National AI Strategy (NAIS) 2.0, setting the following two goals to ultimately bring benefits to Singapore and the world through AI: Excellence (selectively developing peaks of excellence in AI to advance the field and maximize value creation) and Empowerment (raising up individuals, businesses, and communities to use AI with confidence, discernment, and trust). To attain these goals, the government will direct its efforts toward three systems: Activity Drivers (Enablers: Industry, Government, Research); People & Communities (Enablers: Talent, Capabilities, Placemaking); and

Infrastructure & Environment (Enablers: Compute, Data, Trusted Environment, Leader in Thought and Action).

In the area of innovation economy, the Ministry of Digital Development and Information released in May 2024 the Digital Enterprise Blueprint, which comprises four focus areas: Empower enterprises to be smarter by adopting AI-enabled solutions; enable enterprises to scale faster through integrated solutions; equip enterprises to be safer through improved cyber resilience; and upskill workers to make full use of digital capabilities. At the same time (May 2024), the Singaporean government introduced its National Quantum Strategy (NQS), with plans to invest nearly S$300 million over the next five years in strengthening Singapore's position as a leading hub for quantum technology. The strategy focuses on four strategic thrusts: enhancing scientific excellence, strengthening engineering capabilities, fostering innovation and enterprise partnerships, and developing a robust talent pipeline.

In the area of balanced society, the Ministry of Health published in January 2023 the Living Life to the Fullest: 2023 Action Plan for Successful Ageing, which aims to transform Singapore into a nation for all ages. The action plan is centered around three key themes of Care (empower seniors to take charge of their physical and mental well-being through preventive health, active ageing programmes and care services), Contribution (enable seniors to continue contributing their knowledge and expertise by enhancing the learning, volunteerism and employment landscapes.), and Connectedness (support seniors to age in the community within an inclusive built environment and digital landscape, while staying connected to society and their loved ones). Subsequently in November 2023, the Ministry of Health, Ministry of National Development, and Ministry of Transportation jointly launched the Age Well SG programme, which aims to encourage active ageing, strengthen support for seniors with care needs in the community, and improve the physical living environment.

Concerning net-zero emissions and sustainability, the Singaporean government released the Singapore Green Plan 2030 in February 2021. The key targets for the plan are as follows: Plant 1 million more trees; quadruple solar energy deployment by 2025; reduce the waste sent to landfill by 30% by 2030; at least 20% of schools to be carbon neutral by 2030; and all newly registered cars to be cleaner-energy models from 2030. The plan comprises five strategic pillars: City in Nature, Energy Reset, Sustainable Living, Green Economy, and Resilient Future.

(7) Israel

The Ministry of Innovation, Science and Technology and Ministry of Justice announced in December 2023 Israel’s Policy on Artificial Intelligence Regulation and Ethics to facilitate development and responsible innovation, enable the use of AI while safeguarding basic rights and the public interest. The policy focuses on government policy framework, ethical AI principles, AI policy coordination center, tools for responsible AI, and international collaboration. Singapore’s commitment to collaboration, transparency, and adaptability reflects its dedication to fostering a thriving AI ecosystem.

In the area of innovation economy, the National Council for Civilian Research and Development (NCRD) published the Recommendation on Israel's National Civilian R&D Priority Areas in August 2022, proposing five areas to be prioritized in national R&D: Bio-convergence of engineering and medicine, food tech, renewable energies and energy storage, civilian space industry, and blue-tech. These areas are recommended to ensure Israel's economic future and maintain Israeli excellence, and simultaneously support Quantum and AI, and Data Science which are two previously approved areas that received initial support.

In respect of balanced society, to help members of the reserve duty forces transition to and thrive in the high-tech sector, in August 2024, the Israel Innovation Authority and Ministry of Defense jointly launched the Specialized Entrepreneurial and Ideation Training for Reserve Military Forces for a Seamless Integration into Israel's High-Tech Industry. Companies, academic organizations, and venture capital funds that have entrepreneurial experience are invited to participate. The training courses, covering ideation methods, pitch tools and storytelling techniques, support for current reserve duty members transitioning to the high-tech sector, and guidance on becoming an entrepreneur, are designed to help members of reserve duty forces master the skills required for a successful transition.

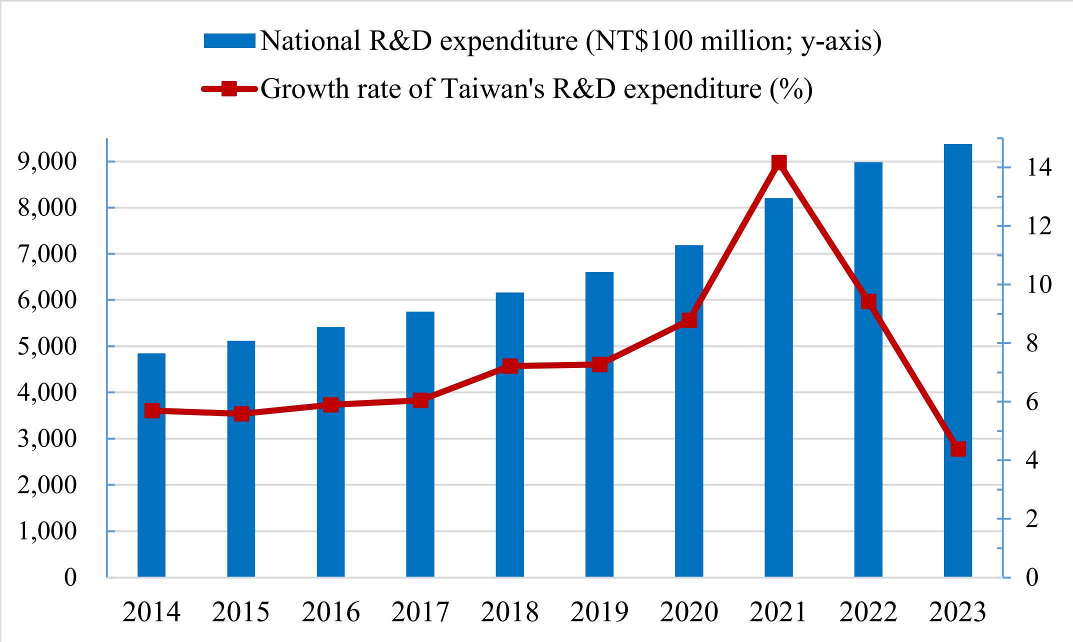
In terms of net-zero emissions and sustainability, the Ministry of Environmental Protection released the National Action Plan on Climate Change in October 2021 to build Israel into a low-carbon and thriving economy. The plan comprises three pillars, including mitigation action plan, adaptation action plan, and economy wide measures. The mitigation action plan details specific targets in each area of energy, transportation, industry, waste, and cities and buildings, including 1.3% improvement each year in energy efficiency, 30% electricity generation from renewable energy by 2030, transition to zero-emission vehicles, and reduction in waste to landfill. The adaptation action plan outlines response strategies for urban systems, natural systems, food systems, and educational systems, with emphasis on strengthening urban resilience, preventing disasters, strengthening ecosystems, and promoting sustainable food systems. The economy wide measures included environmental financial regulation, promotion of climate innovation and technologies, and strengthening of measuring and reporting mechanisms to realize Israel's climate targets.

2.2. Current Science and Technology Development Status and Results

2.2.1. Current Science and Technology Development Status

(1) R&D Expenditure

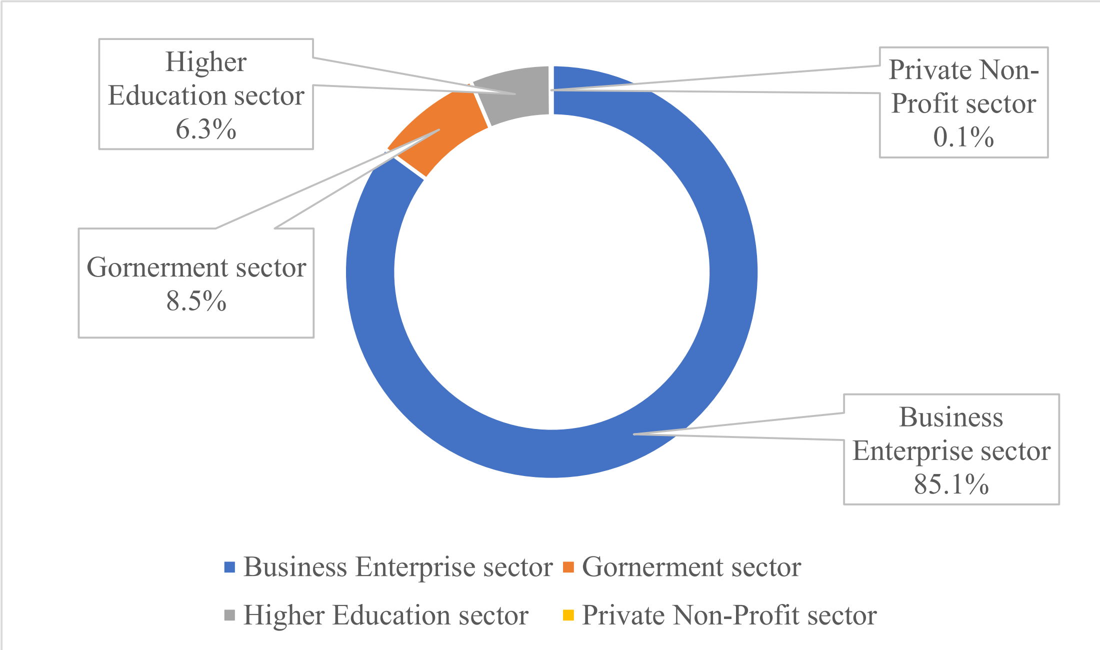
Taiwan's R&D expenditure over the past decade increased steadily over the years (Figure 1) from NT$484.5 billion in 2014 to NT$937.3 billion in 2023, showing continually increased investment. The growth rate of the R&D expenditure peaked in 2021, exceeding 14%, and began to fall in 2022. Growth fell below 10% for two consecutive years, indicating that both private and public sectors are paying more heed to R&D investments to maintain the competitiveness of Taiwan's industries.



Data source: Indicators of Science and Technology, 2024, organized by the Science & Technology Policy Research and Information Center (STPI).

Figure 1. R&D expenditure and growth rate trends

According to an analysis of the source of Taiwan's R&D expenditure in 2023, the business enterprise sector contributed the most, at 85.1%, suggesting that private enterprises are the main source of funding for R&D activities. The government sector accounted for the second highest, at 8.5%, providing stable support. The higher education and private non-profit sectors accounted for only 6.3% and 0.1%, respectively. This distribution reflects the industrial sector's increased attention to R&D and the government's auxiliary role (Figure 2).



Data source: Indicators of Science and Technology, 2024, organized by STPI.

Figure 2. Source of R&D expenditure in 2023

According to the distribution of Taiwan's R&D expenditure by types of R&D, R&D expenditure was primarily on "technological development." In recent years, Taiwan's expenditure on different types of R&D projects exhibited a growing trend, with expenditure on basic research and technological development increasing to NT$74.6 billion (8.0%) and NT$689.7 billion (73.6%), respectively. By contrast, expenditure on applied research remained roughly the same, at around NT$173 billion, compared with the previous year; however, the percentage of expenditure decreased to 18.5%, suggesting that technological development remains the main direction of R&D investment (Table 1).

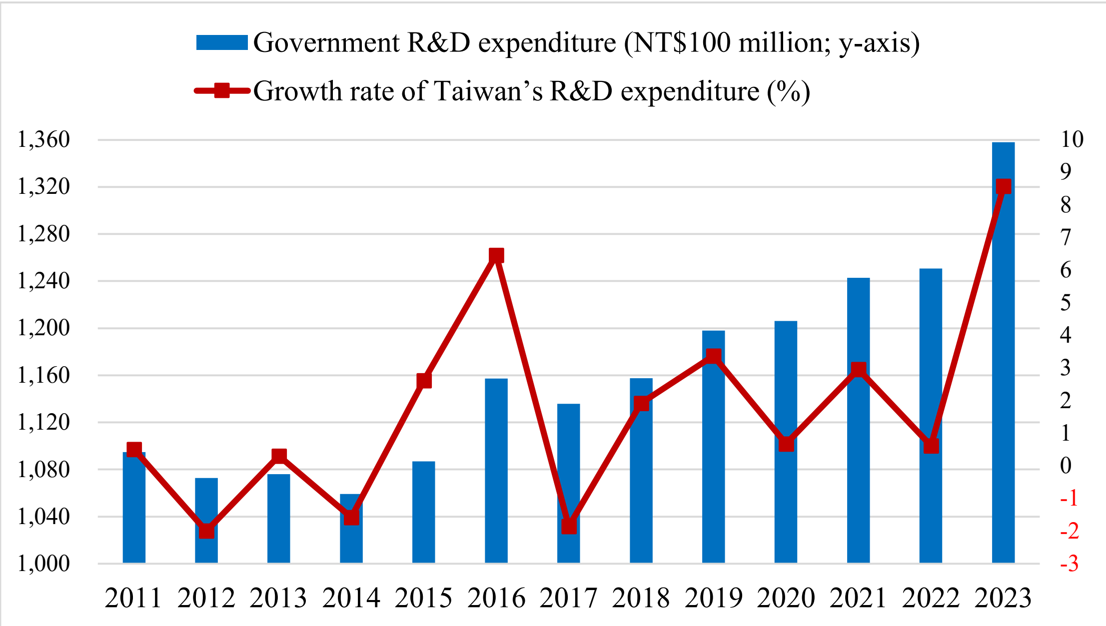
Table 1. R&D expenditure by type of R&D

Unit: NT$ 100 million

Year	Basic Research		Applied Research		Technological Development		Total	
	Amount	%	Amount	%	Amount	%	Amount	%
2015	472	9.2%	1,181	23.1%	3,463	67.7%	5,116	100.0%
2016	468	8.6%	1,242	22.9%	3,707	68.4%	5,418	100.0%
2017	466	8.1%	1,309	22.8%	3,970	69.1%	5,745	100.0%
2018	449	7.3%	1,414	23.0%	4,296	69.7%	6,160	100.0%
2019	461	7.0%	1,500	22.7%	4,647	70.3%	6,608	100.0%
2020	505	7.0%	1,561	21.7%	5,121	71.3%	7,188	100.0%
2021	611	7.4%	1,654	20.2%	5,941	72.4%	8,206	100.0%
2022	685	7.6%	1,754	19.6%	6,540	72.8%	8,980	100.0%
2023	746	8.0%	1,730	18.5%	6,897	73.6%	9,373	100.0%

Data source: Indicators of Science and Technology, 2024, organized by STPI.

According to investigation results, for the 2022 national R&D expenditure, the R&D funds sourced from the government sector amounted to NT$125,059 million, and in 2023 this amount was NT$135,792 million, up 8.6% from the previous year (Figure 3).



Data source: Indicators of Science and Technology, 2024, organized by STPI.

Note: Government R&D expenditure refers to national R&D expenditure funded by the government sector.

Figure 3. Government R&D expenditure and growth rate trends

The central government allocated total budgets of NT$114.1 billion, NT$121.5 billion, and NT$132.7 billion for the development of science and technology (S&T) in 2021, 2022, and 2023, respectively (Table 2).

Table 2. The S&T budgets of government agencies for 2021–2023

Unit: NT$1000

Agency	2021 Budget	2022 Budget	2023 Budget
National Science and Technology Council[1]	43,583,882	50,006,506	52,416,459
Ministry of Economic Affairs	33,992,968	31,226,914	35,839,430
Academia Sinica	11,673,001	11,940,601	12,503,457
Ministry of Digital Affairs	-	7,993,656	9,373,783
Ministry of Health and Welfare	4,494,895	4,872,369	5,325,744
Ministry of Agriculture[2]	4,492,213	4,334,188	5,097,903
Ministry of Transportation and Communications	2,221,009	2,677,037	2,493,183
Ministry of Education	2,243,148	2,441,344	2,453,161
Ministry of Culture	952,668	1,001,688	1,470,606
Ministry of the Interior	1,328,017	1,375,814	1,422,062
Ministry of Environment[4]	349,550	336,721	1,049,472
Nuclear Safety Commission[3]	641,231	600,165	841,153
National Development Council	993,097	582,319	785,942
Ministry of Finance	450,189	450,584	409,750
Council of Indigenous Peoples	279,138	224,314	229,228
Ministry of Labor	242,078	207,336	209,358
Ministry of Justice	232,739	208,599	202,844
Ocean Affairs Council	112,437	145,000	180,637
Ministry of National Defense	143,380	118,000	119,000
Directorate-General of Personnel Administration, Executive Yuan	88,929	77,910	75,069
Public Construction Commission, Executive Yuan	12,100	29,000	70,436
Hakka Affairs Council	42,500	38,000	36,400
National Palace Museum	108,100	116,372	36,380
Academia Historia	39,200	39,800	34,399
Transportation Safety Board	35,177	31,477	33,539

Agency	2021 Budget	2022 Budget	2023 Budget
Financial Supervisory Commission	24,789	15,928	13,287
Department of Information Management, Executive Yuan	11,100	8,520	6,616
Office of Homeland Security, Executive Yuan	-	-	4,000
Overseas Community Affairs Council	-	4,350	3,581
National Communications Commission	3,173,799	404,009	-
Office of Science and Technology Policy, Executive Yuan[5]	1,618,994	-	-
Administration for Cyber Security, Executive Yuan[6]	503,443	-	-
Total	114,083,771	121,508,521	132,736,879

Data source: Annual performance evaluation and review of government S&T development programs, organized by the STPI.

Notes:

1. The 2023 legal budget for NSTI included the NT$1,313,560,000 allocated to the cross agency S&T development funding program.
2. Formerly the Council of Agriculture, restructured on August 1, 2023.
3. Formerly the Atomic Energy Commission, restructured on September 27, 2023.
4. Formerly the Environmental Protection Administration of Executive Yuan, restructured on August 22, 2023.
5. The Office was incorporated into the NSTI on August 27, 2022.
6. The Administration was restructured and incorporated into the Ministry of Digital Affairs on August 27, 2022.
7. The agencies were ranked according to their legal budget for 2023.

Taiwan's R&D expenditure as a percentage of gross domestic product (GDP) has remained consistently higher than the average expenditure of member states of the Organization for Economic Co-operation and Development (OECD). In 2022, the R&D intensity of Taiwan was 3.96%, which was lower than that of Israel (6.02%) and South Korea (5.21%) but higher than that of China (2.56%), Germany (3.13%), Japan (3.41%), Sweden (3.41%), and the United States (3.59%).

Table 3 shows that the R&D expenditure of Germany, the United States, and Sweden as a percentage of their GDP remained in the range of 3.1% to 3.6%, which indicates that the S&T results of those three countries remained highly recognized globally, and it also suggests that the amount of R&D expenditure is not the only factor influencing a country's R&D performance. The efficiency with which R&D funds are used and the designs of management are also the key to enhancing R&D performance, and merit further exploration as a valuable source of reference.

Table 3. Comparison of the R&D expenditure of various countries as a percentage of GDP

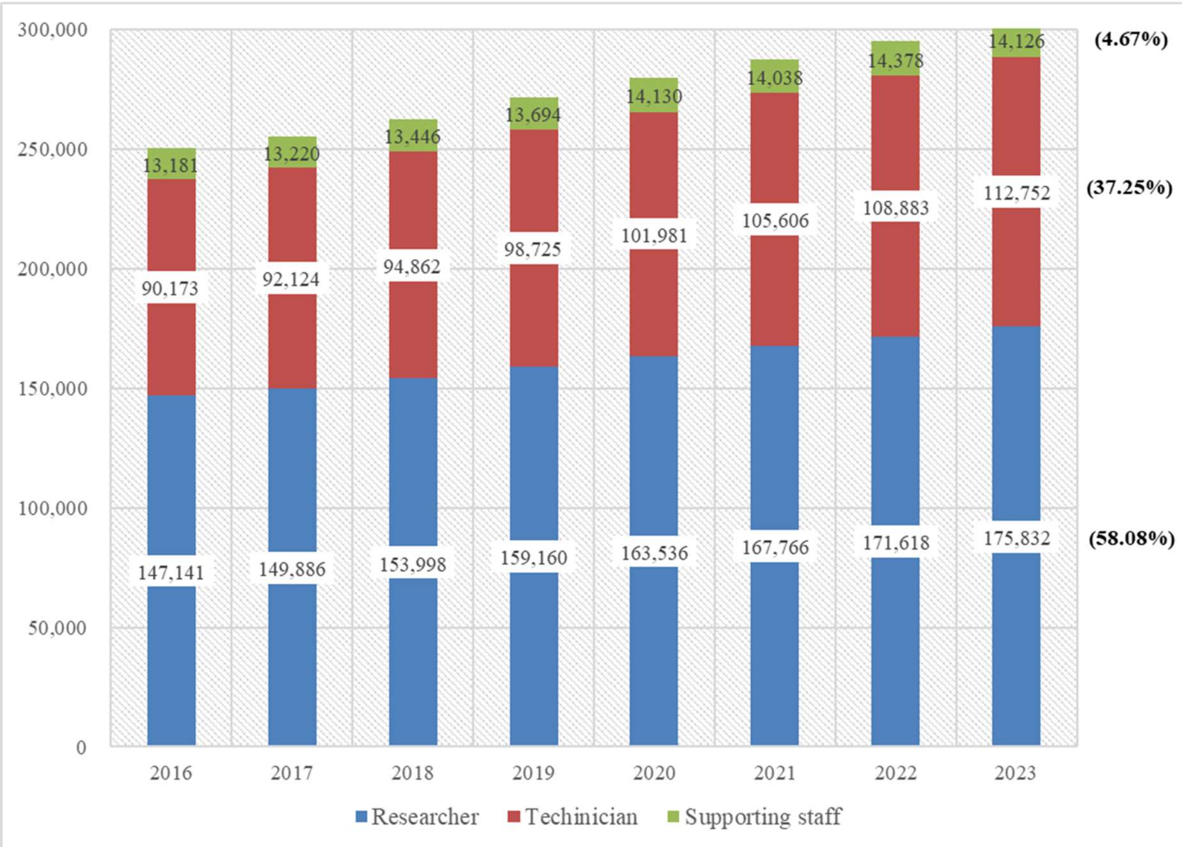
Unit: %

Year	Taiwan	China	Germany	Israel	Japan	South Korea	Sweden	United States	Average of OECD Countries
2012	**2.96**	1.91	2.88	4.07	3.17	3.85	3.23	2.67	2.30
2013	**3.00**	2.00	2.84	4.12	3.28	3.95	3.26	2.70	2.33
2014	**2.98**	2.02	2.88	4.21	3.37	4.08	3.10	2.71	2.35
2015	**3.00**	2.06	2.93	4.31	3.24	3.98	3.22	2.77	2.37
2016	**3.09**	2.10	2.94	4.60	3.11	3.99	3.25	2.84	2.37
2017	**3.19**	2.12	3.05	4.76	3.17	4.29	3.36	2.88	2.41
2018	**3.35**	2.14	3.11	4.93	3.22	4.52	3.32	2.99	2.49
2019	**3.49**	2.24	3.17	5.37	3.22	4.63	3.39	3.15	2.56
2020	**3.61**	2.41	3.13	5.82	3.26	4.80	3.49	3.42	2.72
2021	**3.79**	2.43	3.13	5.77	3.38	4.91	3.40	3.48	2.72
2022	**3.96**	2.56	3.13	6.02	3.41	5.21	3.41	3.59	2.73

Data source: OECD, Main Science and Technology Indicators (2024/7), organized by the STPI.

(2) R&D Workforce

In 2023, Taiwan's R&D workforce comprised a total of 302,710 individuals, an increase of 2.66% compared to the previous year. The annual average growth rate increased steadily between 2016 and 2023. The R&D workforce in Taiwan was composed mainly of researchers; in 2023, there were 175,832 researchers, accounting for 58.08% of the workforce; and 112,752 technicians, accounting for 37.25%; 14,126 supporting staff, accounting for 4.67%. This structure reflects Taiwan's continued focus on and investment in R&D professionals (Figure 4).

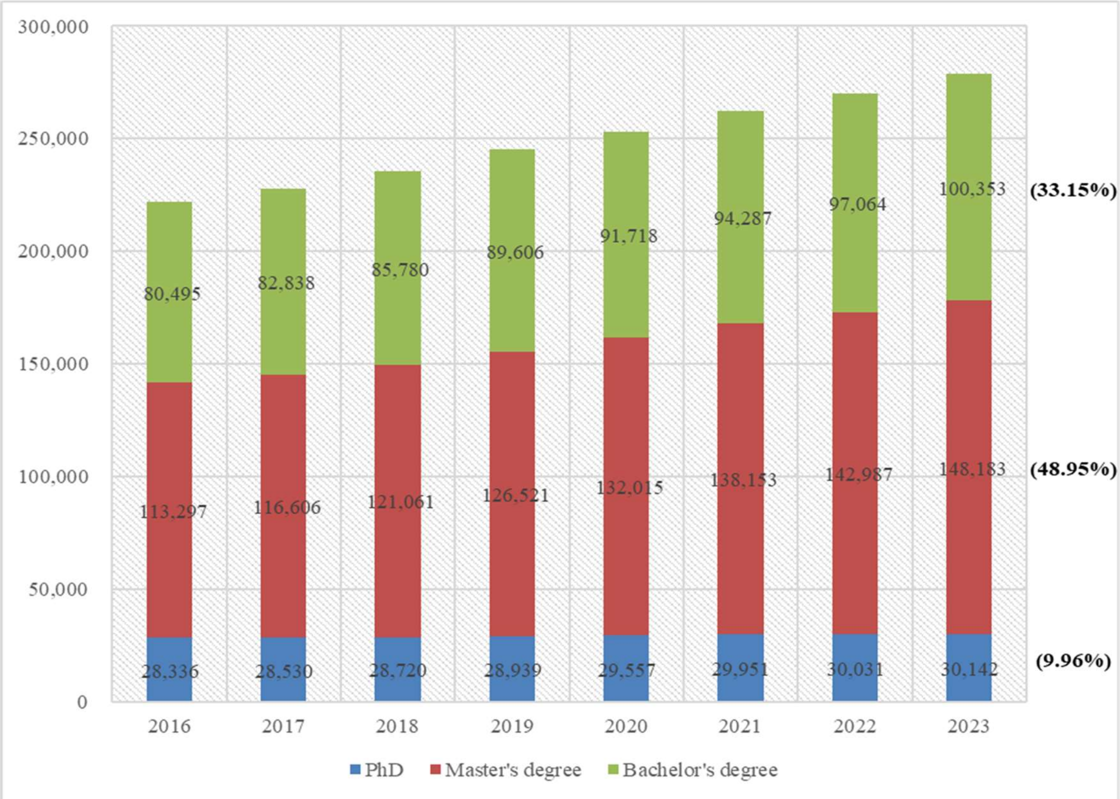


Data source: Indicators of Science and Technology, 2024, organized by the STPI.

Note: Unit is full-time equivalents (FTE; person-years).

Figure 4. Index of Taiwan's R&D workforce

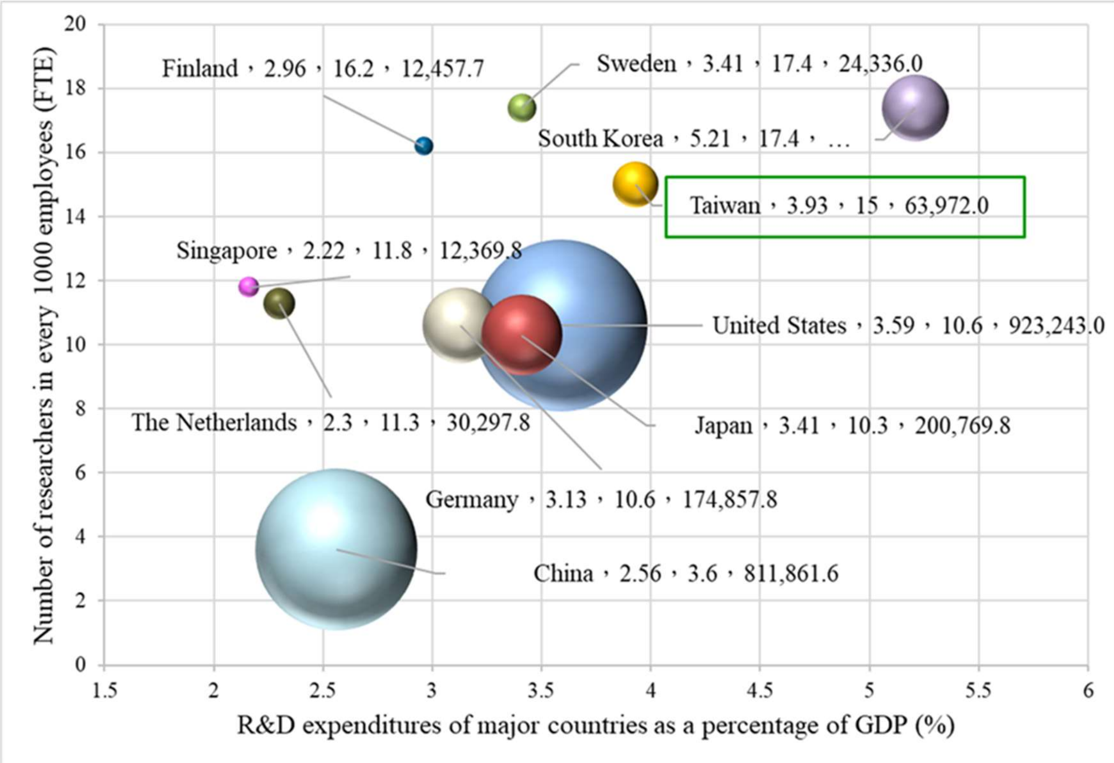
In terms of academic qualifications, most of the R&D personnel in Taiwan have a master's and PhD degree. In 2023, 48.95% of R&D personnel had a master's degree, an increase of nearly 35,000 person-years and 3.72 percentage points compared to 2016; there were 30,142 R&D personnel with a PhD degree, accounting for 9.96% of the entire R&D workforce, which represented an increase of 1,806 person-years and a slight decrease of 1.35 percentage points compared to 2016. Generally speaking, nearly 58.6% of Taiwan’s R&D personnel are holders of a postgraduate degree, indicating that Taiwan’s national innovation system comprises a pool of high-caliber R&D professionals – this phenomenon is closely related to the continued support of a policy that enables the popularization of higher education (Figure 5). An analysis of the chart shows that Taiwan’s national innovation system is characterized by a strong R&D workforce in which more than 58.9% of R&D personnel hold a postgraduate degree, highlighting the positive influence that an accessible and policy-backed higher education has on talent development. Furthermore, there were 15 full-time equivalent (FTE) researchers per 1,000 employees in Taiwan, higher than those in Japan (10.3), Germany (10.6), and the Netherlands (11.3), indicating that Taiwan has a robust R&D talent pipeline. This status quo underlines the expansion of Taiwan’s higher education system and the gradual improvement of the country’s innovation capability.



Data source: Indicators of Science and Technology, 2024, organized by the STPI.

Note: Unit is full-time equivalents (FTE; person-years).

Figure 5. Taiwan’s R&D personnel by academic qualifications



Data source: Indicators of Science and Technology, 2024, organized by the STPI.

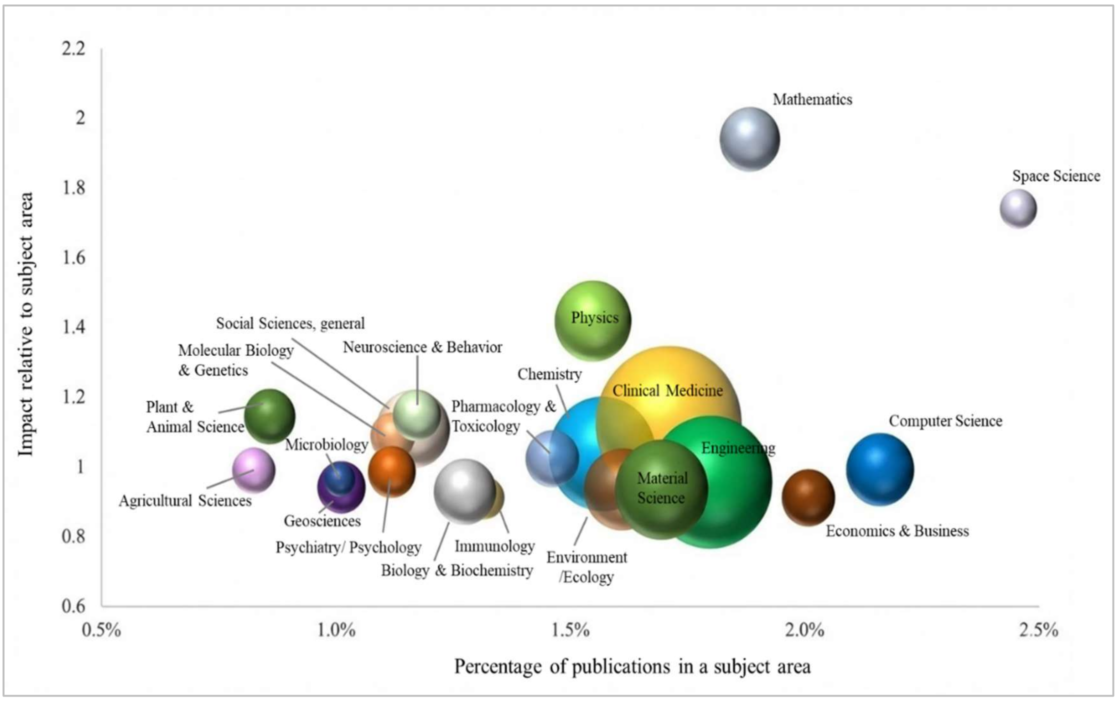
Notes:

1. Bubble chart represents total R&D expenditure (adjusted for PPP; unit: US$1,000,000).
2. Data year: Except for the number of researchers in every 1000 employees, the data year was 2021 for the United States, 2020 for all of the data for Singapore, and 2022 for all others.

Figure 6. Comparison of the R&D expenditure and R&D workforce of different countries

(3) R&D Activities

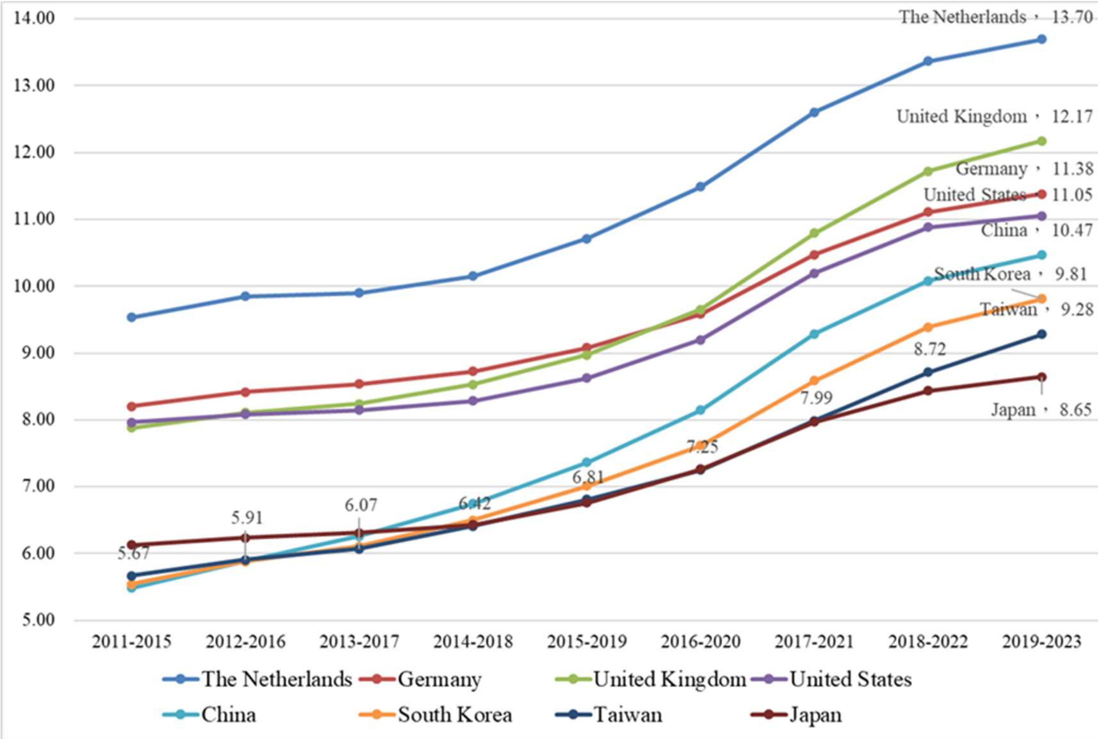
As mentioned earlier, Taiwan's commitment to R&D and innovation is effectively reflected in the output and impact of its academic journal publications. In terms of performance in subject areas, Taiwan's impact relative to the subject areas of space science, physics, plant and animal science, and mathematics was above the global average of 1, which demonstrates the country's international competitiveness in specific areas (Figure 7). A subsequent analysis of citations per publication in the Science Citation Index Expanded (SCIE) shows that Taiwan's international competitiveness in science publications is improving. Although Taiwan's performance still lags behind that of the Netherlands, United Kingdom, and United States, it has significantly closed the gap with South Korea and Japan, even surpassing Japan during 2017–2021. This highlights the continued improvement of Taiwan's academic impact (Figure 8).



Data source: InCites, Clarivate Analytics (2024/9), organized by the STPI.

Note: The bubble chart shows the total number of publications in each subject area, the x-axis represents the percentage of publications in a subject area relative to the world, and the y-axis represents the citations of each of Taiwan's publications relative to the global average, with 1 indicating that they are comparable.

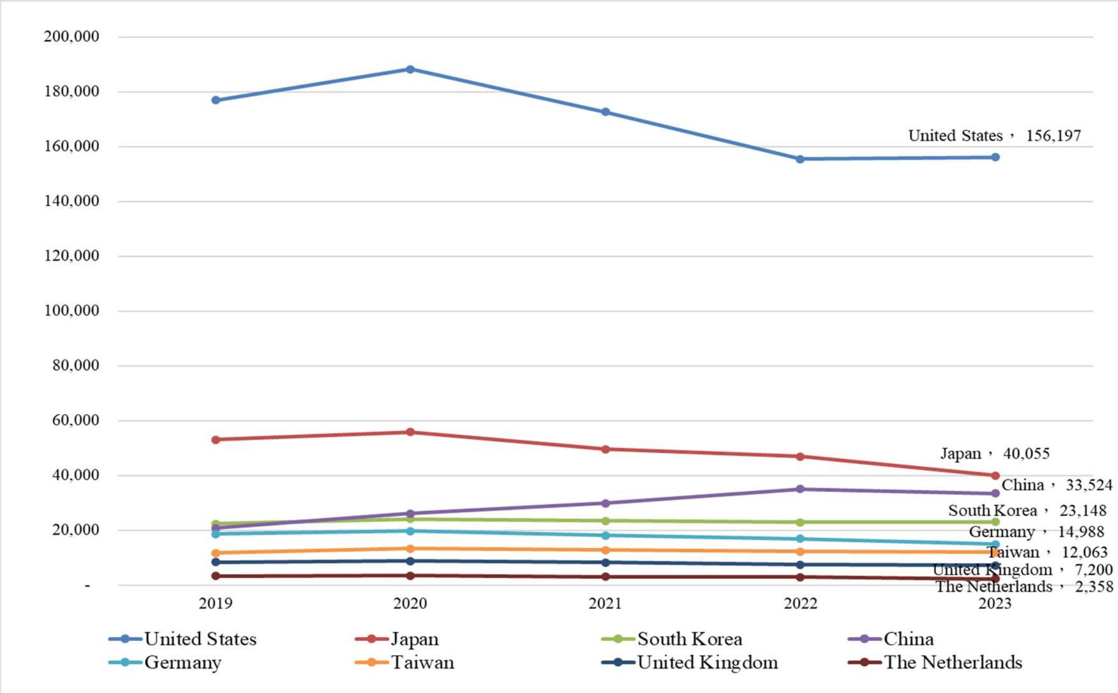
Figure 7. Journal publications in different subject areas between 2019 and 2023



Data source: Indicators of Science and Technology, 2024, organized by the STPI.

Figure 8. Citations of each publication in SCIE

Regarding patent performance, Taiwan ranked 6th globally in terms of total patents in the United States Patent and Trademark Office (USPTO) in 2024 (Figure 9). This reflects Taiwan’s stable performance in innovation and R&D activities. However, although the number of patents can be used to measure R&D results, this measure cannot completely reflect the quality and economic value of the patents. Another evaluation method is required to more accurately reflect a country’s innovation capability and competitiveness.



Data source: Indicators of Science and Technology, 2024, organized by the STPI.

Figure 9. Number of utility patents in the USPTO held by Taiwan and other countries

2.2.2. Effectiveness of Policies Implemented in Taiwan in Recent Years

The National Science and Technology Development Plan is crucial for the planning and implementation of key policies in Taiwan. It will guide each government department in launching plans to implement S&T policies at the ministerial level and subsequently advance progress in S&T development. The strategic planning of the National Science and Technology Development Plan involves creating a blueprint that details the next stage of S&T development, taking into consideration the effectiveness of past policies and the opinions collected from all sectors of society. In the following sections, the achievements of Taiwan's S&T policies are reviewed based on the four key goals of the 2021–2024 National Science and Technology Development Plan: (1) Refine the talent cultivation environment and create advantages for talent recruitment; (2) Improve the R&D ecosystem and allocate resources for the development of pioneering technology; (3) Co-create economic momentum and build a solid ground for innovation; and (4) Enhance smart living capacity and realize a secure society.

(1) Refine the talent cultivation environment and create advantages for talent recruitment

1. Create an environment that facilitates talent cultivation and recruitment

Through the Higher Education Sprout Project, the government assisted industries and educational institutions to establish research institutes that specialize in strategic areas of national interests; implemented the Young Scholar Cultivation Project, Yushan Fellow Program, Taiwan Experience Education Program, amendments to the Act for the Recruitment and Employment of Foreign Professionals, and Strengthening of Overseas Talent and Deep Cultivation of Taiwan Project; created an excellent environment for talent development; and reinforced Taiwan's pool of skilled professionals.

2. Improve industrial talent cultivation

The government launched a "cross-agency collaboration platform for labor supply and demand for critical industries and major investments" and a "regional base for vocational talents and skill cultivation"; combined private training organizations; established innovation talent cultivation models linking industries, academia, and research institutes; fostered students' cross-disciplinary practical abilities in line with industry practices; and assisted in matching university students to industries. Meanwhile, the government established diversified workplace environment to facilitate female re-employment.

3. Promote diverse lifelong learning

The government created digital learning materials by using 5G smart learning and virtual reality (VR) technology, trained teachers to develop the ability to teach digitally, specifically using dashboards on learning platforms to display instructional information. In addition, the government launched digital learning courses for people who live in rural areas and people of different ethnicities, to bridge the digital divide, enhance learning effectiveness, and promote lifelong learning. Digital museums offered different guided tours and interactive promotional services involving action games for tourists.

Talent is foundational to S&T development. Taiwan strives to promote talent development to keep pace with industry changes and international competition. By encouraging industry–academia collaboration, the government established research institutes that specialize in strategic areas of national interests, and launched a number of scholar cultivation projects to attract skilled professionals at home and abroad. To meet industry demands for talent, the government created platforms linking industries, academia, and research institutes to provide students with practical training opportunities and facilitate their job search. Furthermore, the government endeavored to promote diverse lifelong learning by developing digital learning resources, bridging the digital divide, and enhancing people's learning capability. Through these measures, the government hopes to build an excellent learning environment, foster interdisciplinary talents, and enhance the country's competitiveness.

(2) Improve the R&D ecosystem and allocate resources for the development of pioneering technology

1. Make use of resources in strategic areas

By organizing the Executive Yuan Science and Technology Advisory Meeting and compiling the White Paper on Science and Technology, the government assisted with the strategic planning of national S&T development and continued implementing, in a top-down approach, strategic plans to enforce ministerial S&T development policies and allocate R&D resources.

2. Foster stronger basic research capacity

The government continued to support basic research and development, focusing on the development of quantum technology to lay a foundation for future quantum research. The government invested in research on frontier semiconductor technologies and new memory device materials, developing critical technologies, including world-leading epitaxy wafers made from third-generation semiconductor materials (GaN-on-Si), high bandwidth memory (HBM), and AI.

3. Forge deeper industry–academia–research ties

The government facilitated industry–academia collaboration by funding collaboration projects, fostering industrial practitioners with a PhD degree, building the FinTech Space, incentivizing universities to provide physical spaces for entrepreneurial teams, and creating R&D industrialization platforms. The government forged deeper industry–academia–research ties by supporting technological alliances between industries and academia and facilitating the development of skilled professionals for industries.

4. Strengthen S&T risk assessment and data management

The government developed infrastructure risk assessment and application technologies. For example, the government has identified and analyzed critical technologies for the decommissioning and safety control of nuclear power plants, and developed an independent assessment model based on potential scenarios to identify the risks and hazards to which the energy infrastructure is exposed in the event of natural disasters and to formulate safety response strategies accordingly. In terms of data management, the government established a privacy-protected data infrastructure environment, introduced a diverse range of TWID services, and created a friendly data flow environment to provide secure and trusted data exchange environment and mechanism.

Through various mechanisms such as organizing technology advisory meetings, the government developed national S&T development strategies, with a focus on quantum and emerging semiconductor technologies, among other strategic areas of national interest. At the same time, stronger basic research capacity has been fostered by investing in the research and development of frontier technologies to bolster Taiwan's competitiveness. In order to deepen industry–academia–research collaborations, the government provided the wherewithal to facilitate industry–academia–research exchange and foster industry-required talents. The government also attached importance to the assessment of risks that may occur during S&T development and to data management in order to ensure safe and credible S&T development.

(3) Co-create Economic Momentum and Build a Solid Ground for Innovation

1. Speed up the intelligentization and digital transformation of industries

   By using cloud-based service platforms, the government initiated industry-wide adoption of digital technology, physically and virtually integrated technology, and AI technology, promoted industrial intelligentization, and used IoT-powered smart manufacturing bases to provide a range of critical services in and outside of Taiwan, including smart manufacturing of Made-in-Taiwan integrated circuits, product smart manufacturing, and industrial smart manufacturing. The government also created digitally transformed service functions for science parks, and introduced startup companies to facilitate innovational transformation and develop effective industry–academia collaboration models.

2. Implement circular economy and environmental sustainability

   The government promulgated the Climate Change Response Act, stipulating GHG emission source control mechanisms. Through collaborations with industries, the government engaged in decarbonization research to prepare for Europe’s CBAM; developed resource recycling and reuse technologies; and facilitated the development of resource recycling industries that process inorganic waste and recycled aggregates. The government encouraged industry–academia–research collaborations on the development of new resource recycling and treatment technologies to strengthen the driver of resource recycling and increase the value of reused products.

3. Expand the use of renewable energy

The government established green energy technology demonstration sites, operated Shalun Smart Green Energy Science City and Maritime Technology Innovation Center, and assisted in partially amending the Renewable Energy Development Act and in organizing revisions to the "Conditions for Installation of Renewable Energy Power Generation Equipment in Public Constructions or Public Buildings" and "Regulations on Rewarding Cooperatives and Communities for Public-Funded Installation of Renewable Energy Civil Power Plants for the Purpose of Demonstration." The government continued to promote the development of renewable energy industry to drive investments in this area and increase employment opportunities.

4. Boost the startup economy

The government introduced the resources and smart money of world-class accelerators, gaining access to top-line venture capitals. The government selected startups for entry into accelerator programs, helping them to acquire external investments to promote collaborative efforts within the supply chains of startup industries. The government increased angel investments and entrepreneurial investments to invigorate the country’s domestic startup investment environment.

To facilitate industrial transformation and sustainable development, the government has enforced a number of policies. By using cloud-based service platforms and utilizing IoT-powered smart manufacturing bases, the government accelerated the intelligentization and digital transformation of industries, and encouraged industry–academia collaborations on the development of innovation talents. To combat climate change, the government formulated laws and regulations that encourage the research and development of decarbonization technologies; and developed a circular economy by promoting resource recycling, facilitating renewable energy development, establishing green energy demonstration sites, and relaxing relevant laws and regulations to encourage public participation. To boost the startup economy, the government introduced international resources, helping startups gain access to funds and connect to industries. Accelerating startup growth while enhancing industrial competitiveness will facilitate the attainment of both economic growth and SDGs.

(4) Enhance Smart Living Capacity and Realize a Secure Society

1. Develop healthcare

The government established a disease prevention information network, including a mosquito-borne infectious disease risk prediction map, Passenger Name Record (PNR) analysis system, animal disease prevention information network, and African swine fever information display interface, to provide the latest information and ramp up disease prevention efforts. The government also established an emergency influenza vaccine production platform for the research and development of vaccines.

2. Strengthen cybersecurity

The government implemented a national cybersecurity risk assessment mechanism, integrating world-class cybersecurity and research institutions to foster cybersecurity talents. The government conducted tests and cybersecurity assessments on 5G private network service management systems, subsequently obtaining Taiwan Accreditation Foundation's (TAF) certificate of accreditation for "5G Cybersecurity Testing Laboratory" and the "Next Generation Node B" certification. The government released the Cybersecurity Test Specification for 5G Open Radio Access Network (RAN), and Cybersecurity Assessment Guidelines for 5G Private Network Service Management Systems. For the public sector, the government expanded hybrid cloud systems and installed a secure environment for storing confidential data; the objective of these is to meet the cloud computing, storage, and data cloud service conditions required for public services and highly confidential information, and to safeguard highly confidential data.

3. Create a secure homeland

The government adopted various implementation strategies, including developing early warning systems for disaster prevention and building a green chemistry environment and resilient city. The government improved the disaster prevention intelligence network by setting up a public warning cell broadcast service for disaster prevention, Taiwan Climate Change Projection Information and Adaptation Knowledge Platform (TCCIP), website providing comprehensive disaster prevention information, chemical-related disaster prevention infographic system, and fixed-point disaster rescue operation communication platform. The government strengthened smart environmental monitoring and reporting technology to aid disaster reporting and rescue operations. Additionally, the government used environmental radiation monitoring information to strengthen the nation’s radioactive waste control systems, and integrated and developed autonomous radioactive waste storage, treatment, and disposal technologies to ensure environmental sustainability. With the support of smart technologies, the government prevented crime, tracked crime, and enhanced its forensic investigation and crime analysis capabilities. The government strives to build a secure homeland by adopting the foregoing measures to prevent or reduce natural or anthropogenic hazards.

4. Support smart living

Through the Formosa Open eXchange (FOX), the government improved the efficiency of cross-domain transmission for domestic public networks, and established Taiwan Fiber Optic Cable Channels, which enabled large international cloud companies and data centers to set up a computing and storage platform in Taiwan. The government also developed virtual National Health Insurance (NHI) cards, creating a smart mobile healthcare model that reduces healthcare workers' exposure to occupational hazards in a home care environment.

The government has taken steps in various areas to improve citizens' quality of life and national security. In the area of healthcare, the government strengthened disease prevention and control by establishing information platforms, and developed vaccine R&D capability. In cybersecurity, the government created an effective cybersecurity mechanism, fostered cybersecurity talents, and ensured secure 5G communications. In disaster prevention, the government built different types of disaster prevention information platform to enhance disaster response capability, and developed nuclear power plant decommissioning technology. In smart living, the government improved network transmission efficiency, facilitated the development of international cloud services, and developed smart healthcare services to build a safe, healthy, and smart living environment.

2.3. Current Challenges

The vigorous development of S&T has given rise to a variation of novel technologies. Taiwan must reinforce its S&T strengths to adapt to the changing global landscape, including competition for cutting-edge technologies and the emergence of life-changing technologies; geopolitical restructuring, and the fourth industrial revolution that is driven by AI; Taiwan's transition into a super-aging society and the global DEI trend; the imminence of net zero emission goals accelerated by the exacerbation of climate-related risks. Taiwan may encounter challenges in the following four dimensions:

(1) Smart Technology

Taiwan must tackle challenges in industrial development, including semiconductor competition, geopolitical risks, breakthroughs in emerging technologies, cybersecurity threats and lack of autonomy in national defense, and shortage of visionary talents. Challenges in this dimension are described below.

1. The Five Trusted Industry Sector

Taiwan's domestic semiconductor industry is facing a series of challenges, including the integration of compound semiconductor technologies, talent shortage, geopolitical impacts, and intensified global competition. Taiwan must pick up pace in technological upgrading and international collaborations to overcome development bottlenecks. The government must continue to invest R&D resources in AI, next-generation communications, and cybersecurity, strengthen application platforms and resilience, and continually promote autonomous defense and the research and development of cybersecurity technologies to brace for future challenges.

2. Frontier technology deployment

   In quantum technology development, it is necessary to overcome environmental noise interferences and enhance the stability of encryption technology and software. For space technology, the communication independence and orbital launch capability of Made-in-Taiwan satellites must be strengthened. For maritime technology, continued fortification of infrastructure and monitoring capability is imperative. Challenges in precision healthcare include the cross-disciplinary integration of new technologies and strengthening of healthcare resources. The development of net-zero emissions technology should be focused on frontier energy technology and resource recycling efficiency. The development of digital infrastructure should be focused on data management systems to address data sharing and security problems.

3. Democratic partnerships

   Under U.S.-imposed bans, Taiwan's semiconductor industry must brace itself for competitive pressure and maintain its technological advantage. Against the growing threat of the red supply chain, the drone industry must ensure technological security. Amidst the increasing risk of loss of core technologies, IC and AI-related cybersecurity challenges are imminent, necessitating an overarching response strategy.

4. Visionary talent development

The loss of skilled talents, low pay, and inadequate interdisciplinary integration are problems that have restricted Taiwan's development potential in biomedicine, AI, and other emerging technology areas. As competition for foreign professionals reaches peak intensity, it is necessary to formulate more effective talent development and talent retention policies to bridge the talent gap, facilitate technological innovation, and promote industrial upgrading.

(2) Innovation Economy

SMEs are seeing increased geopolitical risks, wider talent gap, slow progress in AI integration and business transformation, and limited internal capacity. SMEs are also exhibiting climate anxiety, which affects industry innovation and stymies competitive development. Industries are thus compelled to tackle the changing landscapes head-on. Challenges in this dimension are summarized below.

1. Industrialization of AI and Intelligentization of Industries

Taiwan is facing multiple challenges in the area of AI, including large-scale AI chip development, talent shortage, and scarcity of AI solutions. Despite its strengths in semiconductor manufacturing, Taiwan remains in need of improvement in the areas of software development, AI algorithms, and data applications, all of which influence our advance to autonomy. SMEs are in urgent need of AI tools and the support of resources, smart agricultural technology and equipment are inadequate, and AI regulations and standards are still incomplete.

2. Balanced development across industries

Considering the external dependency or monopoly of core technologies and equipment, companies are unable to commercialize their products due to lack of R&D capability and marketing resources. Against challenges in internationalization, the capacity of industries, academic institutions, and research organizations must be integrated to fortify the international ties of industry chains. In commercial service sectors, digital innovation lacks investment, block chain applications yield limited benefits, and competition in e-commerce market is fierce. Given the shortage of FinTech talents and resources for financial regulation, fraud prevention efforts must be ramped up. The economic structure is overly centralized, necessitating the expansion of overseas science park resources and revitalization of existing science parks to explore international market opportunities.

3. Trusted supply chain

Worldwide occurrence of de-Sinicization and supply chain restructuring has intensified global competition. Political and economic changes are affecting the security of supply chains in the national defense and livelihood industries. Extreme weather events are impacting urban water supply systems, leading to unstable water supply. Water facilities lack the capacity and resilience to cope with the increase in and uneven distribution of water demands. Science-park companies are expanding their investment, causing unstable supply of resources such as water, electricity, and gas.

4. Twin transformation of SMEs

Enterprises must invest sufficient funds for digital transformation to combat the challenges of digital transformation, increasing raw material prices, economic recession, and geopolitical conflicts. SMEs lack data-driven decision making infrastructure and expertise; there is a shortage of digital talents; and technological innovation is moving slowly, affecting market competitiveness. Enterprises face labor and financial bottlenecks; carbon inventory and net zero and decarbonization standards pose challenges to SMEs; and there is an exigent need for the government to provide decarbonization guidance, training, and financial support.

5. Investment in future generation of industry talents

The expansion of the global semiconductor market, the rapid development of LEO satellites and next-gen communications industry, and the trend of achieving Net Zero by 2050 have significantly exacerbated the shortage of skilled professionals across industries. It is necessary to strengthen the transition from education to practice and actively develop skills courses that meet industry needs in order to bridge the theory–practice gap.

(3) Balanced Society

In spite of rapid advances in science and technology, it is still necessary to address societal demands and solve various social problems. Therefore, the first challenge to tackle is determining ways to use technology to develop long-term care 3.0 and smart healthcare to bring about benefits to different people. Another significant challenge to consider is the role of technology as an ancillary tool for the preservation and promotion of cultural heritage and for balancing regional development. Challenges in this dimension are outlined below.

1. Benefits to diverse group of people

   Technological innovation is advancing rapidly, but its adoption in real life requires further improvement. The development of smart healthcare and real-life application of AI must be accelerated, while digital and communications infrastructure must be made more accessible to develop long-term care 3.0 and smart healthcare, thereby increasing the capacity of public healthcare services. New types and variants of infectious diseases are emerging rapidly, but Taiwan's disease prevention system is not yet mature and needs to become more resilient.

2. Increased inclusivity

   Cultural heritage is difficult to promote and preserve. Preservation efforts must be ramped up by increasing channels to access cultural heritage. The languages of multiple ethnic groups are at risk of endangerment and must be more proactively preserved. We should utilize the special cultures of various ethnic groups to develop cultural industries, and leverage international situations that are beneficial to Taiwan for cultural output. The challenges of aging society are imminent.

To combat these, tapping into the older workforce is necessary, and discrimination on the basis of gender, age, and race must be eliminated to create an environment where it is friendly for women to participate in research and development and to become a decision maker.

3. Balanced regional development

Taiwan is facing numerous challenges of development imbalance between urban and rural areas. First, healthcare resources for rural communities must be strengthened. Compared with urban residents, rural residents have far less access to healthcare or healthcare capacity and as a result, they receive lower level of health protection. Second, the slow economic development and lack of innovation and diversity in rural areas restrict young people's opportunity to live and work in their hometown. Three, low population density in rural areas, trip distribution, and long distances are factors that render transportation services inadequate. Finally, the purpose of a social safety net, whether in urban or rural areas, is to provide a family-centered, community-based social safety system through public–private collaborations. This requires integration and intervention across agencies and professions to eliminate risk factors that affect social safety.

(4) Net-Zero Emissions and Sustainability

To tackle challenges of climate change, net-zero emissions by 2050, and resource scarcity, it is necessary to promote sustainable production, circular economy, and net-zero lifestyles, strengthen energy and environmental resilience, and help Taiwan realize net-zero transition. The following provides a review of the current problems and challenges of net-zero emissions and sustainability that Taiwan is facing.

1. Climate change and environmental adaptation

   Decarbonization is a responsibility shared across multiple areas and involves new technologies that are at the demonstration or prototype stage. It can be widely adopted only when combined with the development of innovative technologies. Regarding how to utilize information gathered from climate monitoring and reports, and using climate services to strengthen the benefit of using net zero technology, there is still room for improvement. Extreme weather events have incurred agricultural losses, affecting food safety. In sum, net-zero emissions and adaptation to climate change are equally important, and neither can be neglected.

2. Net zero life and just transition

   The transition to net-zero emissions may economically impact some industries or regions. To mitigate this impact, there needs to be effective policies and supporting measures, as well as a policy and regulatory framework aligned with local contexts, scenarios, and needs to facilitate a just transition. A just transition is not a slogan; it must be implemented through a process that is recognized by and involves all sectors of the society, and through citizen governance and social communication to enhance people’s understanding and practice of recognition justice, procedural justice, and distributive justice.

3. Green manufacturing and circular economy

Industries need to improve their green manufacturing model and create a circular economy by integrating product life cycle stages, including design, manufacturing, consumption, and recycling. Current industry practices still require further improvement, particularly in respect of green designing, energy conservation, decarbonization, environmental protecting, green manufacturing, and sustainable management. Consumers also have low confidence in green products; thus, different guidance related mechanisms are required to help bridge production and consumption practices.

4. Stable electricity supply and decarbonization of electricity production

Domestic renewable energy development, due to the geological environment and climate conditions, exhibits trends of centralization in terms of installation distribution. Consequently, grid integration hotspots lack sufficient capacity, and the limited transmission capacity may lead to regional transmission congestion and curtailment problems. The output power of renewable energy power generation equipment varies considerably with climate, time, and seasonal changes, resulting in intermittent generation uncertainty. Moreover, the available system inertia is lower than that of traditional power generator units, which makes it difficult to maintain the dispatch operations and stability of system grids. To overcome these problems, the integration of smart grid technologies must be strengthened to improve the cost and safety of energy storage and increase grid resilience.

2.4. Future Prospects

As science and technology advance rapidly, different challenges may arise at any moment. Smart technologies must be used to drive an innovation economy and increase the resilience of the society and environment, thereby realizing the national strategic goal of building a balanced, resilient, and healthy Taiwan. This section details the directions along which the four dimensions of smart technology, innovation economy, balanced society, and net-zero emissions and sustainability will be promoted in the future.

Regarding smart technology, to brace for a world of rapid technological advances and geopolitical challenges, we will be proactive in developing our critical industries, including semiconductors, AI, next-gen communications, security and surveillance, and military, by deepening frontier technology research to ensure international competitive advantages. To sustain the strengths of Taiwan's semiconductor industry, we will accelerate the innovation of IC technology to seize the core capacity for new-generation semiconductors, and strengthen the computing performance and expansion of AI applications. Meanwhile, we will develop autonomous next-gen communications technology, actively participate in the development of international standards, increase the nation's network resilience and cybersecurity capability, build a trusted digital ecosystem, and build up the autonomous capacity of our national defense. To facilitate the preemptive deployment of frontier technologies, we will continue to explore quantum applications, accelerate the development of MEO/LEO satellite manufacturing technology, fortify basic marine research and exploration capability, and integrate biomedicine and health technologies. This will involve diverse investments in the R&D of cutting-edge energy technology and the creation of new data management framework. To ensure Taiwan’s competitiveness and security in the global supply chain, we will engage in tech diplomacy with international democratic partners. To build a strong pool of technology talents, we will foster interdisciplinary talents with forward-looking skills and facilitate their international exchange to maintain Taiwan’s overall development momentum.

Regarding innovation economy, to promote the use of AI across all sectors of society, we will strengthen the integration of AI and IC technologies, and by establishing data sharing mechanism and launching localized AI models, we will provide support to enterprises to lower adoption costs and expedite innovational transformation. To facilitate the balanced development and internationalization of Taiwan’s industries, we will promote the R&D and commercial application of frontier technologies, ramp up support for the digital transformation of SMEs, adopt digital innovation tools, and establish an active presence in the international market to enhance the international competitiveness of Taiwan’s domestic companies. To build a reliable and resilient supply chain, we will strengthen autonomy and cybersecurity efforts in all areas, improve the stability of energy supply, and enhance the competitiveness and resilience of Taiwan’s industries in the global supply chain. To accelerate the twin transformation of SMEs, we will promote cloud, AI, and big data solutions, formulate decarbonization strategies, and promote low-carbon production to realize the goal of transforming companies both digitally and sustainably. To increase high-caliber professionals that industries need, we will implement a cross-disciplinary industry talent training system, in which industries, academia, and ministerial departments will collaborate and concert efforts to foster professionals in strategic areas of national interest, and strengthen foreign professional recruitment and employment policies, thereby expanding Taiwan’s talent pipeline.

Regarding balanced society, our ultimate aim is to bring about benefits to diverse groups of people. This involves implementing long-term care 3.0 and popularizing care technology to alleviate the burden of care; promoting home healthcare to expand public healthcare services; adopting smart technology to prevent diseases and promote health; and simultaneously supporting access to digital public services for vulnerable groups and diverse ethnic groups. To achieve social inclusion, we will combine technological applications to ramp up the preservation, revitalization, and educational promotion of cultural heritage; commit to promoting the development of multi-cultural industries; and employ smart technology to build a friendly, inclusive environment free of discrimination and of barriers to digital technological services. To balance regional development, we will promote local revitalization and develop integrated care models for rural areas, thereby bridging the economic and healthcare gap between rural and rural areas; adopt technology to enhance regional governance and facilitate balanced development; utilize advanced technology to improve road safety, actualize a people-centered transportation system, and build a smart social safety net; and strengthen public health response capabilities.

Regarding net-zero emissions and sustainability, we will mitigate climate change-related impacts by the following approaches: ramp up cross-ministerial collaborative efforts and adapt to climate change laws and regulations; promote just transition and reduce the impact of a net-zero lifestyles model, including the risks that net-zero transition will bring to individuals, SMEs, the living environment, healthcare systems, and carbon-intensive industries; and focus on aspects of green manufacturing and circular economy, including developing circular recycling technology and fostering green talents. To attain Taiwan's net zero goals and decarbonize supply chains in response to international pressure, we will develop smart grids, renewable energy, and energy-efficient technologies—this process of research and development will be autonomous and aligned with international trends and the state of Taiwan.

III. Goals and Vision

For the Plan, the status of the current environment, both inside and outside of Taiwan, is analyzed to establish a strategic S&T development framework that will help Taiwan tackle and combat challenges and impacts. First, the status of the current environment outside of Taiwan is analyzed by examining the global S&T development trends and evaluating the potential impacts of new or emerging technologies on Taiwan. Second, the current environment in Taiwan is determined by taking an inventory of existing resources, social needs, and the challenges that the country is facing, which in turn provides insight into the current status of Taiwan's S&T development. Next, different channels are adopted to collect expert opinions from all sectors of society and consolidate their consensus. Ministries and agencies across the government then worked together to formulate strategies and measures, which encompass the following four goals and response actions.

Goal 1: Strengthen Smart Tech Ecosystem and Build AI Island

Actions for achieving this goal include the following: With science and technology at the core, cultivate the Taiwan's Five Trusted Industry Sectors—semiconductors, artificial intelligence (AI), military, security and surveillance, and next-generation communications, and leverage Taiwan's advantages in science and technology, specifically IC design, chip manufacturing, advanced packaging technology, and computing centers, to secure a strategic position in the field of AI, and strengthen national resilience. Encourage innovation and R&D by strengthening industry–academia–research collaborations, actively participate in international standards development while developing key technology areas such as quantum computing and biotechnology, ramp up basic research and talent development efforts, and forge ties with international academic communities. In the area of space industry, develop autonomous satellite technology and improving orbital launch capability. In the area of maritime technology, strengthen ocean observations and resource development and protection. In the area of precision medicine, accelerate the research, development, and application of gene editing and cell therapy. Realize net-zero emissions by committing to developing renewable energy and improving energy efficiency, and participate in international climate collaborations. Utilize the country's technological capacity to deepen cooperation with democratic partner countries and build safer and reliable supply chains to overcome geopolitical challenges. Commit to talent development and recruitment efforts to build a pool of talents with skills in humanities and social sciences and technological foresight, and promote industry upgrading and transformation through industry–academia–research collaborations and exchange to cement Taiwan's global leadership in the future.

Goal 2: Drive Twin Transformation with Innovation and Promote Balanced Development Across Industries

Actions for achieving this goal include the following: Adopt IC and AI innovation technologies, accelerate application across small and medium-sized enterprises (SMEs) and traditional industries for faster digital transformation, strengthen internationally aligned AI development efforts, facilitate software and hardware applications, promote smart agriculture, improve competitiveness and service performance, implement industrial applications in accordance with international AI regulations, and ensure both innovation and compliance. Build autonomous supply chains and link them to global supply chains, enable the commercial application of innovative services, and develop FinTech to establish diverse services, thereby creating a regional ecosystem and innovation corridor. Use innovative technologies to make our economy more resilient and the supply of critical energy resources more secure, thereby strengthening the critical position of Taiwanese businesses in the global supply chain. Facilitate SMEs' twin (digital and net zero) transformation by adopting measures to encourage innovation and R&D, optimize digital tools, provide decarbonization consultation, diagnosis, and guidance, and cultivate talented carbon managers. Foster diverse talents through industry–government–academia–research collaborations, fortify Taiwan's talent development system for domestic key industries, bridge the theory–practice gap, and improve the training and development of elite athletes and skilled professionals.

Goal 3: Use Smart Inclusive Technologies and Create a Diverse, Inclusive, and Equitable Society

Actions for achieving this goal include the following: Promote application-oriented healthcare technology and service development to enhance people's quality of life and wellbeing. Underline the importance of people-centered designs to ensure that technology and services truly echo the needs of people of different ages and backgrounds. Meanwhile, promote the principles of diversity and inclusion and ensure that everyone, regardless of gender, culture, or social background, has fair access to the innovation and convenience of technology. Construct communication infrastructure in rural areas and use mobile broadband or other advanced communications technology to safeguard rural residents' right to communicate, thereby bridging the digital divide. Actively adopt technological applications to enable the proper preservation, revitalization, and promotion of cultural heritage, and develop multi-cultural industries. Combine smart technologies to make digital services accessible to everyone, and actively create an inclusive, discrimination-free society. Strengthen rural healthcare through regional governance and balanced development across urban and rural areas. Develop a smart, secure transportation system that ensures safe and efficient transportation. Maintain social security and create a secure homeland, using AI technology to build a sound system of social safety nets. Create a safer living environment and improve disaster resilience. Finally, adopt advanced information communications technology to strengthen technological capacity for crime detection and prevention.

Goal 4: Promote Green Lifestyles and Circular Economy and Strive for Net-Zero Emissions and Sustainability

Actions for achieving this goal include the following: Promote environmentally friendly green consumption models, strengthen green building designs and services as well as efforts to construct decarbonized infrastructure and public transport networks, and enhance, through education for everyone and more effective social communication, people's understanding of the transition to greener and low-carbon way of consumption and living in order to achieve net-zero green lifestyles in all aspects of life, including food, clothing, healthcare, accommodation, traveling, and leisure activities. Promote green manufacturing and business transformation as follows: encourage enterprises to use environmental protection technologies; help SMEs, through policy incentives and regulatory approaches and by providing them with financial and technical support for green transformation, to reduce carbon footprint, strengthen green manufacturing and designs, and adopt low-carbon technology, recycled materials, and smart operations; develop high-value recycling technology; actively promote green product verification and certification; and achieve the goals of the sustainable development of whole life cycle management. Accelerate the research and development of alternative sources of green energy for decarbonization, adopt AI and net zero technologies, strengthen smart electrical grids and energy storage + conservation technology to ensure stable and reliable energy supply, and through cyclical review of business models, reduce threshold for adoption and create price incentives to facilitate the adoption of behind-the-meter (BTM) energy storage systems. Provide active guidance in the investment and R&D of decarbonization technology to increase energy efficiency and achieve resilience, low-carbon electricity, environmental safety, and sustainability.

Achieving these goals can facilitate the development of scientific research, economy, society, and the environment. Through early deployment, we can meet the four needs of Taiwan: the need for technological development for the future, the need for industrial upgrading and transformation, the need for a secure and inclusive society, and the need for a decarbonized sustainable environment, and strive to realize the vision of "Building balanced development throughout Taiwan through Smart Innovations and Democratic Resilience."

IV. Strategies and Important Measures

Goal 1: Strengthen Smart Tech Ecosystem and Build AI Island

Target 1.1. Develop the Five Trusted Industry Sectors

Strategy 1: Develop next-gen semiconductors, build innovative R&D platforms, and accelerate the research, development, and innovation of IC technology

1.1. Vertically integrate and promote the autonomous development of compound semiconductors to establish an ecosystem-based industrial model

(1) Develop GaN high-frequency devices ideal for commercialization and the ability to produce 8-inch epitaxy wafers, and expand the application of high-power silicon carbide from materials, equipment, device modules to system development and integration to accelerate the development and application of electric vehicle power systems.

(2) Use policy tools to set up a complete experiment line for the production of compound-based power electronic devices and a verification testing environment, create platforms integrating semiconductor substrates, auxiliary design software, device design and manufacturing, and module packaging and testing technology, and strengthen international collaborations and expansion into international markets to increase global visibility and boost industrial development. Develop compound semiconductor materials, process equipment, power

devices, modularized packaging and testing, and power systems to meet the power system requirements for high-end applications such as industrial control, electric vehicles (EVs), AI data centers, and smart grids. Achieve full autonomy in critical compound semiconductor technology, thereby forming an ecosystem.

(3) Develop plans for high-frequency high-power GaN devices, create a whole ecosystem comprising epitaxy wafers, devices, IC designs, and systems, with operating frequency bands ideal for satellite communications and B5G (Beyond 5G)/6G communications, and improve power characteristics and transmission distance to achieve reduced power consumption, energy conservation, and the vision of net-zero emissions.

(4) Develop domestic high-voltage, high-current circuits and modules for compound semiconductors, apply them in power converters required in EVs and smart grids, or in high-power-density power supply modules of data centers and AI servers. Actively build a pool of talents with expertise in next-gen compound semiconductor technology to enhance Taiwan' capacity to autonomously research and develop compound semiconductors.

1.2. Launch Å-generation semiconductor and compound semiconductor R&D projects

(1) Aim to maintain the global leadership of Taiwan's domestic semiconductor industry by promoting the early deployment of frontier devices and materials, advanced process testing, and technologies needed for the next decade, and foster cutting-edge R&D talents required for next-gen semiconductor technologies.

(2) Invest in the development of frontier technologies, including low-dimensional (2D) semiconductor materials, critical devices and technologies, and advanced process testing technology, achieve breakthroughs in the development of semiconductor wafer technology, transfer early research outcomes to the domestic semiconductor industry, evaluate the feasibility of mass production, and effectively reduce the risks of technological pathfinding.

(3) Attain mastery in critical IC design tools, enhance advanced chip design capability, and set up an automated IC design cloud platform that enables industry, academia, and research teams to share silicon-related intellectual property and IC design tools, thereby enhancing the performance of electronic design automation (EDA) tools and shortening the time to research and develop IC designs.

1.3. Promote heterogeneous integration and the R&D and innovation of advanced chip technologies, build the next-gen semiconductor capacity, and revitalize the HPC application market, including AI servers, multi-functional robots, and drones

(1) Set up pilot production lines and autonomous EDA technology for the advanced manufacturing and heterogenous integration of semiconductors, provide domestic IC designers, semiconductor manufacturers, and startup companies with a diverse array of mass and small-volume production services for advanced processes, assist industries to quickly verify advanced chip product concepts, accelerate the market launch of innovative technologies and products, and promote the technological advancement, innovation, and development of the domestic semiconductor industry.

(2) Develop key chip and heterogeneous integration technologies, including chiplet heterogeneous integration, hardware and software solutions for large AI model chips, silicon photonics high-speed transmission technology, fan-out panel-level packaging technology, sensing technology for advanced packaging processes, and novel 3D memory, to drive Taiwan's innovation in advanced semiconductor and propel the co-creation of a domestic product application ecosystem. Focus on the research and development of frontier high-performance computing (HPC) chips to accelerate the development of Taiwan's AI semiconductor industry,

vie for opportunities in the HPC application market, thereby prompting both academic and industrial sectors in Taiwan to cultivate talents with expertise in the R&D of own-brand hardware and software. Accelerate business and industrial transition to the fields of advanced processing and HPC chip applications while expanding the adoption of AI applications to SMEs and traditional industries to boost the development and competitiveness of Taiwan's domestic AI industry, develop Taiwan's ability to design chips autonomously, and create employment opportunities.

(3) Support chip design companies' investment in the development of chip designs that are comparable or superior to the technical indicators of international benchmark manufacturers, and in the research and development of "advanced processes below 16 nm" or "critical, special areas that are highly trusted internationally", or areas of high value such as AI, HPC, automotive, AI light field 3D display technologies or emerging applications, and drive industries to accelerate the expansion of emerging applications and high-end product markets, thereby enhancing industrial competitiveness.

(4) Urge the domestic academic sector to research and develop silicon-based semiconductor chips and system operating performance, combine memory

integrated designs and advanced process technologies to achieve HPC, keep abreast of critical HPC chips and critical high-speed transmission IC designs, and realize a heterogeneous integration platform, which will help accelerate the development of frontier S&T, strengthen the development and competitiveness of Taiwan's domestic chip design industry, and foster high-caliber R&D professionals.

Strategy 2: Deeply cultivate AI-based core technologies, improve computing performance, and expand applications

2.1. Build a national AI computing technology and equipment development center

(1) Work with industries, academia, and research institutes to ascertain the computing resources and hardware equipment that Taiwan needs, and support domestic research institutions and corporate R&D departments to engage in the R&D of AI-related technology and equipment.

(2) Support enterprises to develop low-power processors and devices and embedded systems for AI applications, and address the impact of carbon taxes on the international competitiveness of Taiwan's AI hardware industry.

(3) Integrate domestic supercomputing resources, establish an application system, and publish relevant data to facilitate value-added research.

(4) Enhance AI computing power and provide training

models for software and information service providers to accelerate AI innovation and development.

(5) Establish HPC resources to support the operations and R&D of numerical weather prediction models and 6G technology.

2.2. Discuss and establish national standards and specifications for HPC

(1) Formulate technical standards and specifications for AI computing to ensure interoperability between different hardware devices and technologies and avoid resource wastage and redundant construction.

(2) Formulate supporting measures, which will help companies commercialize their AI hardware R&D results, promote market applications, enhance corporate competitiveness, and facilitate industrial upgrading and economic development.

2.3. Deeply cultivate AI-based core technology and continue to boost momentum in AI research

(1) Develop AI research strategic blueprint for Taiwan, commit to providing AI-based core technologies, algorithms, and basic models urgently needed for the smart transformation and autonomy of all sectors of the industry, strengthen sovereignty in AI research and development, tackle the challenges and crucial issues facing Taiwan, and expand international cooperation networks to accelerate the integration of

AI innovation and R&D results into the global value chain.

(2) Increase monetary investment in AI technology, set up a special grant to support AI-related research, train AI-related talents, attract foreign professionals to work in Taiwan, and provide incentives such as tax breaks and R&D grants to promote the rapid development and application of AI technology.

(3) Conduct an inventory of data of both public and private sectors and negotiate authorization for Traditional Chinese materials, focusing on corpora, texts, and specific fields.

2.4. Use AI to enable smart monitoring and emergency decision-making

Establish resource allocation and job scheduling procedures for adapting smart ICT equipment to system and environmental changes in real time; adopt AI to achieve automatic detection of system anomalies, bottleneck prevention, and early warning; and use AI to help compile and determine the scope of impact and subsequent risks of emergency incidents and automatically recommend necessary response actions and handling procedures.

2.5. Combine the capacity of industries, academia, and research institutes to research and develop autonomous AI-based core technologies and industry-specific application models for Taiwan

Create localized AI models, leverage Taiwan's industrial characteristics and cultural values, continuously develop AI-based core technologies, enhance the processing performance and preference requirements of industry-specific application models, and create new value chains and business models through AI technology to establish a first-mover advantage in the industry.

2.6. Join forces with industry associations to guide all sectors of the industry to adopt AI applications

Understand the pain points and critical needs of industry operators, invite AI experts to develop innovative industrial AI applications, establish demonstration cases showing real-life use by benchmark companies, and propose industrial transformation plans. Guide industry operators to develop value-added applications and tools, and join forces with public associations to promote the adoption of AI in the business sector, thereby prompting industrial transformation and upgrading.

Strategy 3: Deploy next-gen communications technology, align with international standards, and accelerate cross-disciplinary applications

3.1. Develop 6G autonomous technology and establish an international presence

(1) Develop 6G autonomous technology and establish intellectual property and standards

Integrate the capacity of industries, academia, and research institutes to deploy international mainstream 6G technologies and intellectual property, and promote the development of 6G prototype systems, including integrated sensing and communications, local smart networks, and non-terrestrial communications. Provide research grants and engage with industries, academia, and research institutes to jointly develop internationally aligned 6G technology.

(2) Develop critical chips for 6G base stations and end-to-end network systems

Conduct R&D on base station radio frequency and baseband chips based on international 6G technology standards, and develop communication protocol software, 6G ultra-massive MIMO, micro/large/non-terrestrial communication base stations, and critical technologies such as smart and cloud native wireless networks, core networks, and network management systems.

(3) Promote international cooperation on 6G and strengthen Taiwanese industries’ advantages in international coopetition

Push for the integration of autonomous 6G technology into international 6G R&D or experimental network projects, and cooperate with international strategic partners to build 6G experimental networks that feature such characteristics as high efficiency, energy efficiency, integrated sensing and communication, multi-dimensional intelligence, digital twin, and multi-machine collaboration. Through verification of experimental network technology, explore points of entry to achieve patent breakthroughs, secure intellectual property rights to 6G technology while supporting Taiwanese manufacturers to improve end-to-end technology and scenario-based verification private networks by 2028 to make the transition into the development of pre-commercial 6G products and seize the first wave of opportunities in the international market.

3.2. Make forward-thinking plans for 6G spectrum resources to ensure sufficient supply and efficient use

Align with the latest 6G spectrum policies and management systems of international organizations and advanced countries, conduct field tests on harmonious spectrum sharing mechanism, use spectrum resources more efficiently and flexibly, improve Taiwan's spectrum interference handling system, incorporate a backup mechanism for communications technology, make Taiwan's 6G communications more stable and reliable, create a sound environment for the certification of Taiwan's spectrum sharing technology, and cement the foundation of Taiwan's industrial ecosystems.

3.3. Encourage industries to partake in international communication standards organizations and expand business opportunities in the areas of communications technology and international supply chain collaboration

(1) Support domestic companies to deploy frontier communications technology, and encourage industrial collaboration to vie for opportunities to host international communication events and conferences in Taiwan, promote exchange among industries, government, academia, and research institutes to capture future opportunities in the global supply chain, and increase the international visibility and influence of Taiwan's communications industry.

(2) Connect academic communities to trans-disciplinary ICT operators to reach a consensus in the industry, facilitate technological information exchange, and strengthen horizontal cooperation across domestic industries.

3.4. Strengthen the ability to develop space communications autonomously

Develop satellites and ground systems, using purchased and self-developed dual-track communications payload strategies to strengthen Taiwan's ability to autonomously develop space communications technology.

3.5. Build a seamless and highly integrated communications network to make Taiwan's networks more resilient

(1) Keep abreast of the evolution of international 6G

technology standards, encourage the communications industry to incorporate 6G in technological R&D, and introduce subsidy and reward policies with reference to the strategies of advanced countries and international organizations to promote in-depth collaboration between operators of heterogeneous networks (satellites, mobile networks, submarine cables, fixed networks) to transform Taiwan's air–ground–sea network into a single integrated support structure, which is interconnected to multiple backup routers to strengthen multi-path transmissions and enhance the resilience of Taiwan's networks.

(2) Set up tethered high-altitude balloons, verify domestic non-terrestrial networks (NTN) and applied services to establish demonstration cases for industries, which will in turn improve their ability to autonomously research and develop applications in Taiwan and guide the telecommunications industry to strengthen their network coverage in remote areas or to actively test applications, such as real-time network repair during disasters, to build a solid technological foundation that propels the development of Taiwan's NTN industry, thereby realizing the vision of a smart technology island.

3.6. Assist industries to adopt different communication and sensing technologies and environmental equipment

Accelerate the development of communications technology and tools required for different fields to enhance ease of use and reliability for the digital transformation of industries, empower providers of communications and application services to create solutions and dissemination mechanisms, promote the use of next-gen applications to meet diverse needs, and develop the digital economy.

Strategy 4: Optimize cybersecurity capability, build a trusted digital ecosystem, and adopt AI technology for optimal security assistance

4.1. Build a digital government cybersecurity governance environment, promote public–private collaboration on intelligence sharing, and deepen cyber defense and response resilience

Guide government agencies to adopt the zero-trust framework and simultaneously conduct cybersecurity assessments on the industrial control systems of critical infrastructure sectors to provide a basis for Taiwan's central authorities in charge of relevant industry to revise industrial control cybersecurity standards. Deepen cyber defense and response resilience. Establish a blacklist automated deployment service to strengthen proactive defense; organize and participate in cyberattack and defense drills and cybersecurity audits to strengthen the ability of Taiwan Computer Emergency Response Team / Coordination Center (TWCERT/CC) to report and handle cybersecurity incidents; and participate in international cybersecurity conferences or events.

4.2. Keep abreast of frontier cybersecurity technology, create a sound industrial ecosystem, and strengthen the cybersecurity resilience of core industries

Engage in the R&D of active threat detection and smart defense collaboration technology, and create a national post-quantum algorithm platform to help cybersecurity companies commit to the R&D or application of frontier technologies. Guide field operators to collaborate with cybersecurity companies to verify products or solutions, assist business operators with product cybersecurity testing, match their needs to the relevant market, and help them venture into that market. Organize international exhibitions to connect international buyers to Taiwanese cybersecurity companies. Guide manufacturers to participate in international exchange events. Strengthen the cyber resilience of core industries (including semiconductors and military). Promote the Specification for Cybersecurity of Fab Equipment (SEMI E187). Align chip security standards with international standards, establish internationally recognized laboratories with the capacity to perform chip security testing, and guide companies to invest in the chip security industry. Engaged in the R&D of military-civilian cybersecurity technology and adopt the Cybersecurity Maturity Model Certification (CMMC) to help cybersecurity companies enter the military industry chain.

4.3. Promote AI-powered cybersecurity and build an AI network active defense R&D ecosystem

Use AI to build a smart, autonomous technology for analyzing threat intelligence, and then develop four types of smart situation tracking and converging technology: threat situation alert, attack payload source identification, unknown vulnerability risk identification, and AI-powered situation tracking and converging technology.

(1) Threat situation alert: This compares threat patterns based on past cybersecurity incidents, and then predicts future events, attack intentions, and targets, thereby assisting frontline cybersecurity officers in cyber defense operations.

(2) Attack payload source identification: This compares new cybersecurity incidents against malware to identify new attack features, checks with other organizations for similar devices or vulnerabilities, and provides recommendations or reports of similar attack behaviors to facilitate corrective actions as a precautionary measure.

(3) Unknown vulnerability risk identification: This improves upon the limitation of existing information and communications security vulnerability reporting platforms that only focus on software analysis, then expands the ability to analyze potential vulnerabilities, and combines risk analysis algorithms to provide

ratings as a reference for agencies to patch vulnerabilities.

(4) AI-powered situation tracking and converging technology: This integrates open source cybersecurity threat intelligence, performs in-depth analysis using large language models, and then follows the MITRE ATT&CK (Adversarial Tactics, Techniques, and Common Knowledge) framework to recommend device protection measures, priorities, and reinforcements, thereby effectively enhancing organizational cybersecurity capability.

(5) Promote an environment ideal for an ecosystem of AI network active defense R&D: This involves keeping abreast of new AI-related issues and trends, predicting and proposing response strategies and approaches for use in the promotion of technological upgrading, and increasing the depth of Taiwan's overall cybersecurity development strategies to comprehensively enhance the cybersecurity capability of Taiwan's digital environment.

4.4. Develop high bandwidth transmission interface and cognitive computing technology for AI chiplet, and implement verification for international output

Develop high-speed image recognition key technology, with a focus on edge computing devices for unmanned vehicles as the main application, leverage the strengths of Taiwan's semiconductor industry to tap into foreign business resources to jointly develop AI chip applications, including assisted driving and security control, thereby maintaining Taiwan's competitive advantages in advanced semiconductors.

4.5. Upgrade security and surveillance products with AI and protect citizens' confidential data

(1) Encourage security and surveillance industry to adopt and increase its use of trusted critical components to gain a foothold in the niche market of trusted security and surveillance, and assist the industry to become AI-empowered, which drives industrial upgrading and transformation, accelerates the development of high-value smart security and surveillance hardware products, and helps major security and surveillance manufacturers to achieve global leadership in the security and surveillance industry and global presence in the international markets.

(2) Improve the household registration data exchange and transfer framework: Keep all citizens' household registration data secure, fortify the security of personal data archives and information systems, enhance the data defense and protection mechanisms of the household registration and conscription systems, safeguard personal data privacy, establish a data coding, credential encryption, and segmentation-based storage and transmission mechanism, adhere to the principle of protection by data minimization,

eliminate the transmission of data in plain text, and ensure that the entire transmission process is completely free of Chinese characters, identification numbers, and addresses.

(3) Enhance the strength of identity verification: As a response to the increasingly complex cybersecurity threats and the increased importance of controlling access to interior affairs and military service intranets, introduce into mobile workstations the concept of verification with natural person certificate or mobile natural person certificate, verify user identity upon login, and ensure the legitimacy of those accessing the interior affairs and military service systems.

(4) Enhance the protection of interior affairs terminal devices and establish a trusted and secure environment: Improve the security and defense environment of interior affairs terminal servers, install in these servers antivirus software, government configuration baseline (GCB), asset management, and central control servers, and strengthen the consistency of server security configurations to reduce cyber intrusion channels and improve the overall cybersecurity and efficiency with which terminal servers provide interior affairs services.

4.6. Develop a smart search and rescue (SAR) decision support system to integrate cross-agency intelligence and assistive SAR operations

(1) Develop a smart SAR dispatch system, digitally integrate command, control, surveillance, investigation, and coordination mechanisms to connect rescue operations across command chains, strengthen the horizontal and vertical integration of SAR capacity and information between task groups and agencies, improve the efficiency of SAR operations, and ensure the safety of citizens.

(2) Develop a smart SAR decision support system to facilitate the planning of SAR tasks, use AI technology to integrate air and sea rescue resources, and develop optimized SAR plans with due consideration to various factors such as sea and weather conditions at the site of incident. Through database and model development, the smart dispatch system, and continuous optimization and verification, develop optimized SAR assistance decision-making plans suitable for Taiwan to help commanding officers or decision makers conduct reviews and make decisions.

(3) Set up a smart image recognition platform, which uses drone aerial photography to quickly identify people in need of rescue and adopts AI image recognition technology integrated with an ultra-low bandwidth SAR real-time image transmission system to form an overarching drone-assisted SAR image management system that is capable of overcoming the

impact of complex terrains such as mountains and valleys to improve the efficiency of SAR operations at disaster sites.

4.7. Promote the autonomous R&D and integration of AI technology and applications, and safeguard digital sovereignty in the era of AI to promote overall industrial upgrading

Enhance the strengths of domestic industries, build a sovereign AI, strengthen the development of AI-related applications from hardware to software-based smart services, assist startups in diversifying their AI solutions, integrate those solutions into up-, mid-, and downstream supply chains, provide field demonstration to encourage the adoption of domestically made AI software and platforms in the business sector, strengthen the localization of AI technology, and ensure domestic data security and technological autonomy.

Strategy 5: Strengthen collaborations on military-to-civilian technology, accelerate national defense transformation, and reinforce the country’s autonomy in national defense R&D

5.1. Adopt innovative technology and strengthen autonomy in military aircraft repair and maintenance

Utilize R&D grants and industry collaboration resources to help industry operators develop autonomy in the repair and maintenance of F16 and other military aircrafts, such as by adopting smart or AI technologies to predict which aircraft components require repair and maintenance, accurately diagnose failures, and optimize maintenance processes.

5.2. Integrate the capacity and resources of industries, academia, and research institutes, and continue to build defense autonomy

(1) Motivate domestic industries to develop autonomous aerospace and shipbuilding technologies, evaluate technology projects which are prioritized for development and thereby enhance the industry’s technological capabilities, extend the benefits of military inventions to the private sector to increase international market opportunities, and ensure that relevant technologies remain rooted in Taiwan.

(2) Integrate the capacity and resources of industries, academia, and research institutes, encourage defense and aerospace contractors, shipbuilders, and equipment system developers to engage in technological exchange and industrial cooperation with R&D institutions or academia, and boost the development of the defense industry

(3) Provide funds to establish academic research centers: For academic research centers that specialize in the seven subject areas of information, communications, electronic, and smart technologies, critical system analysis and integration, advanced sensing and precision manufacturing research, cutting-edge power systems and aircrafts, advanced system

engineering research, advanced ships and underwater vehicles, and advanced material and mechanical analysis research, provide funds to engage in cross-disciplinary collaborations with other universities on the following: planning of critical technology research blueprints, R&D, exploration, and integration of cutting-edge technologies, and talent development.

(4) Fund defense technology research projects: Explore cutting-edge technologies that surpass the technical standards and operating principles of current defense systems and that have the potential to be actualized in the next 10 to 30 years, and combine the findings with the capabilities and missions of academic research centers to deepen critical defense technologies.

(5) Promote the demonstration and verification of forward-looking technologies: Promote the R&D and verification of forward-looking technologies and apply them in field tests.

(6) Link private cybersecurity R&D resources to promote the domestic production of military cybersecurity technology: Promote military–civil dual-use cybersecurity technologies funding programs for domestic companies to deepen Taiwan’s critical cybersecurity technologies, promote cooperation and ties between the military and private sectors, and foster local cybersecurity companies with autonomy

in defense R&D.

(7) Expand the technical application of domestically made military aircrafts, forge ties with the civil aviation market by leveraging real-life experiences in military aircraft maintenance and the influence of military inventions on the private sector, establish a certified civil aircraft quality assurance system, and expand international opportunities in aircraft maintenance.

5.3. Tap into domestic markets to promote the R&D and transfer of military–civil dual-use technology

(1) Support policies that drive domestic aircraft manufacturing and shipbuilding, use military demand to stimulate civilian demand, invest R&D funds and resources to help build Taiwan's autonomy in the manufacturing of system modules, critical materials, and other production technologies and products, and leverage the impact that military inventions have on the private sector to boost the domestic development of high-value critical technologies and niche products, thereby strengthening military–civil support.

(2) Use the domestic market to stimulate aerospace, shipbuilding, and peripheral supply chains, create a positive cycle in military–civil cooperation, enhance the industry cluster effect, and create high-value-added economic and industrial benefits.

(3) With the goal of achieving defense autonomy and

increasing the capacity of the defense industry, make plans to transfer to private companies the design and integration testing capacity of the defense technology, and promote private participation in the defense industry through co-development of critical military–civil dual-use technologies.

5.4. Establish military–civil exchange channels to reach a consensus on issues and needs related to national defense and cybersecurity

Organize military–civil cybersecurity technology conferences to promote exchange and cooperation among defense departments, military manufacturers, and industry associations, and focus on the R&D of defense and cybersecurity technologies to enhance Taiwan's overall defense and cybersecurity capabilities.

Target 1.2. Promote plans for frontier technology

Strategy 1: Develop quantum computers, quantum communication devices, and peripheral components, and promote the development and application of quantum software technology

1.1. Strengthen the stability of quantum systems and reduce quantum decoherence

Develop new qubit architectures and advanced process technologies, such as technologies for the fabrication of low-temperature superconducting qubit materials and devices for use in photon quantum light sources and single-photon detectors, reduce the effect of environmental noise on quantum systems, and develop high-performance quantum state control technologies, such as dynamic decoherence.

1.2. Increase qubit scalability and strengthen quantum error correction (QEC) technique

(1) Develop advanced processes for the fabrication and control of qubits with increased consistency and scalability, including higher process yield, better gate fidelity, more modular qubit control capabilities to achieve quantum error correction, and increased intermediate circuit capabilities, including the ability to control, reset, and read qubits.

(2) Develop quantum error-correcting codes and algorithms that can efficiently reduce the error rate of quantum computers, and conduct large-scale experiments to verify the effectiveness and feasibility of quantum error correction technique.

1.3. Develop and produce critical technologies required for large quantum computers

Lower the operating temperature of circuits and communications technologies from room temperature to 4K or even below 1K to achieve tighter integration with quantum chips, thereby improving data transmission efficiency and reducing the space required for transmission lines.

1.4. Develop cryogenic control circuits and modules, among other quantum computer components that industries need

Upgrade low-temperature laboratory with state-of-the-art testing equipment to provide a comprehensive range of measurement services to domestic IC design and semiconductor companies. Develop cryogenic control chip modules and packaging design technologies capable of supporting more than 100 superconducting qubits, and engage in discussions with domestic companies about the self-development and integration of cryogenic wires to achieve self-reliance in critical technologies.

1.5. Reduce R&D costs and promote commercial applications

(1) Promote public–private partnerships, establish a quantum technology joint research center, form cross-disciplinary research teams, actively integrate the research capacity of industries, academia, and research institutes, and ramp up efforts to build quantum research bases and core facilities to share resources and technologies.

(2) Encourage transnational cooperation, forge international strategic partnerships, leverage international advanced technologies, and jointly promote the development of quantum technology.

(3) Support startups and SMEs to develop hardware components and applications for quantum technology, and provide financial and technical support.

(4) Explore application scenarios, identify potential applications of quantum technology in the areas of

communications, computing, medicine, and finance, and encourage the publication of research results to promote knowledge sharing and technology transfer in quantum technology.

1.6. Develop quantum key distribution technology and build quantum networks

(1) Develop efficient quantum light sources, detectors, and quantum repeaters to improve the distance and efficiency of key distribution.

(2) Establish pilot projects to test quantum network infrastructure and promote the building of quantum communication infrastructure in different regions.

1.7. Encourage transnational cooperation and promote investments in commercial applications

(1) Continue to collaborate with industries, academia, and research institutes to share resources and technologies, build an overarching quantum communication network, and encourage transnational cooperation to access the quantum communication networks of other countries.

(2) For banking industries or those that handle confidential information, promote investments in and use of quantum communication to ensure message confidentiality.

(3) Provide demonstrations of application scenarios to help companies identify the scenarios in which quantum communication is applied.

(4) Unify standards and specifications to achieve technological compatibility and interoperability.

1.8. Establish theory-supported high-level quantum programming languages and quantum algorithms

(1) Design good abstraction layers so that high-level quantum programming languages can effectively express various computational models, while ensuring that the language is supported by theory and that subsequent compilation and verification works have precisely defined mathematical semantics.

(2) Transform programs into semantically equivalent quantum circuits, taking into account hardware architecture and optimization under various constraints, to ensure that the compiled or optimized circuits are semantically equivalent and to automatically synthesize circuit optimization rules.

(3) Develop software technologies for exploration of new quantum primitives and classical verification of quantum computing.

1.9. Ramp up exploration efforts in quantum computer applications

Quantum computing has been applied in the fields of finance, materials and new drug simulation, transportation management optimization, aerospace engineering, and AI. As quantum computers mature, using them in analysis will become the norm. It is therefore necessary to strengthen the exploration of quantum computing applications and the development of quantum talent.

1.10. Develop post-quantum cryptography (PQC) and post-quantum zero-knowledge proofs

(1) Enhance PQC to achieve efficient, secure, verifiably correct, and readily available standard practices.

(2) Develop technologies related to PQC, such as post-quantum zero-knowledge proofs.

1.11. Develop quantum silicon IP chips and testing technology, and urge industries to migrate to PQC

(1) Develop silicon IP chips for PQC circuits, and promote the integration and verification of open source post-quantum silicon IP technologies, thereby facilitating autonomous R&D of post-quantum products and applications in domestic chip-driven industries.

(2) Develop security testing technology for PQC chips, and guide domestic industries to set up PQC fields and tests to accelerate awareness-raising and applications in the industry.

(3) Establish encryption and decryption security assessment tools, create guides to PQC migration, and promote cryptographic transformation and upgrading within domestic industries.

Strategy 2: Develop medium/low Earth orbit (MEO/LEO) satellite manufacturing technology, and establish the ability to launch spacecrafts and manufacture space-related components

2.1. Strengthen cross-sector collaboration, enhance Taiwan's technological capability in satellite components, and develop resilient satellite communication networks

(1) Develop satellite communication ground equipment key technologies and support the industry to develop mass production and integration capabilities.

(2) Build a testing center to conduct network access testing of satellite communication equipment, thereby helping domestically made equipment gain access to the Starlink network. Encourage international satellite operators to build ground stations domestically and expand their communication bandwidth so as to ensure all-weather satellite coverage, strengthen Taiwan's autonomous control over satellite networks, and facilitate the scheduling of heterogeneous and diverse network bandwidth in emergency situations.

(3) Maintain and improve the non-geostationary satellite (NGS) verification network established in Taiwan, evaluate and expand the Non-Geostationary Satellite Orbit Emergency Response Network stations, increase the capacity of Taiwan's emergency response network, and keep abreast of the operating status and resource distribution potential of each emergency response communication station to ensure the priority, stability, and resilience of communications from the command system in emergency situations.

(4) Introduce cybersecurity-related standards or guidelines for the satellite industry, expand cybersecurity verification laboratories, provide assistance to ensure the cybersecurity compliance of domestically produced LEO satellite communication equipment, catalyze the creation of a domestic LEO satellite cybersecurity testing service ecosystem, and strengthen the cybersecurity composition of the space industry.

(5) Develop component specifications based on satellite mission requirements, collaborate with companies, industries, and academia to jointly develop key space components, and strengthen manufacturers' technical standards and capabilities through stages of review and testing. Leverage the satellite manufacturing and system integration/verification capabilities built over time and establish a platform for turning satellite manufacturing into an industry to help build capacity for satellite mass production. Collaborate with entities inside and outside of Taiwan to mass produce domestically developed satellite constellation and integrate it into international commercial LEO, MEO, and geosynchronous equatorial orbit (GEO) satellite constellations, and then use optical communication technology as inter-satellite links (ISL) for transmission to achieve multi-orbit, multi-constellation satellite communication services in

Taiwan, thereby building a resilient space communication system for Taiwan. Support Taiwan's space technology development plans by encouraging academia to develop cubic satellite payloads or components and foster skilled R&D professionals in space-related fields.

2.2. Strengthen autonomy in R&D, establish a complete supply chain, and develop space weather prediction models

(1) Promote the domestic autonomous development of launch vehicle subsystems and components, reinforce domestic rocket component and material supply chains, and establish Taiwan's autonomy in orbital launch capability through a complete range of ground testing and actual flight test verification.

(2) Develop technologies for atmosphere–ionosphere coupling, and cultivate the ability to monitor in real time the area between Earth's surface and space, and the ability to operate whole-atmosphere models.

(3) Develop atmosphere and space data assimilation technologies to improve the performance of forecast products, and develop value-added software components for operational applications to meet spacecraft mission requirements.

Strategy 3: Fortify basic marine research and exploration capability, develop marine atmospheric environmental monitoring, and protect marine ecosystems and biodiversity

3.1. Fortify basic marine research

(1) Increase the depth and breadth of marine science research to integrate international marine research capacity

I. Plan a long-term development path for marine science research and promote new marine exploration technologies.

II. Establish a marine energy joint research platform to promote R&D and innovation.

III. Forge marine energy industry promotion alliances to facilitate technological implementation.

IV. Make long-term plans for the development of and cultivate R&D professionals in marine science and marine weather forecasting.

V. Establish a fleet of survey vessels to conduct basic marine surveys and a national general laboratory to strengthen Taiwan's technical capacity in marine science research and marine engineering, and foster marine exploration technicians.

VI. Build capacity for ocean remote sensing and for observing autonomous carrier fleet operations to increase access to ocean environment information for effective handling of ocean affairs.

(2) Install frontier technologies and equipment to enhance research investigation and survey capabilities

I. Build new facilities and upgrade research instruments on fishery research vessels and at observation stations, establish scientific fishery management measures, and strengthen the sustainable use of Taiwan's marine fishery resources.

II. Establish a deep-sea hydrological observation system to intensify ocean weather observation operations, and adopt data mining and compound AI technologies to better understand the dynamic of Taiwan's territorial waters.

III. Improve existing detection technologies to gain insight into volcano and fault activities in neighboring northern regions.

IV. Combine AI computation and observation data with marine numerical simulations, and adopt data mining techniques in conjunction with generative forecasting to assess the potential for power generation from marine energy.

(3) Utilize the resources of maritime authorities to unleash Taiwan's marine potential

I. Establish a cross-agency communication platform and mechanism for mutual support.

II. Improve marine energy-related policy and governance systems to ensure the sustainable development and continuous improvement of the marine energy industry.

III. Integrate national marine survey resources and strengthen the value and sharing of marine data.

(4) Deepen regional collaboration and sustainable development

I. Develop large-scale seaweed farming technology for open sea areas to create benefits, such as achieving carbon sequestration and conserving fishery resources.

II. Promote groundbreaking R&D achievements and deepen regional cooperation to create a marine R&D ecosystem.

III. Develop underwater cultural heritage survey technologies, make a list of development projects involving underwater cultural heritage preservation and monitoring technologies, and conduct research on the adaptation of underwater cultural heritages to climate change.

3.2. Enhance ocean space monitoring capability

(1) Develop forward-looking global ocean observation network technologies

I. Develop ways to expand upon marine atmosphere environmental sensors and payload, and fortify the ability to conduct fixed-point, real-time monitoring of maritime spaces.

II. Integrate and establish whole-area marine radar observation networks to realize long-period maritime space near-real-time radar remote sensing networks and information applications.

III. Launch satellite constellations and information inversion transformation technologies that feature payloads including dynamic maritime information monitoring, and integrate them into space technologies, and enhance marine exploration capabilities.

IV. Develop unmanned vehicle detection technologies and establish unmanned vehicle fleets to achieve autonomous 3D ocean surface and underwater cruise detection capabilities for operational needs.

V. Deepen core technologies for marine weather monitoring to enhance marine weather forecasting capability.

VI. Adopt AI technology to promote the cross-disciplinary application of marine weather monitoring and forecasting information in recreational, safety, disaster prevention, and rescue services.

3.3. Safeguard the ocean environment and biodiversity

(1) Ramp up efforts to maintain marine ecosystems and to investigate, evaluate, conserve, and restore marine biodiversity

I. Use scientific data assessments to identify marine biodiversity hotspots and evaluate the value of marine ecosystem services.

II. Employ intelligent systems and LEO satellite communication technology to enhance fishery data management and ensure the sustainable development of marine fishery ecosystems.

III. Establish a digital system that processes fish catch information to provide a crucial basis for modeling fishery resource assessments.

IV. Establish time-series monitoring stations to explore ocean current variations and indicators that measure the abundance of economically important fish species.

V. Use smart research instruments and equipment to monitor marine resources and conduct biodiversity surveys.

VI. Strengthen marine biodiversity monitoring and surveys to determine the impact of natural disasters or anthropogenic activities on marine ecosystems.

Strategy 4: Integrate biomedical and health care technologies, build collaboration mechanisms, and attract foreign and domestic investments in pharmaceutical R&D

4.1. Integrate innovative biomedical technologies across disciplines

(1) Strengthen the integration of biomedical and health care technologies

I. Through cross-disciplinary integration, upgrade manufacturing to new smart, modularized, and automated processes, and invest in generative AI in combination with biotechnology and pharmaceutical R&D to promote the digital transformation and innovation of Taiwan's pharmaceutical industry and make the industry more competitive in the areas of drug R&R and manufacturing.

II. Develop critical technologies, such as heterogeneous integration and packaging of biomedical applications, and automated commercial platform technologies required for nucleic acid drugs and cell therapy, and develop critical raw materials and systems that provide accurate diagnosis and follow-up treatment plans for hard-to-treat tumors.

III. Leverage existing domestic capacities, including medical centers' clinical big data and medical ICT companies' smart medical devices, biomedical signal processing technologies, and ICTs, develop commercially valuable smart health care products or system modules that offer solutions to challenges of clinical precision medicine, and support cross-hospital verification of smart health care systems to unleash more development opportunities in the academic and research sectors and clinical applications in the industrial sector.

IV. Conduct an inventory of the following data: international reports of integrating smart technologies (such as gen AI, digital twin) into medical devices, in vitro diagnostic medical devices, and lab-developed testing products, list of post-market surveillance methods, and cases of using medical device development tools to collect pre-market evidence data.

V. Promote the compliance of real-world data and innovative smart health care products, establish a sound mechanism for smart innovative pharmaceutical products in insurance sandboxes to gain market access, optimize the market valuation criteria for innovative medical devices, and develop innovative (smart) health insurance sandbox mechanisms, applications, and supporting measures.

VI. Improve Taiwan's overall health data governance framework to strengthen the infrastructure, establish big data-based machine learning technology and AI-enabled disease risk prediction models, and improve Taiwan's huge biomedical database to swiftly standardize the information stored in various biobanks.

VII. Analyze the metabolites of different cells and their derivatives to determine cell functionality, and establish functional metabolic fingerprint and biomarker systems as quality control indicators and regulatory basis for regenerative medicinal products, and provide clinical applications.

VIII. Combine Taiwan's advantages in the R&D of advanced technology areas such as AI, engage in the cross-disciplinary development of new medical devices or technologies in response to the trends of alternative verification, make emerging industries in Taiwan more competitive in the area of alternative verification, and gradually realize the ideal of substituting medicines completely.

IX. Recommend the adoption of advanced tools, including AI, in next-gen medical information systems, invest resources in maintaining physical fitness, leverage the advantages of Taiwan's domestic ICT industry to develop suitable wearable devices and AR interactive software, adopt AI in personalized and systematic training, and develop humanoid robots to extend healthy life expectancy and meet diverse needs.

4.2. Effectively integrate medical and health care resources

(1) Improve biomedical and health integration platform and collaboration mechanism

I. Promote agricultural food health integrated application systems, ramp up the development of nutritious agricultural products and increase product value by adding domestically produced agricultural materials, and strengthen the link between the nutrition and function of agricultural products to drive the development of precision agriculture and functional food industries and achieve the vision of health for all and healthy ageing.

II. Develop biomedical and health integration technologies and cooperation mechanisms, conduct laboratory accreditation, and train laboratories on accreditation review processes to help them implement quality management.

III. Promote a technological platform for cross-disciplinary drug R&D, integration, and innovation, develop integrated technologies for biomedical drug R&D to ensure emergency stabilization of national needs, and establish a value-added med-chem innovation center to enhance the competitive advantages of Taiwan's biotechnology industry.

IV. Establish a national user-friendly traditional Chinese and western medicine analysis and information sharing mechanism, integrate both traditional Chinese and western medicine data to strengthen suboptimal health management, and promote precision diagnosis and early warning interventions for suboptimal health status.

V. Establish a next-generation electronic medical record (NGEMR) platform, accelerate the adoption of international data exchange standards across hospitals of all levels to facilitate the rapid exchange and integration of EMRs across medical institutions, thereby enhancing interoperability and the performance of integrated analysis to facilitate smart hospital applications that are supported by big data-based decisions.

VI. Use the NHI's next-generation sequencing (NGS) report integration platform, integrate genetic data and clinical health care databases, and provide personalized clinical drug treatments.

VII. Promote the establishment and sustainable operation of a pandemic prevention technical support platform and infectious diseases bank, and ensure that biopharmaceutical plants operate in compliance with the Pharmaceutical Inspection Co-Operation Scheme (PIC/S) and Good Manufacturing Practice (GMP) standards to support the development of GMP-certified nucleic acid vaccine production technology and to implement state-assigned tasks and plans.

VIII. In response to the environmental requirements of decentralized clinical trials, review the progress of the ISO 14155 revision and the methods by which clinical trials should be designed to promote patient/subject participation, and analyze and compare Taiwan’s clinical trial laws and regulations to produce a policy management research report.

IX. Strengthen training and guidance on new digital medical product quality management systems (QMS) to improve operators’ QMS performance, and enhance the quality of domestic smart medical devices through guidance on specific smart medical devices.

X. Next-gen health information system (HIS) is an indispensable infrastructure for promoting smart healthcare. Accelerate the building of system platforms that align with international standards, initially including medical centers, regional hospitals, district hospitals, health departments, and primary care clinics, with long-term care and health testing institutions to be included in future mid/long-term expansion plans, and establish smart home health care networks for international commercial use when needed.

XI. Integrate data from various sources, ensure interoperability between different health data, connect to next-gen medical information systems, and create a comprehensive digital health platform while ensuring privacy protection.

XII. Integrate various medical/long-term care systems across medical institutions, care processes, and care settings, regulate and incentivize the standardization of system interface and data integration with point-of-care testing/remote monitoring/telemedicine platforms, and at the same time encourage experimental sandbox programs and promote field verifications.

(2) Improve Taiwan's medical biotechnology ecosystem

I. Promote the integration of advanced technologies into medical institutions to improve the quality of medical services, and combine ICT and big data to shorten time-to-market and reinforce technological benefits.

II. Establish an international smart healthcare ecosystem that helps domestic academia, research institutes, and startups integrate technology into the medical field; and form teams to participate in international exhibitions, promote Taiwan's smart healthcare products, and enhance the nation's international visibility to foster cooperation and investment.

III. Establish a domestic chain of industries that specialize in innovative medical devices, new drugs, and emerging technology platforms, and provide services and guidance to help domestic manufacturers venture into the development of high-end innovative products, foster technical professionals in emerging fields, and strengthen Taiwan's capacity to research and develop innovative biological agents.

IV. Balance industry needs with privacy protection, advise relevant ministries to establish non-genetic data de-identification standards and regulations with reference to international standards, and facilitate the application of delinked data in the industry.

V. Expand the use of advanced biomedical testing technologies to improve public preventive healthcare, early screening, and early diagnosis, and integrate the capacity of domestic precision medicine and testing industries to promote the widespread use of preventive and precision medicines and implement at-home healthcare to facilitate industrial development.

VI. Develop benefit-based payment models and encourage the adoption of innovative applications to improve healthcare efficiency; meanwhile, explore new resources other than NHI funding (such as commercial insurance) to promote the development of the biomedical industry.

(3) Strengthen transnational collaborative networks in medical biotechnology

I. Conduct an inventory of foreign resources and technologies developed through industry–academia–research collaborations, establish international cooperation channels to strengthen the international ties of domestic companies, and introduce international resources to fill gaps in Taiwan's biomedical industry, reinforce transnational cooperation mechanisms, and encourage manufacturing in Taiwan by establishing NHI green channel incentive policies.

II. Collaborate with international biotechnology pharmaceutical companies, invite them to host innovative medical and pharmaceutical themed events in Taiwan, select themes that meet their R&D needs, and provide relevant resources to promote product development.

III. Collaborate with international biomedical accelerators and encourage domestic biomedical startups to join the accelerators and leverage local resources to accelerate the launching of products across medical institutions and international markets.

IV. Collaborate with domestic and international venture capital and financial institutions to screen for promising R&D results, and help raise funds for the commercialization of these R&D results through technology conferences and case evaluation meetings.

V. Conduct inventory of various certified smart medical devices, introduce them to medical institutions nationwide by using NHI as a sandbox (e.g., include them in temporary reimbursement schemes) to collect ample data and user feedback, and after establishing cost effectiveness, incorporate these devices into NHI reimbursement schemes or optimize those products through system integration for export to international markets.

VI. Attract international giants and biotechnology companies, and advise the government to provide incentives to make Taiwan a world-class preclinical translation center and a clinical trial hub, which will benefit Taiwanese patients who have urgent need for medication (such as those with rare diseases).

Strategy 5: Develop frontier energy-related technologies such as low-carbon (decarbonization) and negative emissions technologies

5.1. Improve frontier energy technologies and carbon reduction efficiency

(1) Promote the R&D of different forward-looking energy technologies, and strengthen new energy industry and R&D platforms

I. Develop hydrogen-related technologies, including welding materials that are resistant to hydrogen embrittlement, hydrogen permeation barrier treatment technology, hydrogen-mixed burner technology, and high-power hydrogen hybrid power systems, and create hydrogen permeation safety testing technologies to ensure the international compliance of hydrogen applications.

II. Develop solid-state battery and module technologies for EVs, improve energy density and battery lifespan, reduce process emissions, and establish low-carbon vehicle systems and AI-powered smart charging key technologies in accordance with international charging agreements.

III. Promote the development of hydrogen-related application industries (such as the fuel cell industry) by keeping abreast of the hydrogen supply and demand situations of relevant industries, and increase the output value of green energy supply chains such as wind power, solar energy, EVs, and energy storage, through guidance and funding, thereby creating competitiveness in net-zero transition.

IV. Collaborate with different ministries on S&T projects to promote the R&D and implementation of critical technologies for integrated marine energy, net-zero smart grids, and converting biomass into sustainable energy resources.

V. Integrate smart technology and geoscience research, assess the potential for power generation from geothermal and marine energy, establish emerging energy research platforms, accelerate the realization of carbon-free electricity (CFE), set up emerging energy technological application solutions, promote new energy industry alliances, and expedite technological implementation.

VI. Provide research grants through funding programs for research on frontier energy technologies such as ocean energy and nuclear fusion.

VII. Encourage research on frontier and critical energy technologies, strengthen international collaboration efforts to foster professionals required for the future of Taiwan to build Taiwan's domestic research capacity, and foster a pool of high-caliber R&D professionals.

(2) Build economic models to measure overall carbon reduction performance

Propose general performance indicators as a measure of behavior change-induced carbon reduction, evaluate the carbon performance of net-zero green lifestyles, and build economic energy models to measure the benefits of behavioral changes.

(3) Develop innovative energy conservation and decarbonization technologies and promote waste recycling and reuse

I. For petrochemical, steel, electronics, and semiconductors industries, among other emission-intensive industries, invest in the R&D of innovative critical technologies for energy conservation and decarbonization, including the following: new low-carbon materials and energy-efficient process technologies for the pyrolysis of petrochemical plastic waste; low-carbon energy-efficient steel smelting technologies; low-carbon electronic material designs and process decarbonization technologies; technologies that capture, reuse, and convert carbon into low-carbon chemicals at low cost; and technologies for recycling textile waste. Promote industry transformation, and collect information on negative emissions and low-carbon technology applications to subsidize industrial adoption.

II. To reduce the carbon footprint of waste, use recycling technologies to increase the reuse of plastics, hydrofluoric acid waste, inorganic waste, and solid recovered fuel (SRF), promote innovative fully circular carbon reduction technologies, adopt green designs and innovative source reduction technologies, and assist industries with low-carbon transition.

III. Accelerate the R&D of low-carbon power technologies and assess their technological, economic, and social feasibility. Combine smart technology and social science research to provide information for predicting the behaviors of energy consumers.

IV. Establish measurement models and resources to reduce industry operating costs.

V. Engage in the R&D of key motor technologies, expand the scope of application and improve the accuracy of monitoring and assessments, promote the net-zero transition of hard-to-abate sectors, and facilitate international cooperation.

VI. Continue to fund low-carbon technology R&D, include relevant equipment in tax exemptions and deductions, promote the development of carbon credit systems, and simultaneously provide administrative and financial support for critical net-zero technologies to facilitate development in critical areas.

5.2. Support the R&D of negative emissions technology and promote technology translation and validation

(1) Develop carbon sinks in forests, soil, and ocean (including wetland) as the main strategy for promoting natural carbon sequestration, with a focus on increasing afforestation area to achieve forest carbon sequestration.

(2) Investigate and assess potential carbon sequestration locations, conduct preliminary research on the installation of monitoring systems, and develop intertidal zone exploration technologies to build Taiwan's technological capacity and capability and accelerate net-zero goals.

(3) Focus on advanced technologies with potential for application, conduct research on the development and mechanisms of innovative biogenic carbon/low-carbon technologies, combine/develop methods and technologies for measuring and identifying optimized proliferation, synthetic biology, and carbon emission to increase the carbon storage capacity of algae and microorganisms, promote carbon capture and fixation, provide decarbonization/carbon capture/low-carbon applications for different industries, and increase the derived value of biogenic carbon.

Strategy 6: Build a data-empowered environment

6.1. Create a new data management framework

Combine new data management technology concepts, plan and design mechanisms for assessing the current status of service data management, and by assessing the actual status of the current data governance of various agencies, examine the maturity of all aspects of data management, including data quality, data governance processes, and data management strategies; adopt guidelines on the framework of data-empowered management technology, provide agencies with a reference for developing data management measures or mechanisms to incorporate new data management frameworks, and provide assistance in formulating specific directions and measures for improving data governance across the process of data creation, collection, storage, processing, and use.

6.2. Make plans for the development of data convergence

For more effective data sharing, establish an environment that enables data utilization on a data sharing basis, connect it to different data platforms or application programming interfaces (APIs) through universal metadata, data standards, data catalogs, and data formats to realize comprehensive retrieval and application of data across agencies, and on the basis of security and reliability, implement a trustworthy data sharing and dataflow mechanism to promote dataflow and realize the value of data, and improve data access and the benefits of data applications to facilitate cross-agency cooperation on policy issues, thereby improving the dataflow problems (Data Silo) of agencies in Taiwan to enhance data interoperability, increase administrative efficiency, and achieve data convergence.

6.3. Develop, test, and deploy privacy-enhancing technologies

Establish privacy-enhanced infrastructure for government data and data analysis privacy protection deployment mechanisms, develop next-gen privacy-enhancing tools and talents to increase organizational data capacity, develop tools for assessing dataset availability and optimal privacy protection, provide agencies with supporting technical measures and access to the latest privacy protection technologies, reduce the risks associated with dataflow and access to raw data within the public sector, build a highly trusted data application and governance environment for government agencies, balance privacy protection with data availability so that data becomes a key driver of social innovation, collaborate with agencies to expand the field application of privacy enhancing technologies, and engage in policy and technology exchange in line with international initiatives to bolster Taiwan's digital competitiveness.

Target 1.3. Deepen democratic partnerships

Strategy 1: Promote innovative chip applications and tech diplomacy and forge ties with international democratic partners

1.1. Cultivate a local IC design ecosystem, accelerate high-value chip commercialization, and co-create new industry value

(1) Establish an ecosystem that will drive domestic small and medium-sized IC design companies to accelerate the commercialization of advanced (below 16 nm) chips in high-value fields such as AI, automotive,

military, and cybersecurity.

(2) Guide and encourage domestic system operators and IC design companies to collaborate with each other, combine emerging technologies (such as AI), and develop innovative applications suitable for all sectors of industry.

1.2. Gather chip startups from around the world and transform Taiwan into an international IC design hub

Form alliances with international semiconductor exhibitions and associations, host global chip startup competitions to scout for domestic and international chip startups that possess forward-looking technologies and market potential, integrate cross-ministerial resources to attract international chip startups to grow their business in Taiwan, and showcase products at Taiwan Innotech Expo (TIE) to build a global brand. Establish an IC acceleration development platform that serves the following functions: provide one-stop entrepreneurial resources to domestic and international startup teams; offer grants in phases and funds for business development in Taiwan; link technological startup fields to expand resources and leverages; connect international chip startups to domestic industries, academia, and research institutes; and promote cooperation between supply chains and the business sector to drive industrial innovation.

1.3. Deepen international cooperation to make Taiwan's semiconductor industry more competitive

As Taiwan and the United States continue to engage in bilateral dialogue on semiconductor issues, strengthen this partnership through state visits and research conferences. In terms of cutting-edge semiconductor technologies, facilitate the cooperation between Taiwan, which leads in wafer manufacturing, and the United States, which has leadership in IC design, to strengthen R&D and international competitiveness.

1.4. Recruit talents from world-class universities

Cultivate international and advanced IC design talents. Leverage Taiwan's advanced manufacturing advantages with a focus on chip design, expand the chip design training ecosystem, strengthen S&T diplomacy, and attract foreign professionals to join Taiwan's chip design industry.

Strategy 2: Build a technically strong democratic supply chain

2.1. Build a cluster of drone industries and accelerate technological R&D and industrial upgrading

Concert the efforts of industries, government, academia, and research institutes to promote the research and development of the drone industry, link the three major bases of drone R&D and innovation, production and manufacturing, and flight testing, gradually promote the development of Taiwan's drone industry, and form a cluster of drone manufacturing industries in Taiwan.

2.2. Expand into foreign markets to bolster the international competitiveness of Taiwan's drone industry

Due to cybersecurity and national security concerns, European countries and the United States, among others, have banned the use of red-chain components in the drone industry, prompting clients worldwide to shift their attention to Taiwan. In response, Taiwan should expand the international market through such engagements as participation in exhibitions, collaborative meetings, and business matchmaking, and lead a delegation of domestic drone companies to participate in international drone exhibitions, strive for more orders from foreign markets, and match with businesses in other countries to unlock more cooperation opportunities.

2.3. Strengthen autonomy in drone critical technologies

Establish a complete non-Red drone kit supply chain based on demands for military-grade commercial drones, and through domestic markets, continue to support domestic manufacturers in the development of critical drone technologies and application services for various activities, including police and fire departments, search and rescue operations, image mapping, patrol inspection, and national defense. Meanwhile, have the Ministry of Economic Affairs continuously utilize R&D funds and resources to assist domestic manufacturers in developing critical processes and technologies, and improve the capacity of the domestic drone supply chain.

Promote the development and industrialization of key drone chips by tapping into the Ministry of Economic Affairs' S&T projects, funding programs, and resources to preliminarily select low-cost flight control boards and high-unit-price/technologically innovative chips (AI image recognition/vision chips, Software Defined Radio [SDR] communication chips) for simultaneous development, thereby enhancing the self-sufficiency of domestic supply chains. Promote the development of critical drone technologies, with a focus on drone swarm technology, navigation and control systems, autonomous positioning technology, heterogeneous collaborative control systems, communication relay networks, and counter-UAS technology, autonomously develop core systems, and concert academia efforts to build capacities for the development of critical drone technologies.

Strategy 3: Continue to ramp up the protection of Taiwan's core critical technologies

3.1. Protect Taiwan's core critical technologies from various aspects

(1) Protect Taiwan's core technologies from multiple aspects by strengthening, through inter-ministerial integration, the mechanisms for reviewing and approving national core technology projects.

(2) Continuously conduct inventory of national core technologies and regularly review key technology

protection projects to make Taiwan an internationally trusted partner for technological cooperation.

(3) Add a provision regarding "economic espionage crime" in the National Security Act, stating that any acts infringing upon the trade secrets of national core technologies will be subject to investigation and prosecution.

3.2. Promote chip cybersecurity vulnerability assessment capabilities

(1) Develop Taiwan's chip cybersecurity vulnerability assessment capabilities and formulate measures to support security certification and verification.

(2) Use chip security architecture to build a collaborative platform and exercise testing simulation environment.

3.3. Promote AI-powered cybersecurity technology and create an environment conducive to AI-enabled active defense R&D ecosystem

(1) Establish a smart technology that analyzes threat intelligence autonomously and develop a smart situation convergence and tracking technology.

(2) Closely monitor emerging AI trends and deepen Taiwan's overall cybersecurity development strategy.

3.4. Build platforms for dialogues with think tanks in democratic partner countries to shape cooperation consensus among nations and international opinions

(1) Focus on developing geopolitical diplomatic relations with democratic partners, and engage in semi-official

policy negotiations to build policy consensus. Initiate cooperation and negotiation on technological and geopolitical issues with official and semi-official think tanks in Japan and South Korea, while at the same time continuously deepen exchange and expand liaisons with official and semi-official think tanks in the United States, Australia, New Zealand, Europe, and Singapore, and expand the scope of negotiations to include issues pertaining to not only the semiconductor industry but also other industries that specialize in AI, energy technology, and military–civil dual-use defense technology.

(2) Continue engagements with think tanks in democratic partner countries to ensure that Taiwan's policy views are aligned with the normal dialogue of international think tanks, and continue to expand international exchange in hopes of influencing the opinions of various countries about science, technology, and geopolitics.

Target 1.4. Strengthen efforts to develop talents with foresight

Strategy 1: Invest in the quality of higher education, education research, and internationalization

1.1. Support domestic higher education development and strengthen students' ability to foster core competencies

Secure funding for higher education to support domestic higher education development, which has always been the main policy direction for the Ministry of

Education; continue to implement the Higher Education Sprout Project, allocating NT$97 billion to the second phase of the project, continue to assist universities in developing different strength-based characteristics, and strengthen students' six core competencies, thereby striving for sustainable development. Concert ministerial efforts to continuously support the implementation of higher education policies through projects and programs (e.g., industry–academia collaboration projects, topic-specific projects, and academic research projects).

1.2. Assist private universities to provide better salary and benefits for faculty members

Employ a "normal approach" to provide private universities with rewards and grants as resources for helping private universities improve their salary offers to faculty members—specifically, by funding 70% of the difference arising between the base salary of full-time (including project-based) faculty members, academic research allowance, supervisor allowance, and the salary of quota-based staff. Regarding the 15% increase in research allowance for assistant professors or higher positions as of 2024, subsidize 70% of it. If the MOE increases the research allowance for private universities to a level comparable to that of public universities, provide incentives additional to rewards and grants to alleviate universities' financial burden.

1.3. Develop higher education characteristics and enhance the quality of instruction

(1) Comprehensively improve the quality of universities and promote higher education diversification

With a student-centered and teaching-focused approach, continuously assist universities in developing different strength-based characteristics, and strengthen students' six key competencies: information technology and humanistic care, interdisciplinary skills, autonomous learning, international mobility, social participation, and problem-solving.

(2) Assist universities to pursue world-class status and develop research centers

Provide assistance to comprehensive universities that possess multi-faceted international competitiveness, select and subsidize research-oriented universities, consolidate key national issues to address societal and industry needs, help universities pursue world-class status and establish research centers, continue to strengthen their research capacity, and cultivate world-class talent in critical areas to enhance international academic influence.

1.4. Create a bilingual learning environment and develop talents with international communication skills

Guide universities to implement the bilingual learning program, which is divided into two sections of "Focused Development" and "Generalized Enhancement" and is based on the assumption that "students are given choices," "teachers are prepared," and "universities are supported." Provide funds to Focused Development schools or colleges (including humanities and arts, engineering and applied sciences, biology and medical and agricultural sciences, and social sciences [including business administration]) and establish a bilingual program teaching resource center to introduce international support teams and organize English proficiency tests for universities nationwide, thereby creating a bilingual learning environment to foster professional talents with international communication skills.

1.5. Deepen the international development of universities and recruit talents from world-class universities

(1) Attract lecturers from developing countries to study in Taiwan

Strengthen the two-way flow of talent, encourage universities to recruit lecturers and researchers from Southeast Asian, South Asian, and African countries to pursue master's and doctoral degrees in Taiwan. After graduating from their studies in Taiwan, many of these graduates return to their home country to continue teaching (as lecturers or researchers). They are mostly intellectuals and elites. Continue to encourage more young students to study in Taiwan and convince foreign alumni to stay in Taiwan to assist with Study in Taiwan campaigns and serve as an important bridge between Taiwan and other countries.

(2) Provide internationally competitive benefits and resources to attract top talents to Taiwan

Offer internationally competitive salaries, benefits, and resources to attract top talent to Taiwan. Encourage universities to provide accommodation, relocation assistance, equipment costs, and other supporting measures required to attract talent.

Strategy 2: Implement education that drives the development of visionary talents

2.1. Strengthen measures that support the development of talented scholars with expertise in humanities and social science

(1) Transnational development of talented scholars with expertise in humanities and social sciences

Select outstanding students, who have a passion for academic research in humanities and social science, to study at internationally renowned universities for one academic year, thereby increasing opportunities for them to participate in the international academic community. Select undergraduate students in their second year or above, soon to be graduates or those who graduated in the last three years who have been admitted to a graduate school, and current first-year master's students to participate in exchange programs and study at top universities in Europe and the United

States (such as the University of California, Berkeley, the University of Toronto, Sciences Po, and the University of Tuebingen) for one academic year.

(2) Cultivate scientific research talents in humanities and social sciences

I. Promote the Taiwanese Overseas Pioneers (TOP) Grants: To encourage Taiwanese scholars in humanities and social sciences who are studying or teaching overseas, help them focus on writing their doctoral dissertation or books, improve the quality of their research, and gain a foothold in international academic communities during the early stages of their career, and strengthen and cement Taiwan's status in international academic circles.

II. Address the talent gap in scientific research, specifically the aspect of strengthening training and scholarships for doctoral students. The average proportion across different disciplines from 2021 to 2023 was: Engineering 38.4%, Humanities 22.6%, Natural Sciences 21.6%, and Life Sciences 17.4%, indicating a distinct balance across different disciplines.

III. Increase funding quota to support doctoral research, giving due consideration to the balance between various fields, with funding programs for humanities and social sciences weighted at 150% for calculation. Thereafter, have universities and colleges establish selection processes at their own discretion; then, have the National Science and Technology Council select and reward 400 key area doctoral students as needed for the nation's development and the "Five Trusted Industry Sectors" to foster talents for core strategic industries.

(3) Develop an intra-university support system for humanities and social sciences

Establish a normal intra-university support system for humanities and social sciences. Those recommended by committee members can apply for the Featured Area Research Center Program to enhance humanities and social sciences research capacity.

(4) Expand the cultivation of overseas skilled talents and establish a transnational research talent network

Appoint domestic full-time researchers to lead a group of graduate students from the United States, France, the Netherlands, Germany, South Korea, and Australia to conduct research on the impact of emerging technologies on the development of social science, and integrate research networks for overseas scholars to gain real-time access to key international research results and current technological events, thereby promoting the research and development of current emerging technology issues.

(5) Integrate the resources of academic and research institutions to diversify academic activities

Collaborate with universities to organize lectures, classroom learning, and seminars, and guide students through class discussions to explore the impact of emerging technologies on democratic societies, thereby promoting academic growth and helping students to expand horizons and foster critical thinking and interdisciplinary understanding.

2.2. Promote the cultivation of talents with interdisciplinary foresight and applied skills

(1) Guide universities to promote interdisciplinary learning

I. Guide universities to align student learning with the six key competencies (including IT and humanistic care, interdisciplinary skills, autonomous learning, international mobility, social participation, and problem-solving) and current technological trends (AI, smart manufacturing, Internet of Things, big data, and FinTech) and cultivate students' ability to conduct quantitative analysis, engage in computational thinking, and develop software programs, thereby training them to become problem solvers who are able to effectively make innovative decisions and judgments.

II. Integrate “IT/Programming Talent Cultivation (Internet Economy)/E-commerce/Digital Learning Literacy” into key policy initiatives. Through general IT education or common IT subjects and cross-departmental integration, offer digital interdisciplinary micro-programs to non-ICT students, properly plan course maps, and gradually guide students to develop core competencies that enable them to solve field-specific problems with digital technology.

(2) Promote the interdisciplinary learning of frontier, pioneering, and digital technologies

Develop a frontier tech talent development model that features the following factors: It aligns with the economic and industrial development needs of Taiwan and social/environmental changes; it is focused on “pioneering” or “forward-looking” fields (including precision medicine, chip design, B5G/6G, advanced cybersecurity, AI, sustainable energy, smart manufacturing, information software, humanities and social sciences, and digital education); it links industrial sectors, the government, academia, and research institutes; it involves courses, teacher training programs, practical exercises, and capstone learning approaches, such as teaching by problem-based learning (PBL), internships, and competitions;

it serves the purpose of demonstration, which can be shared and disseminated across other schools for teachers to adopt in their teaching practice and thereby enrich the pool of high-caliber talents that industries will require in the future.

(3) Promote cross-disciplinary (humanities and social science) technologies

Implement technology projects, including higher education literacy-oriented, digital humanities, and industrial innovation linkage programs, to more effectively apply and integrate the core values of humanities and social sciences in the technological age. Develop literacy-oriented digitally empowered practical courses using topic specific, problem oriented, and service design teaching models. Link enterprise resources, organize creativity competitions and case competitions, foster interdisciplinary talents with systems thinking, innovation abilities, and social insights, promote humanistic practices in the smart society, and nurture a future generation of socially responsible and technologically proficient talents.

(4) Plan scholarships and grants for doctoral and master’s students, actively recruit postdoctoral researchers, provide grants and funding to student summer research projects and project-based learning programs, and train students to become professional medical and health researchers

I. Have the National Health Research Institute (NHRI) plan scholarships and grants for doctoral and master's students and collaborate with multiple domestic universities on featured programs, with NHRI researchers as advisors, to train graduate students and achieve the sustainable development of medical and health research talents. Organize summer learning programs as a form of short-term training for university students to foster an interest in research and train them to become future scientists.

II. To cultivate and nurture talents with potential in domestic medical and health fields, implement training programs from a top–down approach and build a firm foundation, through visits to senior high schools or higher education institutions, and organize popular science learning activities for junior high school students. Through the aforementioned talent development methods, motivate seed researchers to engage in medical research in Taiwan, thereby strengthening the country's foundation in medical and health research.

(5) Foster talents in biomedical commercialization, innovation, and entrepreneurship

Integrate overseas and local training resources, promote training institutions that possess domestic biomedical R&D and clinical trial capacity, establish featured talent development models and biomedical innovation fields, and foster domestic talents in biomedical commercialization, innovation, and entrepreneurship.

(6) Actively foster agricultural research talents

Encourage agricultural research talents to study master's and doctoral degrees in Taiwan, and encourage research institutes to engage in cross-disciplinary complementary collaboration to build a university-based pool of agricultural high-tech talents. Launch digital platforms and specialized programs for researchers to continuously improve their professional knowledge and skills, particularly in the research areas of net-zero carbon reduction, smart agriculture, Internet of Things, digital transformation, and AI.

(7) Foster professionals and promote cross-disciplinary collaboration

I. Strengthen quantum science education in universities and research institutes, and establish specialized courses and training programs.

II. Increase quantum research incentives, establish special research projects, and cultivate high-caliber quantum research talents.

III. Foster business cooperation, launch internship programs and research cooperation projects, and improve students' practical skills.

IV. Organize trans-disciplinary conferences and exchange activities to promote expert collaboration in physics, materials, electronics and electrical engineering, mathematics, and information science.

V. Encourage trans-disciplinary research (TDR) projects to explore technological integration and innovation across different disciplines.

VI. Cultivate future professional talents required for quantum information-related fields.

(8) Establish Taiwan AI College Alliance and promote resource sharing across universities

The Ministry of Education established the Taiwan Artificial Intelligence College Alliance (TAICA) in response to the transformative impact of generative AI. By pooling AI educational resources, the TAICA launched intercollegiate AI programs, providing ample learning opportunities for students interested in AI.

Strategy 3: Facilitate international bilateral exchange of visionary talents

3.1. Encourage universities to promote talent exchange

(1) Establish the University Academic Alliance in Taiwan (UAAT) and engage in research collaborations and

talent exchange with the university systems of Europe, the United States, and Japan

I. In line with Taiwan's development focuses, unite the forces of major domestic universities and collaborate with universities in Europe, the United States, and Japan on academic and research projects in specific critical areas to develop advanced technologies needed for a technology-based economy and to foster the talents needed for Taiwan's future economic development, thereby achieving the goals of talent exchange and circulation. Bilateral collaborative projects include large research projects, graduate student exchange programs, off-campus research projects, dual degree programs, industry–academia collaboration programs, short-term courses, academic activities and conferences, and language exchange programs. The scope of collaboration includes semiconductors, AI, sustainability, engineering, social sciences, space technology, agriculture, and biomedicine.

II. Sign Memoranda of Understanding (MOUs) with the University of Illinois System, University of Texas System, Texas A&M University System, Interested Czech Universities (ICU), and Kyushu Okinawa

Open University (KOOU) in Japan. Have the MOE establish interministerial resource integration measures for each MOU, and discuss overall strategic plans and resource allocation with other ministries.

(2) Attract participation in the Taiwan Experience Education Program (TEEP)

Significantly increase opportunities for young promising, outstanding students from India, countries in the New Southbound Policy, and other developed countries to participate in internship programs in Taiwan and in turn learn about the strengths of Taiwan's higher and vocational education, which may convince them to pursue a master's or doctoral degree in Taiwan after completing the internship or choose Taiwan as their work abroad destination. For this purpose, strengthen the teaching and research quality and internationalization of domestic universities to facilitate the fostering of more high-caliber talents from friendly nations such as the New Southbound countries, and include the following areas of focus: "smart technology," "green energy technology," "biomedical industry," "defense industry," "new agriculture," and "circular economy."

3.2. Build a strategic partner talent network for unobstructed access to international research engagements

(1) Strengthen the functionality of the International

Talent Taiwan Office to provide visionary talents with a one-stop hub for making arrangements to live in Taiwan

Assist ministries to design application procedures for recruiting international talents and provide a one-stop service to help them relocate to and live in Taiwan. Provide descriptions of Taiwan's talent recruitment policies and job opportunities during ministry-organized activities, including international exchange events, career expos, and overseas talent recruitment delegations.

(2) Participate in international R&D networks

Explore R&D cooperation models through mutual visits among members of the international R&D network, nurture top tech talent. Jointly establish a R&D talent exchange mechanism; and engage with international alliance members to help Taiwanese industries secure early access to business opportunities in new-generation communication.

(3) Deepen international cooperation with strategic partners

Establish the early stages of research collaboration with international partners, jointly explore industry/technology development blueprints or researcher mobility programs, and cultivate international top tech talent. Collaborate with Japan's New Energy and Industrial Technology Development

Organization and the U.S. University of Illinois, among other major international think tanks, to plan and produce forward-looking technology blueprints and strengthen the pool of strategic planning talent for emerging industries; and promote off-site research between Taiwan and the United Kingdom, focusing on such fields as smart technology and green energy, to further enrich Taiwan's R&D talent pool.

(4) Ramp up international talent recruitment efforts

Assist domestic enterprises in matching with foreign highly-skilled personnel and establishing a systematic talent recruitment mechanism, and organize, as needed, job matching events for overseas Chinese and foreign students, overseas job fair booths, visits to prestigious universities at home and abroad, and collaborations on hosting talent recruitment activities to attract outstanding international talent.

(5) Plan and promote international advanced agricultural technologies

Train international agricultural talent for study abroad or short-term research opportunities, encourage recommended talent to study in friendly countries or intern at international organizations to reinforce their global perspective and involvement in international affairs, accelerate the development of technologies and tools needed for the next generation of Taiwan's agricultural industry, including the application of discriminative and generative AI in labor-saving agricultural technology, speed breeding technology, and early warning and control of pests and diseases, accumulate experiences and exchange practices, expand agricultural networks, and build agricultural R&D capabilities to enhance agricultural resilience and achieve low-carbon sustainability.

Goal 2: Drive Twin Transformation with Innovation and Promote Balanced Development Across Industries

Target 2.1. Promote industrialization of AI and intelligentization of industries

Strategy 1: Combine generative AI and chips to promote innovative transformation across industries

1.1. Strengthen AI-clustered R&D of high-performance chips

(1) Strengthen Taiwan's gen AI clusters, promote chip design data sharing mechanisms, and continuously fine-tune AI models for domestic applications and combine AI systems for development.

(2) Establish startup platforms, reward innovations in the chip and gen AI fields, and build integrated AI service facilities that provide a complete range of startup platform services to boost industrial development.

(3) Develop large AI model hardware accelerators to support chip manufacturers' venture into emerging fields such as smart manufacturing, and unite domestic companies to develop lightweight AI models and hardware software integration solutions, thereby promoting innovative transformation.

(4) Promote pilot testing of early demonstration cases, establish non-sensitive data sharing for specific products as targets for the field testing of gen AI models and technologies, and consolidate industry, academia, and research capacity to reduce entry threshold, help manufacturers reduce costs, and

promote industrial transformation and upgrading.

1.2. Promote locally trusted large language models (LLMs) and applications

(1) Adopt the four AI strategies of developing software infrastructure, increasing the scale of applications, commercializing ecosystems, and realizing internationalization to enhance the AI application capabilities of various industries and bolster industrial competitiveness and international influence; and as outlined in the AI Action Plan 2.0, promote the Artificial Intelligence Evaluation Center and international AI standards, and cultivate battle-ready talent to facilitate digital transformation and international integration.

(2) Collect and strengthen traditional Chinese training data and integrate the strengths of industries, academia, and research institutes to develop Trustworthy AI Dialogue Engine (TAIDE) that features characteristics of Taiwan and traditional Chinese characters. Both TAIDE LX-7B (for commercial use) and TAIDE LX-13B (for academic research) models have been released. In the future, launch newer versions of TAIDE to align with international open source models and incorporate traditional Chinese authorization data.

(3) Improve public sector services by combining locally trusted LLMs with gen AI to reduce labor burden and

improve professional interaction capabilities.

(4) Establish weather forecasting models based on data science and AI, validate and apply these models to industries, and improve their forecasting performance through the creation of multiple high-resolution datasets and collaboration with interdisciplinary talent.

(5) Effectively utilize domestic traditional Chinese AI models (e.g., TAIDE, Breeze, and TAME), combine the data and knowledge of areas specific to Taiwan, create AI models exclusive to Taiwanese industries, and promote AI-empowered upgrading of metal machinery, electronic information, optoelectronics and semiconductors, petrochemicals, steel, and exhibition industries.

1.3. Promote the adoption of AI in SMEs and build an AI ecosystem for the service industry

(1) Pool resources from the industry, government, and academia to guide small and micro-sized businesses to adopt universal AI tools, and establish benchmark cases to drive the AI transformation of SMEs, thereby creating an AI ecosystem for the service industry.

(2) Carry out the following in accordance with national development policies: review supporting financial measures, improve the multi-layered capital market system, support industrial development and economic transformation, and enhance market competitiveness.

1.4. Promote the integration of AI software and hardware facilities in smart machinery

(1) Through various resources including guidance programs, integrate AI technology into machines, machine tools, robotic arms, and precision machinery and connect them to production line management information or peripheral automation systems to effectively increase the value of these facilities and ultimately achieve “autonomous feedback” thereby strengthening the integration of hardware and software capacities.

(2) In a context where AI is industrialized and industries are AI-powered, flexibly integrate the AI software and hardware solutions of smart machinery through modular designs and automated data collection.

(3) Urge domestic manufacturers to collect key process data from supply chains or manufacturing sites, integrate hardware and software, and adopt AI- and robotics-driven smart manufacturing and applications (e.g., precision machinery) to monitor progress, achieve transparent and traceable production processes, ensure reliable quality and safety, and predict market demands.

Strategy 2: Attract international top AI companies to set up R&D center in Taiwan

2.1. Attract international AI companies to establish R&D center in Taiwan

Advanced semiconductor fabrication technology and production capacity are crucial for the production of AI chips at the present stage. Taiwan has built a complete and advanced semiconductor supply chain, making the country the preferred partner to produce semiconductor technologies for leading global AI companies.

Conduct inventory of relevant industry and technology gaps in Taiwan to select and invite top international companies to set up base in Taiwan, thereby fostering collaborations on industrial development.

2.2. Promote a Southern Taiwan Silicon Valley

(1) Integrate the management and operation of the entire Shalun area to plan clusters that specialize in the R&D of net-zero emission technology, cybersecurity, smart grids, compound semiconductors, and AI chips.

(2) Establish AI computing data center, promote smart health industry and AI applications across all sectors of the industry, and create a cluster of key manufacturers specializing in smart transportation and everyday activities.

(3) Through inter-ministerial cooperation, provide an integrated service platform, build a Southern Taiwan Silicon Valley, and promote multi-party collaboration among industry, government, academia, and research institutes.

Strategy 3: Promote smart agriculture and fishery and a self-reliant food supply chain

3.1. Develop smart agricultural and fishery technologies: Develop drones, AI control systems, agricultural robots, and remotely operated underwater vehicle (ROV) to help farmers and fishers carry out sophisticated tasks, thereby addressing labor shortage problems.

3.2. Build a farmers' knowledge database: Build an image database containing the knowledge of experienced farmers and a digital breeding management system, and use AI technology for pest and disease control to improve agricultural management and food security.

3.3. Develop climate-smart agriculture (CSA): Strengthen agricultural meteorological observation networks and forecasting technologies, provide precise management information, establish public–private partnerships, and promote agricultural production and risk management.

Strategy 4: Align with international AI specifications and focus on niche applications in Taiwan

4.1. Improve Taiwan's laws and standards to build an environment that facilitates the development of AI industries

(1) Develop comprehensive AI laws: Draft a Basic Law on Artificial Intelligence to build an environment that is supportive of AI and its applications, and thereby provide guiding principles for government agencies in Taiwan to develop and promote AI applications;

and improve the whole AI legal framework by incorporating the ministries' review of current AI laws, mechanisms, and measures as compiled by the Digital Policy and Legal Coordination Task Force.

(2) AI evaluation, certification, or verification: Refer to the AI standards adopted by international standards organizations and establish an internationally aligned testing framework, which will help industries assess the risks, performance, and robustness of AI product systems throughout the stages of development from R&D to application implementation.

(3) Tax incentives: The investment tax credits set forth in Article 10-1 of the Statute for Industrial Innovation have expired at the end of 2024. To continuously facilitate industries' twin transformation (digital and low-carbon), the Ministry of Economic Affairs has proposed an amendment, which will extend the tax credits to the end of 2029, include AI and Energy Conservation/Carbon Reduction in the scope of the tax credits, and raise the maximum eligible expenditure to NT$2 billion,

(4) Strengthen international cooperation: Encourage collaborations with global leading companies and research institutes, introduce advanced technologies and management experiences, and enhance Taiwan's AI technology.

4.2. Promote AI applications in the construction industry

(1) Consolidate R&D and innovation focuses

I. Invite members from industry, government, academia, and research communities to hold interdisciplinary research advisory meetings.

II. Organize interdisciplinary technology exchange meetings.

III. Seize opportunities in niche markets and areas in which Taiwan has an advantage such as advanced semiconductor manufacturing, adopt "Trustworthy AI" among other international AI concepts and technologies, develop and promote inclusive AI building applications that will meet citizen needs within 5–10 years, continuously revise smart building evaluation standards, continue to encourage applications for smart building certifications for all types of buildings, use Taiwan's unique domestic smart building market as a testing ground for AI industry innovation, and support industrial export development.

(2) Foster talent to support AI integration in the construction industry

I. Organize innovation competitions to discover interdisciplinary talent.

II. Compile application guidelines for professionals and organize courses and workshops.

(3) Promote exhibitions

I. Provide a venue to physically showcase the innovative application of AI in the construction industry.

II. Organize activities to promote AI technology.

4.3. Adopt AI tools and promote their use in manufacturing

(1) Organize AI training courses, develop open source teaching materials and train seed instructors for these courses, and enhance AI awareness and application across industries, thereby assisting industries to become AI-empowered.

(2) To assist the manufacturing industry in adopting AI, have expert advisory panels help enterprises adopt AI guidelines and match them to AI tools, and make AI applications widespread in the manufacturing sector.

4.4. Raise AI compliance awareness

(1) Keep abreast of international regulatory trends, promote exchange across the ICT and construction industries, and guide them to develop publicly and internationally trusted AI products and services that will yield economic and social benefits, such as safety and security, health care, convenience and comfort, and energy conservation and carbon reduction.

(2) Continuously revise smart building evaluation standards as needed to keep pace with Taiwan's progress in AI legislation and the international

development of AI testing systems, dynamically adjust AI application strategies to align with international standards, and promote the harmonization of smart building regulations to maintain international competitiveness

(3) Encourage the promotion of AI standards and strengthen the compliance awareness of industry operators.

Target 2.2. Promote balanced development across industries

Strategy 1: Encourage Taiwanese industries to be a part of the global supply chain

1.1. Seize hold of technologies and talent that are critical to industries and promote the development of forward-looking industries

(1) Assist academic communities to establish a robust research and testing environment that facilitates the R&D of critical technologies, including innovative structures, novel materials, and next-generation semiconductor fabrication processes, and organize relevant courses and training to foster tech talent, reduce the theory–practice gap, and forge strong industry–academia ties.

(2) Accelerate the commercialization and application of technologies and R&D results, including strengthening technology transfer to private companies and enhancing domestic critical technology R&D capacity; and provide research

teams with diverse guidance on patent planning, regulatory assessments, and industry matchmaking.

(3) Assist with the development of critical technologies or consignment of R&D and manufacturing services in the areas of design, components and materials, equipment, system modules, processes, drugs, medical devices, and net-zero emission technology, and subsidize investments in these areas to link domestic and foreign fields, accelerate product commercialization and application, and capture overseas business opportunities.

(4) Provide guidance on compliance with the regulations of international manufacturers and supply chains, such as guidance on adopting cybersecurity standards, improving domestic industry technology certification regulations or environment, and increasing data application awareness.

(5) Nurture key or high-caliber talent required for the development of forward-looking industries, such as professionals with skills in technological R&D, brand marketing, and international standards, and establish transnational cooperation mechanisms.

1.2. Forge ties with international industries and vie for opportunities to collaborate with overseas entities

(1) Integrate the capacity of domestic industries, encourage the business sector to cooperate with others sectors, including industry, academia, research

institutes, and domestic medical associations and organizations; and develop innovative gen AI-based business models.

(2) Promote systematic or ecosystem-wide marketing and exports by organizing business opportunities and exhibitions or providing relevant information and facilitating cooperation with major international manufacturers; expand the scale of domestic industries to increase their international visibility; and accelerate product commercialization.

(3) Strengthen the international networks of domestic companies and form strategic partnerships by, for example, setting up industry development offices (e.g., for drones), service platforms, and business delegations.

Strategy 2: Promote commercial innovation applications

2.1. Adopt digital innovation technology and promote the application of commercial innovation services

(1) Implement subscription-based cloud service tools for small and digitally illiterate businesses to improve their ability to run digital operations.

(2) Provide themed innovation and R&D funding programs to support the innovation and R&D initiatives of commercial service providers, expand market scale and expedite pilot operations, and enhance their service innovation capability and international competitiveness.

(3) Assist medium- and large-sized commercial service providers to "lead by example" and adopt cloud services to drive digital transformation and innovation in the business sector, optimize business composition, and expand into international markets.

2.2. Drive technological applications and business innovation and expand international industrial cooperation and innovation services

(1) Develop data collection services, adopt blockchain technology, implement applications in domestic industrial clusters, and expand international innovation and industrial cooperation in blockchain technology.

(2) Maintain digital innovation bases and industrial technology support centers, establish field demonstrations for virtual reality technology, provide R&D resources, and encourage business operators to invest in commercial innovation and entrepreneurial applications.

(3) Plan and integrate emerging e-commerce technology solutions, adopt and verify these solutions to facilitate industrial innovation, build a cross-border e-commerce ecosystem, guide businesses to develop innovative sales models, and expand international market opportunities.

2.3. Promote digital transformation and innovative applications in the construction industry

(1) Provide themed innovation and R&D funding programs to support the innovation and R&D initiatives of construction industries.

(2) Whole-building-lifecycle digital technology R&D, verification, and integrated application: Assist the construction industry to adopt building information modeling (BIM) tools, integrate AI and IoT, and apply them in design, construction, and maintenance management to promote the industry's digital transformation.

(3) Promote digital, automated construction: Introduce automated construction equipment and AI analysis technology to reduce labor requirements, monitor construction status in real time, optimize production decisions in construction projects, and ensure construction quality.

(4) Develop digital twin and smart maintenance management technologies: Monitor building conditions in real time, optimize building operation performance, and in the future, integrate geospatial information to serve as the foundation of a smart city.

Strategy 3: Develop financial technology (FinTech) for service diversification

3.1. Relax limitations on the scope of business trials and access to patent licensing, and expand the momentum of FinTech innovation

(1) Expand the scope of banking, insurance, and

securities business trials, and allow financial institutions to license their patents and technologies to others, thereby strengthening FinTech innovation efforts.

(2) Adjust the innovation experiment implementation mechanism and align it with product and service review procedures.

(3) Encourage business operators to jointly invest in FinTech R&D to promote collective FinTech innovation.

3.2. Permit the operation of virtual asset businesses, explore FinTech development opportunities, and support finance transformation

(1) Promote the monetization of real-world assets; and allow the financial industry to provide virtual asset custody.

(2) Formulate laws to regulate virtual asset service providers (VASPs) and promote the standardization of VASPs.

3.3. Strengthen digital trust through fundings and guidance resources

(1) Promote the integration of AI into industries and the industrialization of AI by, for example, verifying applications for key customers and planning operational models/business models, encourage international export, and acquire international orders.

(2) Support cybersecurity startups, provide fundraising

guidance, and subsidize cybersecurity technology R&D and field demonstrations.

Strategy 4: Promote the balanced development and internationalization of science and industrial parks

4.1. Accelerate the revitalization and transformation of existing parks and integrate park resources

(1) Adopt “demonstration of renewal” in stages to promote the development plans for five industrial parks and three technology industrial parks, and accelerate the renewal and revitalization of these parks.

(2) Improve park facilities and environment by, for example, integrating such resources as industrial technology, agricultural recycling, and industrial services or planning waste treatment facilities, assessing the feasibility of resource recycling facilities and planning implementation actions, and incorporating environmental impact assessment principles.

4.2. Expand industrial parks and increase industry diversity to achieve balanced development across regions

(1) Continue to establish and expand science parks to meet the needs of emerging industries such as semiconductors, smart healthcare, smart agriculture, and space technology, promote trans-disciplinary innovation, and bridge the urban–rural technology gap.

(2) Combine local industry characteristics, diversify industrial development, introduce emerging industries including biotechnology, green energy, smart manufacturing, space technology, and AI, and create more jobs locally.

4.3. Connect science parks to the capacity of industry, academia, and research institutes, and strengthen technological innovation

(1) Through industry–academia collaboration programs, assist manufacturers to invest in the R&D of emerging technologies and collaborate with local industries and academia to enhance the overall risk resilience of the industry.

(2) Strengthen the innovation partnerships that science parks have with neighboring industries, academia, and research institutes, promote the upgrading of strategic industry clusters in existing parks, and leverage software parks' emerging technologies to drive the digital transformation of traditional parks.

(3) Promote an industry–academia collaboration network, match companies and academic research institutions to industrial clusters, and encourage industries to enhance core technologies and to continuously engage in value-added upgrading, thereby strengthening the operational competitiveness of park resident companies.

4.4. Establish an overseas distribution channel for science parks and connect it to international markets

(1) Share park management experiences, facilitate international exchange and cooperation, consider the needs of Taiwanese industries, and have ministries cooperate on the basis of reciprocity to evaluate and assist friendly countries in developing science parks to help Taiwanese companies expand their manufacturing bases and venture into overseas markets.

(2) Encourage park resident companies to partake in international trade shows, establish international market channels, create a distinctive industrial cluster and high-quality product images, and guide Taiwan's agriculture industry to venture into the marketing world.

Target 2.3. Create a trusted supply chain

Strategy 1: Use innovative technology to make the economy more resilient and supply chains more secure

1.1. Encourage technological R&D among semiconductor, 5G, and optoelectronic industries

(1) Encourage technological R&D in advanced processes

I. Encourage domestic companies to engage in innovation and R&D, purchase advanced equipment, and promote the commercial development of domestically made 5G open networks, and fund collaborations between IC design and system developers to expand high-value application markets.

II. Tap into the resources of the semiconductor research institutes of six top universities to foster semiconductor and chip cybersecurity talent.

III. Promote the Specification for Cybersecurity of Fab Equipment (SEMI E187) and strengthen the cybersecurity of semiconductor supply chains.

(2) Develop domestically made 5G technologies and industrial ecosystems and boost the development of the optoelectronic industry

I. Accelerate the development of autonomous technologies for domestically manufactured 5G end-to-end base station open network systems, and strengthen cooperation with Telecom Infra Project (TIP) to deepen international interoperability testing.

II. Prompt cross-industry collaborations to develop the ability to integrate the vertical applications of commercial 5G open networks.

III. Guide business investments in smart display integration solutions and accelerate the development of micro light emitting diode (LED).

1.2. Establish domestic self-sufficiency in drones and vehicles to ensure secure supply chains for both civilian and defense industries

(1) Promote self-reliance in the designing, development, and production of components that are critical to drones and EVs.

(2) Build a self-reliant supply chain system for electric buses, and improve the supply chain management model of the domestic automotive industry.

1.3. Promote the application of smart technology to achieve agricultural sustainability and enhance food security

(1) Promote the application of smart technology in food security and management to ensure a secure food supply chain.

(2) Promote smart agricultural practices and the use of sustainable environmental protection technologies, facilitate the digital transformation of production and marketing supply chains, and address labor shortage and aging workforce problems to develop a smart, secure, and sustainable agricultural supply chain.

1.4. Maintain and operate mechanisms and platforms for engaging in two-way dialogue with countries in the New Southbound policy, and strengthen the clustering of backup bases for overseas-based Taiwanese businesses

(1) Maintain and operate platforms for communication with New Southbound countries, and assist in addressing the foreign investment needs of overseas-based Taiwanese businesses and in addressing issues of common interest.

(2) Assist supply chains to form industrial clusters, and maintain overseas-based Taiwanese businesses' key position in the global supply chain.

1.5. Adopt zero trust cybersecurity solutions and carry out cybersecurity maturity assessments to strengthen the cybersecurity of industrial supply chains

(1) Guide field operators to collaborate with cybersecurity companies, and encourage suppliers to adopt zero trust solutions, with large companies leading by example.

(2) Launch a Special Interest Group (SIG), give counsel to SIG members on cybersecurity maturity assessments, and recommend improvements to cybersecurity measures.

Strategy 2: Strengthen the security of critical energy resource supply

2.1. Strengthen the regional allocation of water resources and the resilience of water supply, and enhance the safety of critical water infrastructure

(1) Strengthen the regional allocation of water resources and the resilience of water supply, and enhance water production technologies.

(2) Increase the safety of hydraulic water storage, conveyance, flood control, and drainage structures, and establish backup insurance mechanisms to ensure that facilities can continue to operate.

(3) Promote the development of diverse water resources, conduct an inventory of potential subsurface water in Taiwan, and increase the resilience of urban water supplies.

2.2. Promote energy transition and strengthen the resilience of electrical grids and gas supply

(1) Strengthen the resilience of science parks' entire power supply, develop alternative renewable energy sources, and promote smart energy conservation measures.

(2) Supply gas to park-based critical industries via underground pipelines, and implement a gas backup mechanism to maintain stable gas supply.

2.3. Achieve net-zero emissions and stable power supply, develop alternative renewable energy sources, and ensure the security of energy supply

(1) Actively develop base-load renewable energy sources, expand plans for forward-looking energy sources such as geothermal, hydrogen, biomass, and ocean energy, and adopt robust and flexible allocation strategies to enhance the resilience of power systems.

(2) Diversify energy import sources to ensure safety stock level, and improve the overall stability and resilience of power systems.

Target 2.4. Accelerate the twin transformation of SMEs

Strategy 1: Promote the digital transformation of SMEs

1.1. Provide differentiated guidance and support for SMEs

(1) Collaborate with industrial associations, corporations, and business district organizations to provide suitable guidance and assist small and micro-sized businesses to quickly master the use of subscription-based cloud digital tools.

(2) Provide supportive activities based on the current development status and needs of small- and medium-sized manufacturers to increase the awareness of and spread knowledge of industrial transformation.

(3) Promote cloud adoption and use of AI applications among small and medium-sized manufacturers to improve their production and operational efficiency, and introduce low-threshold cloud solutions and AI applications to accelerate the digital transformation of the manufacturing sector.

(4) Introduce guidance measures to assist manufacturers in adopting new technologies such as AI and big data, and help shape the paradigm of digital optimization and digital transformation.

1.2. Promote innovation, R&D, and transformation

(1) Encourage both business and service sectors to invest in innovation and R&D, and guide them to propose ideas for digital and sustainable development, which will help them increase their sales channels, create greater service value, and increase output value and competitiveness.

(2) Provide accessible and user-friendly government data

to promote the use and development of digital services across industries, and guide domestic companies to research and develop digital equipment that will make them more competitive.

(3) Promote industrial innovation and transformation, improve digital service quality and compliance, and export ecosystems to overseas markets.

(4) Inform information service providers of the digital transformation needs and pain points of various industries, and incentivize the R&D of smart digital cloud-based solutions, which will prompt SME clients to adopt cloud applications and subscription models, thereby lowering the threshold for digital transformation.

1.3. Promote smart transformation and verification

(1) Assist commercial service providers to “lead by example” and build an ecosystem in which AI is used to drive digital transformation and innovation across the business sector, thereby optimizing business structures and industrial competitiveness.

(2) Provide funding resources to encourage the use of cloud and digital technologies to accelerate the transformation of small and medium-sized manufacturers, and develop innovative business models for breaking into foreign markets.

(3) Promote the overseas implementation of smart solutions and facilitate the digital transformation and

upgrading of SMEs.

1.4. Foster digital talent through public–private partnerships

(1) Consolidate open source teaching materials and integrate local networks for collaborative training.

(2) Build a high-quality digital learning platform environment, provide diverse array of online courses, and reduce corporate education and training costs.

Strategy 2: Improve SMEs' ability to carry out climate actions

2.1. Assist with promotional campaigns and empowerment

Guide SMEs to launch decarbonization initiatives by helping them ramp up climate efforts, including GHG inventory, net-zero transition planning, and climate competency development.

(1) Promote and strengthen net zero awareness

Use online and offline channels to organize information campaigns to inform SMEs of relevant issues, including current net zero sustainability policies implemented at home and abroad, industry development trends, and current laws governing GHG emission inventory, carbon offsetting, and trading and transfer of carbon credits, and to increase their net zero and carbon reduction awareness.

(2) Foster business carbon management talent

Invite professional instructors from professional associations, industry associations, and higher education institutions to organize training programs and workshops for SMEs in different regions and industrial parks under the MOEA's jurisdiction – this will help employees of SMEs to improve their smart and low-carbon skills and become an ISO 14064-1 certified internal auditor.

(3) Compile guidelines and promote paradigm

Compile guidelines, including GHG inventory manual for SMEs, decarbonization guidelines for SMEs in the manufacturing and service sector, network sustainability design guidelines, GHG inventory guidelines, and sample inventory reports, and provide these materials as reference to help SME employees develop inventory capabilities. Meanwhile, organize company visits, promote case studies, facilitate industry exchange and learning, and foster an organizational climate that supports decarbonization initiatives.

(4) Develop the Public Code Platform to promote net zero initiatives, and encourage industries to use it for value creation

Encourage agencies and companies to engage in customized innovation and development based on existing codes on the Public Code Platform, or make developed codes accessible to the public to reduce the carbon footprint of redundant software development, promote autonomy in national digital technology, boost the economic development of the software industry, and lower the technical threshold for SMEs to independently conduct carbon inventory.

2.2. Provide consultation and diagnosis

Provide consulting and diagnosis services for SMEs, alleviate their climate anxiety, and develop ESG implementation pathways.

(1) Provide energy diagnosis

Collaborate with legal entities, universities, and technical service providers to organize a panel of energy conservation and carbon reduction experts, and send those experts to SMEs and have them use energy conservation and carbon reduction scales to provide an energy diagnosis (of public facilities including electricity consumption, air conditioning systems, and air compressor systems, and of product manufacturing equipment, etc.), which helps SMEs identify their potential for energy conservation and suggests specific improvement actions to alleviate their climate anxiety. Meanwhile, help connect companies to government resources and financial institutions to drive net-zero transformation in the business sector.

(2) Optimize ESG self-assessment and financial management systems

Design SME ESG questionnaires to help SMEs assess the status of their current ESG implementation and produce self-assessment reports; provide consult on developing ESG implementation pathways and improving financial management systems; and help SMEs apply for green loans, which will reduce the financial threshold for SME transformation.

2.3. Strengthen decarbonization consulting

Enhance decarbonization benefits for SMEs, unite companies and manufacturers to jointly promote low-carbon manufacturing or business models, and create low-carbon demonstration cases for promotion and dissemination.

(1) Provide system-based guidance on decarbonization

For carbon-aware SMEs or those subject to trade regulations and to the carbon requirements of brand supply chains, provide support for GHG/product carbon footprint inventory, decarbonization strategy planning/benefit assessments, circular economy, subscription-based digital solution adoption, and low-carbon business model development; and with the assistance of experts, connect SMEs to horizontal or vertical partners, franchise stores, and business districts to promote system-based guidance on decarbonization.

(2) Develop a low-carbon demonstration park

Promote the low-carbon transformation of industry clusters in industrial parks under the MOEA’s jurisdiction, including prioritizing guidance for heavy electricity users, and unite upstream and downstream park-based companies to collectively promote low-carbon manufacturing and develop a low-carbon demonstration park that showcases successful transformation efforts to encourage SMEs to follow suit.

2.4. Support sustainable innovations

Help SMEs cross technical thresholds and venture into green sustainable markets, and support startup verification of innovative technology solutions.

(1) Organize green technology competitions

Adopt the corporate-startup engagement (CSE) strategy of engaging with startups to seek solutions that address large companies' green transformation needs and bottlenecks, encourage collaborations between startups and medium-to-large companies on co-creation and field verification, develop green innovative solutions, and support startups to foster business opportunities in the green sustainable market.

(2) Optimize carbon emission calculators and digital decarbonization tools

Continuously optimize digital tools for calculating public-sector GHG emissions, help SMEs overcome technical thresholds, calculate corporate carbon footprint (CCF) and obtain product carbon footprint (PCF) coefficients, and calculate Scope 3 emissions; meanwhile, collate digital decarbonization tools, and guide SMEs to implement carbon footprint improvement measures, starting with designing decarbonization strategies around emission hotspots, then replacing equipment, upgrading processes, and achieving circular economy (including improving relevant specifications according to industrial development trends and needs).

(3) Organize twin transformation hackathons to promote green startups

Enhance corporate decarbonization capacity by supporting the Presidential Hackathon International Track, which encourages people from different fields, regardless of age and nationality, to use open data, technology, and innovative thinking and inspires public–private collaborations on the creation of innovative solutions to address social concerns; and facilitate the development of domestic and foreign talent to accelerate product commercialization.

2.5. Provide financial support

Introduce project funding and credit guarantee mechanisms to achieve the goals of increasing corporate energy performance and reducing carbon emissions.

(1) Provide fundings to support low-carbon transition and smart transformation

Introduce funding programs for SMEs to purchase energy-efficient or low-carbon process technologies and digital carbon management solutions that will help them improve their corporate carbon footprint. In the meantime, organize proposal writing courses to help companies secure government fundings.

(2) Use credit guarantee funds to help SMEs obtain funds and financing for their business

Introduce credit guarantee funds and special national development guarantee measures to help SMEs apply for loans, and provide interest allowances, special interest rates, and support for coordination and communication with government-owned banks to encourage SMEs to purchase energy-efficient equipment, adopt digital and smart tools, improve production efficiency, reduce carbon emissions, and transition toward net-zero emissions.

Target 2.5. Invest in future generation of industry talent

Strategy 1: Reinforce the Five Trusted Industry Sectors and strengthen the development of advanced tech talent

1.1. Integrate the capacity of industry, government, academia, and research institutes to build a talent pipeline comprising skilled professionals capable of developing and solving real-world problems of satellite and next-gen communication technologies

(1) Launch a "practice-based training" model to change the way companies hire people and reduce talent recruitment costs.

(2) Encourage industries, the government, and academia to collaborate on talent development initiatives to accelerate the building of talent pipelines for industries.

1.2. Pool international resources to increase the talent/R&D/design capacities of the satellite and next-gen communication industry

(1) Improve the R&D knowledge and skills of existing employees and strengthen their technical expertise and service application perspectives.

(2) Participate in international competitions to foster and strengthen talent innovation capacity.

1.3. Bolster the teaching capacity of higher education institutions to cultivate industry-required talent.

1.4. Strengthen satellite system engineering and R&D capacity and foster critical next-gen communication talent

(1) Adopt innovative teaching assistant systems and nurture low-Earth-orbit satellite R&D talent.

(2) Set up space training courses and provide practice-based training platforms to foster space communication experts.

1.5. Leverage the teaching and technical capacities of industries, academia, and research institutes at home and abroad to continuously promote semiconductor talent training

(1) Promote research/industry-based job shadowing programs for undergraduate and master's/doctoral students.

(2) Design innovation/technology-themed programs for graduates, employed workers, and those transitioning to new careers.

(3) Use different models, such as field practices, consulting, and corporate training, to customize training programs for existing workers to develop the skills they need for work.

(4) Use industry–academia–research collaboration to increase semiconductor-related software/hardware capacity, and strengthen training facilities and environment for top semiconductor talent.

(5) Leverage Taiwan's groundwork and strengths in advanced semiconductor manufacturing, and support overseas bases to develop international talent and advanced process IC design talent.

(6) Establish domestic power/compound semiconductor technology talent training bases, and encourage more STEM students to engage in next-gen semiconductor research.

(7) Promote the fostering of expertise in forward-looking semiconductor technologies, assist with the R&D of critical technologies, and promote industry–academia cooperation.

1.6. Have public and private sectors cooperate to foster industrial AI application skills and accelerate industry-wide adoption of AI

(1) Pool talent development resources from all sectors of society including industries, academia, and research institutions, to organize stage-based training activities and certification programs to bridge the AI talent gap in the business sector and strengthen industrial competitiveness.

(2) Integrate local networks to organize different courses and promote AI talent development among micro-, small and medium-sized enterprises (MSMEs).

(3) Collaborate with associations and corporate entities to set up training courses and cultivate AI talent for the commercial service sector.

(4) Provide fundings to academic research institutions to develop innovative breakthroughs in AI technology, integrate with international research capacity, and develop top research talent.

(5) Provide scholarships and grants for top-performing and outstanding overseas Chinese students in AI-related disciplines to strengthen the AI talent pipeline.

1.7. Deepen the training capacity of industries, academia, and research institutions to build a diverse talent ecosystem

(1) Encourage trans-disciplinary collaborations in academic communities, develop innovative industries other than contract manufacturing, and promote the diversified development of R&D talent.

(2) Promote collaborations among industries, academia, research institutes, private sectors, and public sectors

to jointly build a key area talent network and strengthen the technological competitiveness and practical skills of industry talent.

(3) Pool resources from industries, academia, and research communities to promote “practice-based training” and business plan-and-pitch competitions to foster AI, cybersecurity, and digital innovation skills.

(4) Guide industries and academia to jointly cultivate key area talent and develop industry-required S&T talent.

(5) Increase the number and improve the quality of students in AI and semiconductor-related departments.

1.8. Expand the scope of international exchange and cooperation in critical areas and enhance the internationalization of talents and industries.

(1) Provide support to different generations of scientific research talent according to the stage of their career, and continue to implement international exchange fundings programs.

(2) Fund domestic outstanding teams to conduct research abroad in world-class public or private research institutions, focusing particularly on critical technologies or humanities and social issues, and in turn unlock opportunities for principal investigators based in Taiwan to collaborate with laboratories in other countries.

(3) Engage in international cooperation, set up overseas bases, and organize international competitions in order to attract overseas talent and startups, which will enable Taiwan to strengthen the internationalization of its domestic talents and industries.

1.9. Assist academic and research institutions to strengthen case sourcing and early incubation mechanisms for germination programs

(1) Facilitate the industrial application of basic research findings by leveraging the R&D capacity of academic and research institutions, mentorship programs, and industry guidance.

(2) Make R&D results more feasible for commercialization and generate tangible benefits for industries.

Strategy 2: Invest in vocational education and foster technology talent (including green collar talent)

2.1. Strengthen the collaborative efforts of industries, the government, academia, and research institutes to establish a talent development system, and promote talent matching with industry needs, exchange, and cooperation

(1) Adjust departmental curricula and enrollment quota based on industry talent demand to ensure balanced talent development across industries in Taiwan.

(2) Enhance teaching equipment, environment, and

facilities to improve the professional techniques and interdisciplinary skills of faculty members and students in regional universities.

(3) Integrate cross-ministerial resources and talent development programs, strengthen channels of communication between industry, government, and academia, and enhance the effectiveness of industry–academia collaboration.

(4) Establish training courses tailored to the hiring needs of key industries and improve the knowledge and skills of tech talent.

(5) Stimulate industry–academia participation in international exchange and academia–research collaboration on technological R&D, and promote scientific research and applications in the meteorological industry.

(6) Strengthen training collaborations with industry, academia, and research institutes to more effectively incubate net zero talent.

2.2. Reinforce talent development plans, implementation actions, and reward mechanisms to facilitate talent development

(1) Establish industry–academia collaboration programs to foster industry-needed talents.

(2) Offer rewards or government-funded classes to incentivize careers in agriculture, foster top agricultural talent, and encourage youth involvement

in agriculture.

(3) Draft regulations to stipulate the professional and training requirements for emerging talents, and promote the planning, promotion, and implementation of net-zero workforce development programs.

Strategy 3: Enhance the training and development of elite athletes and sports professionals

3.1. Adopt a four-tier athlete training system and foster elite athletes for Taiwan

(1) Tier-1 athletes play in national sports teams; they undergo high-intensity training with national coaches, are the backbone of national sports teams, and are prepared to play in major international sports competitions for the honor of their nation.

(2) Tier-2 athletes are reserve players who undergo Tier-2 training if they proceed to pursue higher education at a university, serve in the military, or become a professional athlete; they are trained by professional coaches to develop the physical strengths and skills needed to become a future candidate for national sports teams.

(3) Tier-3 athletes are promising players recommended by a coach for entry into junior high school; after entering the Tier-3 training stage, they are trained comprehensively on a specific sports category by non-professional coaches. Depending on their ability

and characteristics, they are nurtured into outstanding youth athletes in a specific sport category.

(4) Tier-4 players play in grassroot sports; they are identified and recruited at elementary or junior high school stages, and trained to develop various sports abilities and build baseline fitness.

3.2. Cultivate sports-related professionals including referees and anti-doping seed educators

(1) Promote the “Rules for Specified Sports Association to Establish Sports Referee Qualification Test” as the basis for guiding specific sports associations to organize professional education programs.

(2) Organize anti-doping seed training programs to foster anti-doping educators.

Goal 3: Use Smart Inclusive Technologies and Create a Diverse, Inclusive, and Equitable Society

Target 3.1. Create benefits for diverse group of people

Strategy 1: Promote Long-term Care 3.0, increase accessibility to care technology, and alleviate caregiving burden

1.1. Promote smart care and the development of smart fields

(1) With a vision of achieving autonomy, self-sufficiency, inclusion, and sustainability through public–private and trans-disciplinary collaborations, strive to achieve the policy goals of improving the health and autonomy of elderly people, enhancing the social integration of elderly people, promoting generational harmony, building a safe age-friendly environment, and strengthening the sustainable development of the society.

(2) Use AI technology to provide senior care consultation services and connect it to health departments, local medical institutions, and care institutions to offer advice, telemedicine services, and care consultations tailored to the needs of elderly people, develop a personal health management mechanism, and use technology to support the safety and health of elderly people and provide accessible health care services.

(3) Introduce incentive programs to encourage the use of assistive technology to optimize care quality and reduce caregiving burden. Make plans to integrate technology companies and have them provide smart

device application systems and 24-hour monitoring mechanisms, which can be used to track the location and movement of people with dementia, monitor physiological conditions, and provide emergency assistance to alleviate the stress on family caregivers.

(4) Digitally empower caregivers and elderly people to, on the one hand, improve caregiving skills and reduce caregiving burden, thereby enhancing caregiving capacity and quality, and on the other hand, promote the digital integration and adoption of learning contents and field-based resources for elderly people, create age-friendly learning and social interaction resource platforms, develop a digital ecosystem that supports the lifelong learning and social interactions of elderly people, and stimulate the digital industry and its value through joint implementation and verification efforts.

(5) Establish standard data formats for care technology encyclopedia and solutions, and conduct technology index assessments to determine the current status of care institutions, analyze transformation indicators, and integrate solutions; provide field demonstrations of adopting tiered technologies in care institutions, verify the feasibility of innovative operating models, promote different integrated care service models, and use AI technology to carry out caretaking tasks more efficiently and in conjunction with big data analytics

to provide personalize senior care plans for nurses and achieve smart fields and product popularization.

1.2. Promote green care in farming communities, and develop food and agriculture education and horticultural therapy courses to achieve healthy aging in place

(1) Build learning and social spheres for elderly people in rural farming communities, and conduct data analysis on organizational operations, service models, personnel training, field planning, and resource allocation to optimize the operation and management strategies of care stations. Meanwhile, design courses to improve elderly people's quality of life, such as courses about nutrition and health, cooking and food storage, sensory stimulation, and healthy aging, draft on-the-job training course outlines for food and agriculture educators, and develop horticultural therapy course modules to integrate agriculture into elderly care services for farming communities.

(2) Develop horticultural therapy technology to promote healthy aging in place in farming and fishery communities, combine agricultural resources with applied technology, develop green therapy field installation technology, formulate effective therapy courses, develop health-promoting devices and tools, and work with hospitals to develop physical and mental health assessment technology, then apply it to healthy people, people with sub-optimal health status,

and people with mental disorder to improve cognition, depression, prosocial behavior, thereby achieving holistic health of the body, mind, and society; and facilitate the development of a new industry combining agriculture and geriatric services, and help to improve local aging support networks.

1.3. Attach importance to user needs and feedback, promote interdisciplinary alliances across the industry chain, and establish field-linked business models

(1) Encourage business operators to collect user feedback before launching a product, and use the feedback to continuously improve the product and ease of use to increase market acceptance and customer stickiness; have teams of experts provide guidance to determine product/service positions based on value proposition and empirical evidence and identify target customers.

(2) Provide guidance, funding, and other resources to cement industries' foundation, encourage multi-enterprise alliances to collaborate, invest in, or transform and develop inclusive Gerontechnology (or AgeTech) service solutions. Introduce verification, promotional, and incentive measures to encourage entrepreneurial AgeTech ventures. Meanwhile, help connect startups to large corporate groups to obtain strategic investment or product orders, promote cooperation with large companies, and facilitate the dissemination of R&D results in the AgeTech industry.

(3) Combine field and service verification after the market launch of products or services and make improvements based on user experience, identify the most suitable application scenarios, determine the needs and preferences of target customers and the status of competition in existing markets in order to ascertain the characteristics of target users, which will provide a basis for formulating product development and promotion strategies to commercialize, successfully apply, and implement products and services, thereby creating an effective profit-making model.

1.4. Offer fundings as a tool to facilitate innovation and development in the business sector

(1) The Conventional Industry Technology Development (CITD) Program offers grants for the development of new, marketable products that are superior to those of domestic peers. It aims to enhance industries' R&D and innovation capacity and increase product value. Application is open to healthcare product manufacturers or technical service providers who have a need to research and develop new products.

(2) The Taiwan Industry Innovation Platform (TIIP) Program offers fundings to encourage such initiatives as the integration of information and communication technology and the development of optimal care products or services to improve care efficiency,

product market acceptance, and product popularity. It supports the development of medical products related to long-term care and in-home care.

(3) The Small Business Innovation Research Program, organized by the Small and Medium Enterprise and Startup Administration of Taiwan, offers R&D grants and subsidies and awards bonus points to those invested in assistive devices, products or services for people with disabilities.

Strategy 2: Promote in-home care and expand public health care services

2.1. Provide different home care service models to meet the medical needs of elderly people with disabilities

Provide different in-home care services—including those that cater to basic care needs and to high-level care needs for severe cases, palliative care at home, and in-home emergency care—according to the medical needs of elderly people with disabilities, and use technologies such as telemedicine to enable access to effective health care at home, thereby achieving the goal of aging in place.

2.2. Provide fundings as a tool to facilitate innovation and development in the business sector

The Taiwan Industry Innovation Platform (TIIP) Program offers fundings to encourage such initiatives as the integration of information and communication technology and development of optimal care products or services to improve care efficiency, product market acceptance, and product popularity. It supports the development of medical products related to long-term care and in-home care.

Strategy 3: Adopt smart technology to facilitate disease prevention and health promotion for all ages

3.1. Promote the National Physical Fitness Technology Program

Continue to set up national technology-based fitness testing stations and design national fitness instructor training programs, set up field trials of a tech-based fitness center, establish fitness norms, and review and revise national fitness-related laws and regulations to account for new types of fitness testing.

3.2. Promote and launch Sports for All across all sectors of society and industry

(1) Promote the sports technology industry

I. Use technology to develop sports for all and promote the sports technology (Sportstech) industry

a. Combine innovative technologies such as AI, IoT, and AR/VR, infuse them into smart cyber-physical systems (CPS) and device-empowered technological applications, and integrate with indoor/outdoor sports field service providers to elevate the sports experience for sports enthusiasts and effectively improve sports training and performance, which help promote greater public participation in sports, thereby expanding the scale and development of the sports industry.

b. Leverage the existing strengths of Taiwan's sports equipment manufacturing and ICT industries, integrate and develop Sportstech products and high-value solutions across industries, realize industrial transformation, upgrading, and value-added applications in areas of virtual and real sports interaction, sports training, and sports-based health promotion, and spearhead the sportification of Taiwan's key industries.

c. Integrate sports knowledge into Artificial Intelligence of Things (AIoT) and virtual-real integration technologies, support the development of startups and emerging services, shift Taiwan's Sportstech industry from "hardware manufacturing' to the blue ocean market of "service innovation," and create a Sportstech industry ecosystem.

II. Accelerate digital transformation in the sports field and drive industrial transformation and development

a. Promote smart sports field applications to strengthen infrastructure, accelerate online and offline interactions between big data databases and AIoT, accelerate emerging service development, apply technologies to sports fields, sports venues, outdoor sports, and sports stadiums, promote new smart field models in combination with sports events, develop innovative spectator experiences and integrated services, and transform the sports industry by making indoor sports venues smarter or using outdoor sports technology.

b. Integrate outdoor sports fields with various types of devices and equipment, develop route and training suggestions based on individual sports data, combine them into outdoor settings/scenarios, and support the sports industry to provide a comprehensive range of sports services in the areas of safety management, tourism, exploration, and physical training, thereby creating a user-friendly application environment.

c. Develop a fan management service platform that provides integrated services for fan data monetization: Establish online fan communities where fans can share opinions, discuss competitions, and predict outcomes, thereby creating a fan economy.

3.3. Build a flexible and resilient pandemic prevention and monitoring system, and formulate precise pandemic preparedness and prevention strategies

Develop a sound information infrastructure for pandemic prevention, and use digital applications for optimal situation command performance; conduct an inventory of data integration and sharing needs of decision-making systems adopted during the establishment of the National Health Command Center, and adopt a data governance system for pandemic prevention to increase the synergy and security of using pandemic data; develop a self-reporting mechanism for pandemic investigations to integrate nationwide efforts, thereby realizing digital transformation and shared decision-making; build an interdisciplinary pandemic data analysis mechanism, leveraging the capacity of all sectors of society for rapid early warning; and optimize testing technologies, reorganize testing networks, and establish monitoring frameworks for regionally balanced development. Develop a stockpile mechanism that is flexibly responsive to emergencies and to the state of Taiwan and optimize inventory control; strengthen the emergency preparedness of medical institutions, taking into account both patient safety and the preservation of healthcare capacity; and continuously evaluate the implementation effectiveness of pandemic prevention policies, and comprehensively improve preparedness and prevention strategies. Optimize the quality of response to infectious disease incidents for more effective pandemic prevention and control: Develop new strategies for the prevention and care of chronic infectious diseases and promptly refer potentially infected individuals to the care system; refine infection control and medical care monitoring and expand professional training capacity; develop a review system for high-biosafety-level laboratories in Taiwan and optimize laboratory biosafety management; and develop antibiotic resistance interdisciplinary monitoring and social communication mechanisms to mitigate the threat of drug-resistant pathogens and achieve more effective pandemic prevention and control.

3.4. Develop a smart healthcare pandemic prevention system and pandemic prevention reporting advance alert mechanism

Use AI to develop diagnostic and treatment systems for monitoring changes in pandemic situations, and build a "Traditional Chinese and Western Medicine-based Pandemic Prevention Prescription Database" and "Traditional Chinese and Western Medicine-based Pandemic Treatment Rapid R&D Platform," integrating AI technology to create a smart management system based on both data and new molecular biology technologies to ensure effective pandemic prevention. Meanwhile, establish pandemic prevention indicators, formulate standard data formats for pandemic prevention reporting systems, and use them as the basis for establishing the pandemic prevention reporting advance alert mechanism, which will aid pandemic policy evaluations to optimize traditional Chinese and Western medicine-based pandemic prevention and treatment measures.

3.5. Concert inter-ministerial collaborative efforts and continuously integrate the pandemic research capacity of academic and research institutions to ensure solid groundwork for pandemic prevention

Actively recruit and fund other academic and research teams to conduct research on important and emerging infectious diseases that pose a potential threat to Taiwan or to the world, develop innovative smart technologies and products, and accelerate their implementation by providing guidance on technology transfer, patents, market competition, business/legal affairs, or resource matchmaking.

Strategy 4: Strengthen public digital services that support vulnerable and polyethnic groups

4.1. Continuously improve system functions and data analysis to provide a reference for planning subsidy policies to support vulnerable groups.

4.2. Develop AI module tools

Develop a four-faceted AI module combination, including a recognition module equipped with observation question sets, and provide it to domestic clinical physicians for R&D purposes to standardize child development screening evaluation tools, which can enable real-time monitoring and early prevention, strengthen monitoring capabilities, and reinforce education to address issues from intergenerational parenting in rural areas, thereby facilitating early identification and intervention.

(1) The Taiwan Industry Innovation Platform (TIIP) Program offers fundings to encourage such initiatives as the integration of information and communication technology and development of optimal care products or services to improve care efficiency, product market acceptance, and product popularity. It supports the development of industries involved in providing healthcare services to children and rural communities.

(2) The Small Business Innovation Research Program, organized by the Small and Medium Enterprise and Startup Administration of Taiwan, offers grants and subsidies to encourage the business sector to engage in the innovation and R&D of healthcare products or services for children.

4.3. Establish a next-generation electronic medical record (NGEMR) platform and promote NGEMR systems

Implement a project to establish consensus on an internationally aligned next-gen digital healthcare information system platform, with a focus on four main tasks: conduct an inventory of and maintain standards relevant to information platforms, build and maintain the operation of the "Next-Generation Digital Health Platform (DHP)," assist with the implementation of the DHP across member hospitals of the Hospital and Social Welfare Organizations Administration Commission, and expedite nationwide implementation of next-gen DHP. Accelerate hospital adoption of international data exchange standards to facilitate the rapid exchange and integration of EMRs across medical institutions; and enhance interoperability and integrated analysis to facilitate smart hospital applications that are supported by big data analytics-based decisions, which will strengthen the international competitiveness of the domestic medical information industry and improve citizen health and well-being.

4.4. Promote the integration and application of biomedical and health data and facilitate the compliant application of real-world data

(1) Use AI to copilot health data registration and applications, and promote the forward-looking governance of a new medical technology and drug smart payment system.

(2) Employ Indigenous Peoples' Health Database to develop health indicators as reference for government agencies and academic research organizations to conduct relevant research. Establish a health review

panel comprising medical professionals with knowledge of indigenous peoples to review important health studies—their findings will be translated and evaluated for medical policy purposes and provided to government agencies as reference for formulating relevant policies or plans.

(3) Emulate other countries' approach and adopt a temporary reimbursement or sandbox model to cover smart medical devices in the national health insurance (NHI), plan a pathway, which will be subject to control and management, to apply for at most two years of temporary reimbursement for domestically manufactured smart medical devices that exhibit therapeutic potential but uncertainty in cost-effectiveness; meanwhile, collect empirical data to facilitate subsequent effectiveness reassessments and support product implementation and application.

(4) Improve the nationwide medical fee-charge review process by disclosing the medical fees charged and approval results to achieve data interoperability across cities and counties. Make plans to develop digital and smart management in the future, and accumulate large amounts of information and knowledge during the process, which can be put practice to improve administrative efficiency and promote health empowerment.

4.5. Organize cross-life cycle health behavior surveys

(1) Continuously revise sampling designs for all stages of the life cycle to address societal problems such as population aging and declining birth rate, collect relevant domestic and foreign literature, key surveillance indicators, and questionnaire items, and assemble a professional academic team to design plans to collect the health surveillance data of Taiwanese nationals. As technology advances, establish a system to collect and update various health indicator data in real time, and compile health surveillance data from previous years to build a database for keeping abreast of the current health status and long-term changes of each life cycle.

(2) Devise plans to increase sample size so that survey results will enable more accurate inferences about the entire population and subpopulations; develop and adopt emerging digital data collection models, and establish information communication and data exchange platforms to improve survey capacity, efficiency, and resilience.

(3) Organize a nationwide survey of oral health and the health status of specific groups, and establish a comprehensive national oral health survey indicator and surveillance data system.

4.6. Expand health big data and adjust application measures

The Health and Welfare Data Science Center (HWDC) provides value-added data application services, which enable authorized researchers to conduct big data analytics in a designated zone and remove their analysis results off site. Continuously expand the "Gateway to Health Data Taiwan" infrastructure, promote the application of health big data, and in accordance with Constitutional Court Judgment No. 13 (2022), improve the legal framework (including the right to opt out) and supporting measures relevant to the use of health insurance data. As for establishing a national Taiwan Biobank, coordinate with other smart healthcare plans to promote precision medicine for everyone, advance academic research, and launch public health policies while at the same time lower healthcare costs to promote the development of medical and health industries, and optimize disease-oriented biomedical data infrastructure and technological applications, enrich disease-oriented biomedical databases to optimize biomedical information support service platforms, and promote the translational research, application, and commercialization of biomedical data.

4.7. Provide guidance on preparing school-age children for school and provide multi-faceted assistance to help children finish school

(1) Assistance in preparing children for school: Integrate central ministerial and local government resources into school curricula, help school-age children finish school and practice self-exploration, and promote

vocational training and experiential learning programs.

(2) Financial aid: Organize in-person visits and set up education savings account and government subsidies to support the education of economically vulnerable students.

(3) Educational assistance: Promote learning assistance for students in elementary, junior high, and senior high schools, and help students master the basics of basic subjects.

(4) Counseling and family support services: Use a three-tiered counseling mechanism in combination with resources from student counseling centers, special education resource centers, family education centers, and social safety nets to provide counseling to students experiencing multiple issues; utilize the MOE's "Family Education Network, Ministry of Education" and connect it to the resources of various family education centers to provide a range of professional group collaboration, consultation, and counseling services, including information on available resources, courses or growth groups, counseling or companionship services.

4.8. Develop people-centered, innovative, convenient, and sustainable smart government services

(1) Use smart technology to develop a smart customer service that provides public services in natural

language, establish plans to provide citizens with diverse access to government information, including smart land administration customer service, smart tax customer service, smart online application customer service, and i-Law smart recommendation platform.

(2) Build upon the smart customer service foundation, develop a smart service counter to guide citizens to successfully apply for digital government services, including preparing for the required documents, checking application results, and providing reminders or necessary information; meanwhile, develop smart secretaries to help citizens make informed decisions – smart secretaries will be able to provide the services and information citizens need and actively remind users to submit all the necessary information when they meet the service requirements.

(3) Ensure that the smart customer service, smart counter, and smart secretary plans take into account everyone’s needs, leaving no one behind, conduct usability and accessibility tests regularly before the launch and during service operations to ensure that everyone will benefit from the government’s smart services.

(4) Develop integrated services, establish standardized mechanisms for the collection, quality control, storage, exchange, and retrieval of meteorological data to compile, collect, and manage, from a data

governance perspective, the meteorological data of various government agencies, and establish a national meteorological database to provide services that various domestic departments will need, including meteorological monitoring, disastrous weather data (e.g., typhoon data), and forecasting data services.

(5) Develop 5-star open data, integrate interdisciplinary datasets, and provide high-quality data services.

(6) Guide industries on using meteorological data in value-added applications.

4.9. Utilize emerging technologies to enhance the administrative efficiency and decision-making accuracy of government agencies

(1) Utilize emerging technologies and data applications to develop smart virtual assistants that enable government agencies to operate and carry out tasks more efficiently and effectively—for example, AI writing assistants to draft templates, news articles, and meeting minutes; AI review assistants to aid the review of WebHR, a smart nationwide human resource system, the Ministry of Civil Service's operations, real estate registrations, and Customs Administration's parcel classification; or smart AI applications such as a robotic process automation (RPA) based smart investigation court and an all-rounder AI assistant capable of assisting in any tax related tasks.

(2) Combine AI technology and big data analytics, incorporate them into government decision-making, and improve decision accuracy; for example, use AI to analyze information system logs, develop a smart international pandemic risk early warning system, analyze government plans and data, and facilitate weather forecasting tasks, thereby assisting with decision making in a range of tasks from government policies to single events or cases.

(3) Draft AI application guidelines for government agencies: Refer to AI-related guides and guideline documents adopted globally, develop AI technology application guidelines according to the life cycle stages of the information systems and digital services adopted by government agencies in Taiwan, and provide them to Taiwan's government agencies as a reference and guide for using AI technology to address service pain points. In the meantime, develop AI core competency plans, organize in-service training programs on AI and emerging technologies, and arrange AI education and training tailored to the country's civil service system to equip civil servants with the knowledge, skills, and capabilities required for AI-related roles.

(4) Establish a government language model environment and AI Bots platform: Set up a "government language model environment and AI Bots platform," which

will provide a reliable, secure, and private user environment for government employees to try out language models, learn algorithm results of each language model, and choose the model that best fit the nature of their work. The platform will offer a variety of open source or closed language models and universal AI Bots for government agencies. Each agency can share its AI modules on the platform to promote the sharing and use of AI technologies in the public sector, assist other agencies in digitally transforming their services, and improve the government's service efficiency and decision accuracy.

(5) Encourage cross-agency and cross-disciplinary collaboration: Through the Chief Information Officer Forum and various exchange activities, guide the government to collaborate with other agencies and sectors to address the challenges of digital transformation, promote resource sharing and multiplier effects, improve the quality of government digital services, and effectively facilitate digital transformation.

4.10. Strengthen the security and surveillance of digital systems and infrastructure resilience

(1) Build a digitally empowered innovative application environment (power of empowerment): In continuation of the 2020–2023 big data analysis and

application, expand data models (including inspection data, immigration management data, investigation and detention data, and other data related to illegal immigrants); develop AI application service platforms (consisting of a comprehensive passenger risk assessment expert system, an AI-powered automatic passenger document retrieval system, and a smart customer service system), and build digital innovation capabilities and application environments.

(2) Provide a diverse range of sustainable digital services across sectors (power of sustainability): Adopt zero-trust, secure transmission networks, build a new generation of entry/exit system, immigration management system, and online application systems (including counter services transformed fully into online services and a one-stop inter-agency joint consultation platform) to provide a diverse array of sustainable digital services across sectors.

(3) Build a cloud-based smart security and surveillance mechanism (power of protection): Develop a cloud-based closed-circuit television (CCTV) system and a smart behavioral analysis platform, adopt a cybersecurity and privacy protection platform, and create a cloud-based smart security and surveillance mechanism.

(4) Strengthen the resilience of the digital infrastructure

(power of resilience): Improve the infrastructure of IT server rooms to make the digital infrastructure more resilient.

(5) Expand the scope of online application services, including application for Employment Gold Card, Employment PASS Card, Entrepreneur Visa, and dependent visa, thereby providing a one-stop cross-agency service for the general public.

4.11. Adopt AI technology to increase the accuracy of risk assessments

Use technological tools to increase the breadth and accuracy of various data items or thresholds in passenger risk rules, thereby reducing the subjectivity of human-made rules to improve the accuracy of various risk rules and identify potential or new crime patterns. Meanwhile, increase the cross-referencing of passenger histories, and incorporate relevant information into risk assessment rules and thresholds to improve the accuracy of risk assessments and reduce false alarms.

4.12. Promote the construction of communication networks in rural areas

Accelerate the construction of communication networks in rural areas through public–private collaboration, thereby creating sound, high-speed communication networks that enable rural residents to access and enjoy videos and streaming media services, distance learning, telemedicine services, and a better quality of life.

The aforementioned strategies, specifically those promoting long-term care 3.0 (Strategy 1), in-home care (Strategy 2), and support for vulnerable and polyethnic groups (Strategy 4), are all aimed at developing technological tools to provide services to different policy target groups (long-term care, in-home care, and polyethnic groups). Therefore, at the policy level, fundings can be used as a tool for assisting the business sector with innovation and development to develop products and services that align with the needs of different target customers.

Target 3.2. Increase inclusivity

Strategy 1: Combine technological applications, and ramp up efforts to preserve/revitalize cultural heritage and to promote education

1.1. Use digital technology to help promote archaeological data

Develop animations and multimedia displays of archaeological sites to provide virtual performances digitally and promote knowledge of cultural heritage. Meanwhile, allow public access to land-based archaeological sites to develop cultural tourism and ecotourism, and sustain the operation and management of archaeological cultural heritage by setting up physical exhibitions on-site or using AR technology to provide virtual exploration experiences, such as the Baxiandong Archaeological Expedition AR APP, or to create virtual museums like those displayed at the Shihsanhang Museum of Archaeology.

1.2. Incorporate contemporary creativity and technologies to present intangible cultural heritage in a new light

Use smart technology to develop digital learning materials and exhibition designs that impart knowledge about an intangible cultural heritage and how it is preserved, and integrate them into physical cultural education settings to demonstrate the spirit of the heritage, increase public access to cultural resources, and strengthen public cultural participation, thereby achieving the core goal of cultural equality.

1.3. Promote the revitalization and regeneration of industrial and cultural heritage

Adopt interdisciplinary resources, integrate multimedia technology and other relevant technologies, organize activities to exhibit industrial and cultural heritage, and revitalize the field space.

1.4. Set up a complete Liudui cultural content management system

Use geographic information system (GIS) to record spatial information and other basic information, and install content management system (CMS) to document/present information and contents of specific themes (e.g., Tudigong [Lord of the Land], Sheng Ji Ting [a paper burning incinerator], ancestral shrines) that are crucial to a local area.

1.5. Incorporate digital data into local walking tours

Combine themed events, such as the International

Museum Day, digital museum exhibitions, or community exhibitions into digital walking tours, integrate digital media into the Liudui Hakka Village walking tours, and add videos, old photos, and stories of scenic areas to facilitate local participation.

1.6. Infuse into science parks the diverse cultural elements of neighboring areas to promote local co-prosperity

Incorporate the diverse cultural elements of neighboring areas to promote local co-prosperity and increase resident well-being, respect and preserve local Hakka rituals and cultures, avoid early-period traditional buildings such as ancestral shrines, and increase, as needed, the scope of expansion of Longtan Science Park; have Tainan Science Park and the Tainan Branch Museum of Archaeology work together to promote the science park’s archaeological cultures, and coordinate with companies to establish a Museum of Sidadun Culture that uses technology to showcase local landscapes, thereby balancing high-tech industry development with cultural preservation.

Strategy 2: Promote the development of multi-cultural industries

2.1. Establish a National Language Research and Development Center to preserve and develop Taiwan’s language culture

Establish a National Language Research and Development Center as a non-departmental public entity, and build a professional language research workforce. The center will promote the preservation, revitalization, and development of Taiwan's language culture, and adopt a holistic perspective to conduct language studies, integrate resources, engage in a range of tasks, including implementing nationwide language surveys, engaging in translingual corpora research, developing digital applications of language corpora, fostering language skills, and designing talent flow mechanisms, and build an integrated national language database platform to develop a long-term, systematic, and holistic language research, survey and archiving mechanism. The center will also collect language data and corpora, which will serve as the foundation and training materials for the development of technological applications. Meanwhile, ministries involved in cultural affairs and digital technology will collaborate to strengthen the creation, application, and development of modern technology in the fields of language preservation, learning, and translation, thereby driving the research and application of national languages across disciplines to promote cultural identity through language identity and realize the preservation and sustainable development of endangered languages.

2.2. Promote the revitalization of local arts and cultures

(1) Promote arts and cultural revitalization in the cultural field

I. Design the Hualien AI Music Lab, located in the Hualien Cultural and Creative Industries Park, by incorporating the creativity of indigenous peoples in Hualien and Taitung and the characteristics of indigenous music, and use AI tools to create music that features local characteristics and human intelligence.

II. Integrate elements of local history, culture, and economy into local cultural and creative industries and develop extended reality (XR) applications for immersive experiences and cultural and arts co-creation activities in public-run cultural fields.

2.3. Use technology to optimize Hakka Tour services and boost the development of Hakka tourism and cultural industries

(1) Develop smart personalized tourism services: Create a smart Hakka Tour sightseeing map, which provides accurate route details and itinerary suggestions to meet various tourism needs.

(2) Develop tourist attraction virtual stamp web AR application: Develop a system for collecting virtual stamps at tourist attractions to create a novel experience of exploring ancient trails, and promote the development of neighboring cultural industries.

(3) Establish an IoT-based tung tree flowering forecast system: Install “IoT-based monitoring equipment” at

selected tung tree hotspots to monitor and collect data on the flowering of tung trees, and collaborate with tung tree limited-edition brand stores in nearby areas to access discount offers and drive business opportunities across relevant industries.

2.4. Use emerging technologies to increase the value of multi-cultural industries

(1) Develop featured products: Use emerging technologies to highlight the characteristics of polyethnic cultures, creativity, art, and designs, develop innovative products, and use marketing technology to deepen storytelling marketing and promote polyethnic industries.

(2) Increase the value of the experience economy: Combine local cultural elements into aesthetic designs and emerging technology applications, revitalize polyethnic fields, provide polyethnic cultural experience services, showcase the unique charm of each ethnic group through in-depth tourism development, and create an innovative experience economy for more business opportunities.

(3) Develop industry talent: Empower polyethnic groups, organize activities as needed by industries to pass on skills, including themed courses, experience sharing, and promotional activities, and assist enterprises in using technology to establish new ways of thinking and new operating models to enhance the industry's

sustainability.

2.5. Adopt digital technology to increase the competitiveness of creative life industries

Business in creative lifestyles involves multiple cultures. With this in mind, adopt digital technology to optimize service experiences/processes and marketing activities, increase the competitiveness of the creative life industry, and showcase the appeal of different cultures in Taiwan.

2.6. Make museum services culturally and technologically accessible to diverse groups of people

Use technology, the diverse cultural contents of museums, and different perspectives, including history, human rights, archaeology, art, and natural history, to serve different audiences, including children, adolescents, older adults, people with disabilities, and people from remote areas, and make digital cultural contents publicly accessible.

2.7. Encourage intergenerational collaboration to pool interdisciplinary resources and provide innovative community services.

2.8. Evaluate the feasibility of integrating technology into the field of culture and its impact on cultural art creation

One of the major trends of creativity at home and abroad is the integration of technology into arts and culture to diversify art forms, break through the existing framework of expression, and introduce new ways of creating experiences and interacting with the audience. The government will offer grants and launch programs to support tech-infused art creation in Taiwan, develop original works that feature experimental and cultural contents, integrate cross-sector resources, and participate in international exhibitions and collaborations to strengthen Taiwan's advantages in the development of technology-based art.

2.9. Introduce S&T research resources to develop original works that feature experimental and cultural contents

Provide grants, subsidies, and other S&T research-related resources to encourage the creation of technology-based art in Taiwan, and encourage creative art teams to work with technology researchers to produce original works that feature experimental and cultural contents, exhibit them in domestic cultural art centers, and submit them to international exhibitions and competitions to compete on the international stage for greater global visibility.

2.10. Strengthen the role of public media in increasing the global visibility of Taiwan's perspectives and cultures

Strengthen the role of public media, use the characteristics of 5G (high speed and broadband features) and AI technology to upgrade digital film libraries, revitalize audio-visual assets to drive international co-production and large-scale film production capacity, develop talent, spread the benefits of the entire industry, and enhance Taiwan's cultural content.

2.11. Use technology to expand the forms of creative art and guide public participation in experiencing the application of cultural technology

Support initiatives to create immersive videos using Extended Reality (XR) applications, and pool resources from various ministries, government agencies, local governments, and private enterprises to organize a comprehensive media and cultural technology exhibition that is focused on the experiences of the general public, ensure citizens' digital and cultural rights, and accelerate the integration of cultural technology into activities of daily living.

2.12. Integrate the capacity of legal entities and establish channels for international cooperation and marketing

Support domestic entities to create cultural technological contents, and establish a mechanism for producing marketable contents and implementing and integrating them into domestic and international commercial markets to forge partnerships and promote deeper engagement with key cultural technology exhibitions in Europe, America, and Asia, thereby slowly building Taiwan's brand in content creation.

Strategy 3: Employ smart technology to build a friendly, inclusive environment free of discrimination and of barriers to digital technological services

3.1. Develop horticultural therapy technology and evaluation tools and promote a new industry combining agriculture and geriatric services

Develop horticultural therapy technologies that enable healthy aging in place for elderly people living in farming/fishery communities, combine agricultural resources and applied technologies to develop green therapy field installation technology, formulate effective therapy sessions, develop health-promoting devices and tools, and collaborate with hospitals to develop physio-psychological health assessment techniques for use in healthy individuals, people with suboptimal health status, and those with mental illness to improve their cognition, depression, and prosocial behaviors, thereby achieving holistic health of the body, mind, and society, and support the development of new industries combining agriculture and geriatric services to help build a comprehensive support network for aging in place.

3.2. Develop courses, training programs, and operating models that encourage middle-aged and elderly adults to be more actively involved in farming

Based on a risk analysis survey of middle-aged and elderly adults who engage in farming, develop module courses for adult farmers and instructor training programs to impart agricultural knowledge, enhance farming techniques, reinforce areas of weakness, and satisfy needs; match trainee farmers to training farms that offer farming practice training services, and at the same time, recommend farming business models suitable for middle-aged/elderly farmers to encourage middle-aged and elderly people to join the agricultural workforce, thereby expanding human resources in the agricultural sector.

3.3. Launch campaigns to destigmatize mental illness and build a friendly society

Raise public awareness of mental illness by continuing to work with local governments to promote health education, destigmatize mental illness, and create a friendly social environment for people with mental illness. Work with authorities in charge of relevant industry and local governments to monitor and prevent mental health care institutions or media outlets from discriminating against people with mental illness or psychiatric patients.

3.4. Adopt an evidence-based approach to develop friendly prevention and care strategies for communicable disease cases

Study and analyze reasons for treatment/diagnosis delays in patients with HIV or tuberculosis and why difficult cases (including socially vulnerable groups) are unable to receive stable medical care or take medications as prescribed, and then use the findings as the basis to develop intervention and guidance models to help patients receive early confirmed diagnosis, appropriate treatment, and comprehensive self-care; introduce new testing and diagnostic technologies, assess the effectiveness of using Xpert to test stool samples and achieve more accurate and effective diagnosis of tuberculosis, which helps reduce diagnosis and treatment delays in children and older adults who struggle to provide sputum samples. Optimize Mpox prevention service resources to increase access for susceptible groups, including the LGBTQ community, and reduce the risk of disease outbreak. Strengthen diversified infectious disease risk communication model, disseminate accurate pandemic information, and increase people's awareness of infectious diseases, their confidence in, and satisfaction with the government's prevention and control efforts.

3.5. Optimize senior living and community environments and improve older adults' quality of life

Strengthen research on the spatial planning of living and community communities for older adults, improve existing living spaces for older adults, provide social housing to address the housing problems of older vulnerable groups, prolong the independent living of older adults, and improve their quality of life.

3.6. Enhance the basic digital skills of new immigrants

Organize information education and training, operate a digital learning platform for new immigrants that offers different learning channels to improve their basic digital skills, and promote cybersecurity awareness and new technological knowledge to strengthen new immigrants' information literacy and internet skills.

3.7. Build a sound environment for women entrepreneurship

(1) Build an infrastructure: Provide entrepreneurship knowledge courses to support women's entrepreneurship.

(2) Support growth: Through women entrepreneurship accelerators, provide in-depth guidance to women-led businesses to help expand into markets and raise funds.

(3) Support internationalization: Collaborate with foreign embassies in Taiwan to launch an "Academy for Women Entrepreneurs (AWE)" program, and integrate the capacity of global AWE programs to help women entrepreneurs expand into overseas markets.

(4) Select elites: Organize a "Women Entrepreneurship Elite Award" competition to select exemplary women entrepreneurs in Taiwan, and establish a Women Entrepreneurship Elite Award Association that acts as a mentor in helping more women succeed as entrepreneurs.

3.8. Strengthen women's participation in scientific research and create a women-friendly research environment

(1) Implement popular science education: Inspire and encourage female students to pursue studies or

careers in Science, Technology, Engineering, and Mathematics (STEM), improve gender segregation in education and jobs in the research field, and foster future research talent.

(2) Implement special temporary measures: Provide subsidies to female researchers who were not involved in NSTC-led research projects in the past three years, help them return to research after a career break, and reduce the loss of female talent.

(3) Promote maternity support measures for principal investigators: Provide research backup support and more flexible application schedules to enable researchers who are pregnant or have a child to balance family life and maintain their research capacity.

Target 3.3. Balance regional development

Strategy 1: Balance urban–rural development and stimulate regional revitalization

1.1. Develop integrated care models for rural areas

(1) Through interdisciplinary collaborations among industry, government, academia, and volunteers, unite central and district units in charge of social health and welfare, academic institutions, and ICT service providers, and use health care models and technologies to comprehensively improve the health and well-being of rural communities and smart healthcare services in rural areas.

(2) Pool welfare and health care resources, use cloud and ICT technologies to establish a holistic smart health management system, connect it to household registration, medical, and community services to create a continuous smart care network, and promote it across remote areas to improve resource efficiency.

(3) Establish a holistic integrated care system, establish health records via cloud connection, develop a case management platform for chronic diseases, integrate medical resources and ICT, provide personalized health management, and promote continuous smart care services for the whole of individuals, family, and community.

(4) Promote and develop a fleet of smart unmanned aerial vehicles (UAVs) and establish a smart UAV autopilot vehicle management information system – these can be used to effectively deliver medical supplies to areas with barriers to transportation, reduce the labor required for general deliveries in rural areas, and ensure the effective delivery of any medical supplies (including snake antivenom, oxygen cylinders, and emergency relief supplies) under any circumstances, including bad weather, blocked roads, and emergency rescue operations, thereby shortening emergency rescue time. The system will offer an alternative to efficiently deliver and transport medical supplies to rural areas.

1.2. Develop precision medicine

(1) Promote the cloudification of IT systems, adopt the HL7 FHIR standard to integrate home affairs, medical care, and social service data, establish a “Health and Wellness Technology Integrated Care Platform” that provides a wide range of functions related to family health records, preventive care, chronic disease management, long-term care, equipment management, GIS analysis, public services, and business intelligence analysis, and incorporate a microservice framework into the platform to achieve virtual cloud-based systems. The “Health and Wellness Technology Integrated Care Platform” provides services in urban areas and more importantly in rural areas, where medical institutions are sparsely dispersed, lack the necessary resources, and are in urgent need of a technological platform to integrate patient information, coordinate with urban medical institutions, and access the support of large hospitals, thereby facilitating balanced healthcare development between urban and rural areas.

(2) Develop a data economy ecosystem, establish a long-term whole-population/region/generation database through the precision management of healthy status groups, suboptimal health status groups, and high resource consumption groups, and develop health operation models based on regional characteristics

and the Fast Healthcare Interoperability Resources (FHIR) standard to achieve data interoperability and promote a precision health data ecosystem.

1.3. Reinforce the rural healthcare network

(1) Strengthen local emergency medical response (EMR) capability and increase capacity for critical care – this process will include supporting medical centers (specifically, hospitals with the capacity to provide emergency critical care) and improving telemedicine facilities in areas with insufficient EMR resources and rural areas.

(2) Increase the service capacity and accessibility of primary care centers – this process will include funding projects to reinforce, decommission, or reconstruct primary care centers, and subsidizing the telemedicine outpatient services provided by health centers in indigenous areas and offshore islands.

(3) Reinforce local healthcare workforce and improve the labor shortage problem in the healthcare sector – this process will include fostering government-funded physicians with medical specialties in key areas, launching physician retention incentive programs, and strengthening the missions of healthcare and public health centers set up by public hospitals in rural areas.

(4) Design an integrated information platform, pool resources from different units (Department of

Medical Affairs, Health Promotion Administration, Department of Oral Health, Department of Nursing and Health Care, National Health Insurance Administration, and Veterans Affairs Council), and establish communication channels.

(5) Strengthen the emergency evacuation mechanism, improve the efficiency of golden-hour life-saving treatments, and provide 24-hour emergency evacuation services.

1.4. Promote regional governance for regional revitalization

Organize activities to demonstrate and promote regional governance practices, select four cases of solar photovoltaic (PV) systems, aquavoltaics, micro hydro power generation, and geothermal energy generation for implementation, conduct sandbox experiment, establish mechanisms to operate a participatory public governance platform, and compile a summary of intra-regional living circle measures as part of the efforts to promote the National Development Council's "New Silicon Valley Plan for Taoyuan, Hsinchu and Miaoli" and "Regional Revitalization Corridor Program."

1.5. Improve the regional revitalization support system

Establish an all-inclusive regional revitalization support system, as well as youth empowerment networks to reinforce business models and innovation capability, and promote interdisciplinary collaboration among industry, government, and academia to help regional revitalization teams access the resources (guidance and funds) they need to promote sustainable development and strengthen their operational capability.

1.6. Refine land valuation systems

(1) Review valuation laws and incorporate scientific valuation methods, combine review findings and formulate a computer assisted mass appraisal model, modernize land valuation systems to reflect market prices, and integrate applicable laws to avoid conflicts; meanwhile, foster intellectuals in statistics, big data analytics, and GIS to support the continued implementation of computer assisted mass appraisal.

(2) Expand model applications and accuracy, develop models of special transactions to more accurately appraise the prices of special-use lands such as farmlands, and adopt spatial analysis technology, using GIS and statistical analysis to increase the precision of valuation models and reflect the spatial distribution and characteristics of real estate prices.

(3) Strengthen data accessibility and accuracy, optimize land registry data for consolidation with land and building information, use machine learning and graph learning technology to improve the accuracy of valuation models, and establish data standards for presenting information on the actual price registration of real estate transactions to improve the effectiveness of data exchange and integrated applications and

ensure data transparency and universality.

(4) Deepen information transparency by having the government release statistically defined basic data to provide accurate market information, and at the same time, conduct statistical research and analysis on real estate market issues to avoid misleading viewers and publish accurate information in advance.

(5) Establish real estate indices to facilitate decision making, including urban land price indices, housing price indices, housing affordability indices, and price indices for reviewing the rental and pre-sale housing markets. Then incorporate the secondary market concept, and sort indices by administrative districts, transaction patterns, building types, and transaction hotspots to provide a detailed overview of the real estate market.

1.7. Shape urban and rural characteristics and strengthen business district marketing

(1) Shape urban and rural characteristics, and build urban and rural brands and businesses: Develop urban and rural brand maps, explore industrial networks, develop industry–academia–research ecosystems, and promote joint urban–rural brands by increasing brand value and creating fields that demonstrate and provide guidance on the use of marketing technology to boost the overall visibility and economic development of both urban and rural areas.

(2) Strengthen plans to promote and market business district brands: Guide business districts to develop unique characteristics, achieve business autonomy, optimize service experiences, and enhance brand image; participate in exhibitions and promote tourism itinerary to expand brand value, and praise business districts for their excellence to increase the entire nation's business capacity.

1.8. Promote young farmer guidance and innovation in farming communities

(1) Provide guidance resources for young farmers, select top 100 young farmers and integrate them into local platforms, expand cooperation through guidance and innovative management mechanisms, and effectively transfer production technologies and business resources to those interested in returning to their hometown to engage in agriculture.

(2) Promote the Rural Young program, which encourages communities to set business goals, import youth workforce, assist in establishing business models and implementation plans, propose future innovation initiatives and development strategies, and create new values and features for rural communities, thereby achieving the goal of having young people serve rural communities.

(3) Promote the Corporate Counseling Program for Rural Communities, which is based on the various aspects

of rural communities, including daily life, production activities, ecosystems, and cultures; guide access to resources, transform rural community industries into companies, enhance industrial competitiveness, and promote greater innovation value, and expand the synergy of rural revitalization policies.

Strategy 2: Construct a smart and secure transportation system

2.1. Engage in technological innovation to create a better and safer transportation environment

(1) Promote digital infrastructure for smart transportation, employ AI technology to predict needs and optimize control systems, and combine smart corridors with connected car technology to improve transportation efficiency and safety.

(2) Promote the use of technology to improve transportation safety and equality, use AI technology to analyze data and provide real-time warning against potential safety risks, and integrate ICT applications to ensure greater transportation safety and convenience for vulnerable road users, including older adults, women, and children.

2.2. Support transportation-related academia research and talent development, and promote the development of road traffic safety technologies

(1) Fund research projects and provide research grants for road safety-related academic research.

(2) Encourage cross-disciplinary scholars to jointly conduct cross-disciplinary research on road traffic safety issues to build up Taiwan's domestic research capacity, and foster professionals in road safety.

(3) Set road traffic safety research topics, with a focus on the impact of transportation systems on adaptation to extreme climate, the sustainability of transportation safety, and innovation in surveillance systems, and through interdisciplinary cooperation and advanced technology applications, propose strategies and management measures for improving transportation safety.

Strategy 3: Build a smart secure homeland

3.1. Create a smart social safety net

Assess the feasibility of diverging the service content of the 113 Protection Hotline. Meanwhile, organize data to establish data models, make plans to complete system development by 2029–2030, and set up 113 Protection Hotline AI call forwarding service to ensure that services are provided immediately to every caller. For protective cases filed in three (or more) systems, establish a cross-system service list based on household registration, concurrently develop AI to predict the risk level of cross-system filed service cases, draft intervention plans and access resources to establish a resource service map, and set up a smart coach that answers online queries in real time, particularly regarding difficult cases commonly handled by social workers or supervisors, provides suggestions and information related to intervention decisions, and sends reminders to frontline workers – all these will help strengthen the cross-system collaboration mechanism, deepen protection services, and safeguard and maintain people's interests and rights.

3.2. Use AI to optimize social safety net and implement family-centered services

Strengthen the social safety net information system, use AI to standardize and informatize risk categories and assessments, integrate data fields and logic for analysis, and provide to frontline workers as assessment tools to implement family-centered services.

3.3. Strengthen medical resource dispatch and stockpile management for disaster response to ensure emergency supply and social stability

Use the Medical Resource Dispatch and Support System for Emergency Response to more effectively manage the supply and dispatch of reserve medicines and medical devices for emergency trauma injuries; as outlined in the Pharmaceutical Mobilization Preparation Plan, have local health departments conduct regular preliminary reviews of the items and quantities of the reserve medicines and medical devices, which are then to be reviewed by the MOHW FDA to ensure that the reserve items and regulated quantities are consistent; and discuss which reserves and their substitutes are suitable for long-term storage and for high-performance applications to formulate different reserve strategies to sustain social stability in the event of major disasters.

3.4. Establish a risk case early warning module, and develop a mental health case management decision-making platform to strengthen front-end prevention and crisis management mechanisms.

3.5. Develop mental health support service programs that align with local demands, and increase public mental health services and resources.

3.6. Strengthen building resilience and durability, and promote research on smart earthquake resistance and wind engineering technologies

(1) Research on technologies that make building structures earthquake-resistant: This includes developing seismic monitoring and structural health diagnosis technology, using AI for optimal prediction, maintenance, and disaster prevention, implementing seismic capacity assessment and reinforcement technology, integrating laws and technologies to enhance building performance, and encouraging the study of technical construction specifications to improve design and construction quality, ensure the safety of building structures, and align with international standards.

(2) Research on technologies that extend building lifespan: This includes refining building structural

durability diagnosis technology, improving the accuracy of seismic assessments to more rationally evaluate building safety, developing technologies to repair and reinforce deteriorating building elements, consolidating these technologies and establishing safety inspection procedures to more effectively ensure public safety, and conducting market surveys to select representative materials for research.

(3) Research on wind engineering technologies for buildings: This includes developing real-scale wind resistance testing and new measurement technologies to establish national wind engineering standards; constructing digital maps of urban wind environments to promote natural ventilation design and reduce the probability of disturbing wind fields to mitigate the urban heat island effect; and applying information technology and wind field characteristics to achieve more effective building applications.

3.7. Enhance regional environment's disaster resistance

In response to the rise in the intensity of extreme weather events, strengthen investments in disaster mitigation efforts, use a homeland perspective to engage in the interdisciplinary integration of urban and non-urban areas, plan and govern the use of land for disaster mitigation purpose, and enhance regional environment's disaster resistance.

3.8. Reinforce forensic analysis technologies and knowledge to safeguard social stability and public safety

(1) Strengthen capacity in forensic analysis technology, develop highly sensitive forensic analysis technology through problem-based research that combines theory and practice, and provide forensic opinion services for special cases to maintain social stability and protect public safety.

(2) Expand and polish forensic science knowledge, comprehensively enhance the ability to examine physical evidence, address technical bottlenecks, keep abreast of future development trends, and develop new forensic science technologies, which will reinforce forensic science investigations and technological applications to ensure accurate expert opinions, facilitate criminal investigations and judicial judgments, address public security challenges, and achieve the goal of creating a safe and secure society.

3.9. Strengthen digital intelligence and technology training to enhance police resilience and investigation capability

(1) Establish digital intelligence technology investigation platforms and integrate digital intelligence systems and tools to investigate cases more efficiently; this includes building digital intelligence databases to strengthen the integrity of event intelligence, using visual analytical tools to make cross-intelligence queries and present relationships, analyzing

transaction graphs using a structured approach to process transaction data, and providing automated recommendation function to quickly access critical information, which helps police officers efficiently identify suspicious accounts and counterparties.

(2) Set up digital intelligence technology investigation training platforms, and incorporate digital tools and system training programs to improve investigators' ability to use digital technology in investigations – these include case-based training courses, covering operations, intelligence organization, and analysis; competition-based technological investigation training tools that provide interactive simulation exercises; and training on the use of emerging technologies in investigations, which covers information about dark webs and virtual currencies in response to current trends.

(3) Set up a smart XR police training system, strengthen critical technologies to improve training efficiency, adopt emerging technologies such as intuitive gesture control to improve the natural movements and immersive reactions of virtual characters, and create a variety of unit-based learning materials to provide police officers with immersive training scenarios and improve their ability to think on their feet.

(4) Implement a remote backup plan for the police data center, build a second computer room to run the M-

Police information system, and strengthen system resilience, which includes installing network equipment to expand line bandwidth and setting communication routes, cybersecurity equipment to ensure communication security, application system execution environment to support system operation, authentication mechanisms for simultaneous identity verification, and basic data synchronization mechanisms to ensure the accuracy of system data.

3.10. Optimize medical technology specifications and applications to facilitate more effective infectious disease surveillance and prevention

Improve technological tools or equipment systems to regulate the implementation of pandemic prevention measures to ensure both individual rights and data privacy protection, use technologies such as multimodal fusion, AI image recognition, privacy-enhancing technologies, and generative AI to develop automated pandemic investigation functional modules and data management systems, build a smart infectious disease outbreak investigation information system and a cloud-based pandemic investigation data center, expand personalized digital pandemic prevention information service channels, and use next-generation whole genome sequencing to help identify and diagnose pneumonia and encephalitis of unclear origin. Adopt data governance mechanisms with restructured data architecture to strengthen the resilience of pandemic prevention data, and provide different data services to promote private collaborations with industries and academia, which will accelerate scientific research on infectious disease prevention and control and facilitate the development of AI-powered smart and innovative pandemic prevention applications.

3.11. Establish a zoonotic disease surveillance and early warning mechanism and build a pandemic-ready talent pool

Establish emerging infectious disease or cyclical epidemic (such as dengue fever) surveillance panels to enable decision makers to stay on top of international pandemic situations, enhance the accuracy of future pandemic analysis and forecasting, and develop rapid diagnostic tools or integrated testing methods for emerging and re-emerging zoonotic diseases to provide immediate care and testing at a fixed location. Develop a bioterrorism response team certification model to build a biodefense talent pool and strengthen emergency outbreak response capacity.

3.12. Use smart technologies to strengthen digital services and improve medical information protection mechanisms

Consider the current status of next-gen electronic medical records, refer to existing international risk assessment frameworks for AI service evaluation and implementation, create expert groups to formulate regulations to regulate the cybersecurity of new technologies and personal data protection, provide them as the basis for ensuring the cybersecurity of hospital AI ecosystems, and gradually promote them across all hospitals.

Goal 4: Promote Green Lifestyles and Circular Economy and Strive for Net-Zero Emissions and Sustainability

Target 4.1. Ramp up efforts to adapt to climate and environmental changes

Strategy 1: Leverage net zero technology to maximize the effectiveness of interdisciplinary climate governance capacity

1.1. Build models to evaluate net-zero emissions analysis platforms and establish a key net-zero strategy technical parameter database

In accordance with policies related to the development of domestic emerging industries, use input–output models or some mathematical and scientific methods to estimate the economic growth rate, up to 2050, of Taiwan’s main industries under the impact of future regional development. In accordance with future population growth trends, use demographic or some mathematical and scientific methods to estimate the future number and growth rate of Taiwanese households. Study and analyze the types of transportation in regions of Taiwan and in accordance with future demographic and economic growth trends, use mathematical and scientific methods to estimate the service demand, up to 2050, of each transportation vehicle in terms of passenger-distance and payload-distance. Assess the data of various technical parameters based on current international and domestic technologies related to energy, industry, transportation, construction, agricultural production, and waste development. Simulate and predict the mid-term targets and sector-based milestones in the 2050 net-zero pathway for the six major sectors of energy, manufacturing, transportation, residential & commercial, agriculture, and environment.

1.2. Integrate net-zero technologies and resources across disciplines and promote climate services for net-zero emissions

Integrate the capacity of ministries with that of industry, government, academia, and research institutes, make plans to develop integrated net-zero technologies, and ramp up collaboration and integration efforts across different technology areas. During the process of implementation, communicate with different stakeholders, co-design a technology landscape, recommend cross-department and cross-hierarchy governance strategies and mechanisms, assist in shaping the local industrial ecosystem, and implement net-zero transition policies. Use core AI technology to develop net-zero technology products for interdisciplinary applications, and promote the development of the meteorological industry.

1.3. Establish a national scientific research and application platform for emerging energies and generate CFE

Set up a topic-specific technological application solution platform for emerging energy sources with substantial carbon-reducing impact (e.g., geothermal energy, ocean energy, and integrated marine energy), conduct precision surveys and explorations to provide feasibility evaluations as soon as possible; and establish emerging energy industry alliances to accelerate technological implementation. Commit to creating land utilization plans to achieve a climate-resilient, net-zero, sustainable Taiwan.

1.4. Enhance climate risk disaster management capability and improve infrastructure in response to climate change

Integrate climate data into agricultural production applications, send push notifications using surveillance technology to achieve a complete agricultural disaster early warning system, adopt precision and smart agricultural facilities, and equip them with water-saving irrigation technologies to make agricultural production activities more resilient when disasters occur; comprehensively promote agricultural insurance, continue to develop new insurance products and improve insurance contents, and use agricultural natural disaster relief counseling system to reduce disaster-related losses. Adapt infrastructure, crop stress-tolerant varieties, and production technologies to climate change by ramping up efforts to improve agricultural water infrastructure, smart retention ponds, and other basic public infrastructure, continuously collect and preserve genetic resources, and breed agricultural crops, fish species, and livestock varieties that are resilient to high temperature, drought, and adverse conditions.

1.5. Promote a climate adaptation research ecosystem and strengthen the scientific research capacity required for evidence-based climate governance

In response to climate change, integrate ministries that are involved in climate adaptation research, determine the research needs in relation to climate governance and adaptation, conduct an inventory of climate adaptation research findings and gaps, enrich the climate change risk assessment cross-departmental database and climate change scientific research information, integrate domestic industrial, governmental, academic, and research sectors' capacity for climate adaptation research, promote a climate adaptation research ecosystem, and use scientific capacity to support the country's evidence-based climate governance capability.

Strategy 2: Accelerate amendments to laws and regulations related to climate adaptation

2.1. Draft amendments to the Climate Change Response Act and improve climate adaptation actions

As a response to global climate change, continuously review strategies to respond and adapt to climate change, reduce and manage GHG emissions, implement intergenerational justice, environmental justice, and a just transition so that responsibilities of global environmental protection are shared and fulfilled, continuously review laws and regulations related to climate adaptation, comprehensively enhance capability and resilience to address climate challenges, realize sustainable development, and strengthen climate adaptation efforts.

2.2. Draft amendments to meteorology-related laws and improve the environment for the development of the meteorological industry

(1) Add a new information service mechanism for climate forecasting and reporting, strengthen the support for Taiwan’s climate change risk management and interdisciplinary applications, and increase public involvement in the service capacity of the climate industry.

(2) Create climate service value and space, guide the meteorological industry to build climate service models, and assist society to conduct physical risk assessments. Improve the quality of meteorological services and promote certification marks for smart climate services and applications.

2.3. Continuously review energy and industry adaptation implementation guidelines

(1) Formulate, in stages, “Risk Assessment Guidelines for the Energy Industry to Respond to Climate Change” and “Guidelines for the Energy Industry to Plan Strategies to Respond and Adapt to Climate Change,” both of which will guide the energy industry to identify and assess climate-related risks and to plan

adaptation actions.

(2) Adopt the international climate disclosure framework, strengthen industry climate action guidance documents, ensure the progressiveness and integrity of industry actions, and improve industries' capacity for the autonomous management of climate risks and adaptation.

2.4. Review transportation system adaptation guidelines

Consider future climate change scenarios and collate information on the latest global situations regarding climate adaptation capability and new technological applications for climate adaptation, explore the factors of climate change that influence the resilience and strengths of transportation systems, discuss and propose guidelines on adapting transportation systems to climate change, and provide them as reference to authorities or agencies in charge of transportation systems and private engineering consulting firms.

Strategy 3: Develop a biodiversity database for Taiwan

3.1. Develop the Taiwan Biodiversity Information Alliance (TBIA) and establish data integration and open data standards

Continue with cross-agency surveys and inventory of biological and ecological resource data, ramp up the exchange and integration of biodiversity databases, promote the application of biodiversity data, and adopt data analysis and visualization methods to develop data tools for decision making, calculate biodiversity-related indicators, and facilitate ecological data governance, thereby achieving the vision of sustainability.

3.2. Expand river ecology survey efforts

Over the past two decades, 26 rivers administered by the central government have been surveyed. Continue to conduct systematic surveys on the quantity and categories of aquatic organisms (fish, shrimps, and aquatic insects) to provide more data on aquatic organisms, thereby enriching domestic biodiversity databases to create new possibilities and new services.

3.3. Conduct inventory of biological and ecological resources and establish conservation and restoration plans

(1) Marine and wild life biodiversity surveys: Conduct resource surveys and conservation status assessments through systematic science investigations, citizen science approaches, and collaboration with different agencies and local entities.

(2) Marine ecological resource inventory and surveys: Conduct an inventory and survey of resources in various marine ecosystems, including algal reefs, coral reefs, and coastal blue carbon ecosystems.

(3) Marine wildlife conservation plans and restoration actions: Continuously collect basic ecological data on other marine species and propose threat-mitigating solutions.

Strategy 4: Improve climate risk monitoring capabilities and develop smart monitoring systems, early warning technology, real-time response systems, and interdisciplinary climate adaptation technology

4.1. Improve IoT setups in smart cities

(1) Adopt various technologies, including IoT devices, microsensors, and big data analytics, develop technologies to analyze potential air pollution hotspots, provide narrowed-down suspected or potential pollution hotspots, and establish cloud data quality inspection mechanisms to build a complete air quality sensor network.

(2) Through the air quality sensor network, collect large amounts of sensor data, use neural networks and spatial interpolation technologies to develop two critical AI modules—time-series anomaly data mining model and spatial-series anomaly data mining model, and use cloud-based AI analytics to integrate air quality data with other relational heterogeneous data, thus forming a multidimensional data model that provides real-time data analysis and suggestions to help determine pollution status and expand smart governance applications.

(3) Develop mobile air quality sensors, test them at standard testing stations and on a vehicle for long periods to collect detailed spatial information, use the sensors flexibly in different regions for dynamic

surveillance to ensure that the required range is covered and data update occurs in real time, and quickly assess air quality based on sudden pollution events, thereby providing decision makers with immediate data support for more effective response actions.

(4) Build an air quality sensor network that comprises a sensing layer, which is composed of IoT and micro-sensing technologies, and a data processing layer that applies big data analytics to detect potential pollution hotspots, integrates heterogeneous data, and inspects cloud-based data quality.

(5) Use AI-powered big data analytics to trace the source of pollution and develop mobile sensing technologies to promote smart city concepts: Through the air quality sensor network, collect large amounts of sensor data, use neural networks and spatial interpolation technologies to develop two critical AI modules—time-series anomaly data mining model and spatial-series anomaly data mining model, and send push notifications in real time to report pollution events. Develop mobile sensors, test them at standard testing stations and on a vehicle for long periods to collect more detailed spatial information.

4.2. Strengthen research on the health impact of climate change and promote global sharing of health and climate data

Develop a general health risk management system for climate change-induced health risks to improve the disaster resilience of healthcare facilities. Collaborate with different departments and integrate their resources to implement climate change and health related policies and measures. Cooperate with international health and climate organizations to promote global sharing of health and climate data.

4.3. Develop smart technologies and applications for satellite positioning, mobile mapping, and three-dimensional surveying and mapping

Continuously solve and calculate the coordinates of continuous observation stations to determine the status and trends of Taiwan's ground surface displacement, and provide the findings for relevant units to analyze and interpret potential disaster zones. Develop smart indoor/outdoor seamless positioning and mapping technology, integrate multiple platforms and sensor sources to obtain 3D spatial information, and develop indoor/outdoor positioning and automated post-processing programs to obtain different types of spatial information. Collect gravity, elevation, and tidal data to assess the limitations and stability of relevant baseline systems in Taiwan, and build a stable framework of absolute coordinates unique to Taiwan.

4.4. Set up an agricultural meteorological data center to strengthen agriculture-related disaster alert and reporting applications

Set up an agricultural meteorological data center that has instant, stable access to the meteorological observations and forecast analysis data provided by MOTC Central Weather Administration, simulate the adverse effects of meteorological index-based conditions on agricultural crops and aquaculture ponds, consolidate the current crop spatial information in the Nationwide Agricultural Land Dynamic Database, and use it to develop agriculture-related disaster alert and reporting applications and agricultural insurance relief service applications. Continuously improve and expand the functions of the camera app for taking photos of disaster-struck agricultural areas, and set up platforms for viewing and downloading street view tools, information of local government workforces, and photos of current farmlands.

4.5. Strengthen the debris flow and large-scale landslide response mechanisms and build an evidence-based disaster prevention system

Strengthen the debris flow and large-scale landslide alert, reporting, response mechanisms and construct a smart technological network; establish a smart interpretation and volumetric assessment technology to more accurately assess and predict disaster potentials; refine the technologies and practices used to monitor and manage areas at risk of large-scale landslide and unstable sediment disasters, and adopt preventive measures in high-risk areas; and provide open-source long-term surveillance data to enhance the innovation and application of disaster prevention technologies. Strengthen public education to develop autonomy in disaster prevention and improve residents’ disaster awareness and response capability. Build sustainable and resilient communities and safeguard residents’ life and property. Integrate existing monitoring databases, implement a national disaster prevention open data platform, promote information sharing and visualization applications, accelerate the practical application of technologies, and strengthen public participation mechanisms, for example, establish a real-time citizen observation platform.

4.6. Expand flood monitoring capacity

(1) The government has installed flood sensors at 2,072 stations across Taiwan for real-time monitoring of flood events. Continuously review the recent effectiveness of water governance and provide results to local governments as reference for installing flood sensors or relocating monitoring stations.

(2) The CCTV systems of central authorities and local governments (units not in charge of water-related disaster prevention) were initially installed for a different purpose and are thus not publicly accessible nor connected to the Internet. Continue to build cross-

agency communication mechanisms in the future and effectively integrate resources.

(3) AI image recognition has been applied to monitor flooding and water levels. Continuously update the image recognition technology and its operating system when newer versions are launched.

(4) Continuously improve rainfall- and water-related forecasting and monitoring technologies, and develop smart early warning and reporting mechanisms to strengthen water risk management and response resilience.

4.7. Improve the Sensor-based Water Resources Operating Platform with Internet of Things (a.k.a. IoW Platform)

Continue expanding the service capacity of the Sensor-based Water Resources Operating Platform with Internet of Things (or IoW Platform) by optimizing the platform's operation, maintenance, and functionality, including the collection and storage of water monitoring data, improvements to data quality inspection, and optimization of management reports (e.g., expanding screening criteria and providing multiple download formats and relationship query functions). Use generative AI in the future to develop super-resolution API, which returns a super resolution version, at 2× or 4× scale (dependent on the parameters selected), of a low-resolution image through the graphics processing unit (GPU). Apply object detection algorithm (e.g., Yolov8) to develop object detection API. Continue to optimize the operating platform, strengthen data quality control and system service capacity, incorporate emerging technologies (e.g., gen AI, image recognition), promote cross-disciplinary data integration and sharing, and enable applications in water-related areas to support smart decision-making and sustainable governance goals.

4.8. Build teams to foster industrial competitiveness, and erect an industrial cooperation platform to expand business opportunities

SMEs form a vast majority in Taiwan. They will need to work with different industries, including hardware firms, data analytics companies, and field application operators, to develop smart IoT-based disaster prevention solutions and subsequently create solutions that meet the needs of field application operators. Therefore, to develop and promote smart IoT-based disaster prevention solutions, industry teams will be established and engaged in field verifications, and their achievements will be presented on an industrial cooperation platform to create more business opportunities for them.

4.9. Set up diverse heterogeneous emergency response networks and verify PPDR system

Implement a plan to verify PPDR system, which is a network communication system that enables commanding officers dealing with a national crisis to quickly react to situations, issue policy orders, and assist disaster relief units in using mobile broadband technology to conduct disaster rescue drills and training; establish a secure third-location 5G cloud core network, set up resilient base stations to connect to the 5G cloud core network via asynchronous satellite as backhaul links, and provide commanding systems with a means of communication during emergencies.

4.10. Strengthen the resilience of the transport infrastructure and maintain management technology

Develop methods to inspect bridges and protect bridge foundations, thereby enhancing the ability of railway and highway bridges to adapt to extreme weather events. Conduct research to investigate the corrosion of metals in Taiwan and the correlation of corrosion factors, and use the findings to create anti-corrosion designs for public constructions to increase the durability and resilience of public facilities. Use emerging technologies to inspect, test, maintain, and manage transport infrastructure more effectively.

4.11. Strengthen port environment and vessel monitoring alert technology

Develop port wind intensity forecasting, harbor tranquility monitoring, and image recognition technologies, and optimize surveillance technologies for subsequent smart harbor development. Integrate sea weather and ship information, develop ship monitoring early warning technology, and enhance navigation safety.

4.12. Strengthen the ability to keep abreast of climate risks and enhance warning and real-time response systems

Strengthen the simulation technology of transportation systems to achieve early warning and alert functions and ensure transportation safety. Optimize existing simulation-based early warning and alert systems to achieve disaster prevention. Develop real-time response systems to facilitate immediate disaster prevention and response. Build the Kinmen–Penghu radar system, expand the coverage of its low-level radar network, and combine it with AI technology to enhance radar real-time early warning and forecasting capabilities, thereby strengthening the effectiveness of Taiwan’s radar dense networks. Develop models to forecast earthquake probability, and expand rural-scale disaster decision support and early warning services. Develop high-spatiotemporal-resolution local climate models that use AI technology in climate simulation and assessment to enhance climate simulation capabilities and disaster risk impact assessments, and strengthen the integration of smart monitoring applications with cross-sector information to develop IoT-based sensor application technologies and applications integrating smart monitoring and cross-sector information. Integrate disaster prevention and hydrological infographics, present them as an exhibition or in a space, and with "smart push notification" and "real-time mobile positioning" functions, provide users with the option to configure push notification settings, such as setting alarms for rainfall, water level, and flood sensors, and to use location-based service (LBS) to access the latest information anytime, anywhere for disaster prevention preparations. Use new technologies to develop advanced monitoring and forecasting products, and implement projects to "strengthen seamless precipitation monitoring and forecasting technologies" and "develop meteorological drought monitoring, early warning, and forecasting technologies." Use AI and big data analytics to set up a drought early warning system with dynamic water control function, which ensures that water resources are efficiently distributed and used and recommends water-saving scheduling decisions to facilitate precise water management.

4.13. Develop observation and telemetry technologies, expand the seismic monitoring network, and establish a regional monitoring network

Develop advanced atmospheric observation technology and strengthen its capacity for seismic and geophysical observations. Adopt AI-based data monitoring, analytics, and quality management to build a comprehensive regional monitoring network.

4.14. Promote climate forecasting in cross-disciplinary climate adaptation technologies to mitigate the impact of extreme weather events

Develop advanced climate forecasting models to lay the foundation for climate change research and interdisciplinary climate adaptation applications. Provide hourly, daily, weekly, monthly, quarterly, and interannual climate forecast data. Enhance climate simulation capability and ramp up efforts to develop high-spatiotemporal-resolution local climate models.

Target 4.2. Promote net-zero lifestyles and a just transition

Strategy 1: Ensure just transition for different individuals, groups, industries, and regions

1.1. Ensure equal development opportunities for individuals, industries, and groups to share the positive outcomes of net-zero transition

Conduct an inventory of net-zero occupations where there is a shortage of talent (e.g., renewable energy, carbon capture, or low-carbon industries), and through cross-ministry collaborations, provide a reference for baseline competency development to ensure effective policy implementation. Mitigate the impact of energy transition on salaries and unemployment based on the principles of promoting equality and supporting regional and industrial transformation. Implement innovative business development models that feature local characteristics and can achieve net-zero transition goals so that local citizens can also enjoy the benefits of transition. Meanwhile, guide and subsidize registered self-employed recyclers, support SMEs to establish circular business models, and ramp up industries' decarbonization actions to promote both environmental sustainability and economic development.

1.2. Improve the dispute handling mechanism to facilitate the transition to net-zero

In response to the impact of net-zero transition, focus communication efforts on policy stakeholders, non-governmental organizations (NGOs), and local governments, identify the affected groups, and ensure equal development opportunities for individuals, industries, and groups during the transition. Revise policies to incorporate stakeholder opinions, present cross-ministerial issues (e.g., compensation for indigenous peoples and regional development after the phasing out of carbon-intensive industries) at level-one agency (yuan-level) meetings for discussion, and seek comments from the Just Transition Committee to ensure that policies are comprehensive and fair. In the meantime, complete the "Labor Framework Guidance for a Just Transition in Taiwan," and provide occupational training and career guidance measures for industries affected by net-zero transition to more effectively guide SMEs' transition, improve their net-zero transition capability, and facilitate the sustainable development of local industries. Encourage the integration of the results of the "Civil Society Innovation Demonstration and Sandbox

Testing Program" into some ministerial science and technology plans to ensure that citizens are actively involved in policy making and policy implementation, and reinforce the understanding and practice of just transition across all sectors of society. While enforcing net-zero policies, conduct an inventory of use of land, plan suitable spaces for green industries, and strive to communicate with the society to strengthen local participation and achieve local prosperity.

1.3. Promote cross-disciplinary and cross-departmental collaborations and deepen people's understanding and practice of just transition

To mitigate the impact of net-zero transition on individuals, groups, industries, and regions, trans-disciplinary social science research and forward-looking planning are necessary to propose innovative solutions and local pathways for policy making. Conduct local social science research to systematically identify adversely situated groups, analyze issues critical to just transition, and build a foundation for policy discussion. For the academic sector, use evidence-based research as the basis to amend laws, draft communication strategies, and formulate policies necessary for a just transition; for civic groups, use innovative technological solutions to identify critical gaps in climate legislation research; encourage both parties to work closely together to reinforce the scientific foundation for policy-making and ensure that opinions from multiple parties are adopted to achieve a fairer and inclusive social transition.

1.4. Reduce impact on stakeholders and realize the core value of leaving no one behind

As a response to the 2050 global target for net-zero GHG, the Ministry of Transportation and Communications created a carbon reduction strategy around mobility transition and mobility behavior change. However, during the implementation of vehicle electrification and decarbonization, changes in mobility technology may impact and influence people's lifestyles and the structure and workforce of the automotive industry. In respect of labor skills, implement education and training, vocational training programs, and other empowerment programs to help develop the knowledge and skills of automotive service technicians, car mechanics, and vocational automotive service training instructors; in the area of industrial technology, continuously guide domestic companies to upgrade and transform their technology to build capacities to domestically manufacture key components for vehicles and energy charging facilities; with respect to regional balance, implement demonstration programs to seek and adopt low-carbon vehicles suitable for the local environment, taking into account the uniqueness of mobility transition in rural and offshore areas and the enhancement of vehicular technology; with respect to livelihood applications, create a friendly environment for EVs, increase the number of charging facilities, and provide incentives such as EV purchase subsidies and tax reduction to lower the threshold for transition to EVs. Meanwhile, continue to communicate with the society, collect feedback, promote dialogue between the public and private sectors, engage with members of the Just Transition Committee, external expert scholars, and the general public, and continuously review just transition strategies and measures.

Strategy 2: Encourage net-zero lifestyles and promote citizen transition to low-carbon lifestyles

2.1. Promote zero-waste low-carbon diet and environment-friendly green consumption behaviors

The key to achieving sustainability is promoting green dining, local production & local consumption, and low-carbon agricultural products. Green dining encourages the use of locally farmed ingredients, which helps reduce carbon emissions from food transportation and in turn alleviate the burden on the environment. Supporting the consumption of local agricultural products can promote the economic development of communities while reducing food waste. Promote eco-friendly daily essential products, circular procurement, and recycling practices, update and optimize the features of the “Green Lifestyle Information Platform,” including its green mark database, green procurement application system, and green mark guidance service information, and encourage governments, businesses, organizations, and educational institutions to purchase green-certified products. Require companies bidding for government procurement projects to submit green procurement documentation, include the "Evaluation (Review) Committee Scoring Sheet (evaluation includes Corporate Social Responsibility (CSR) indicators)" to add an additional incentive for purchasing certified products, which can effectively reduce resource waste and environmental burden.

2.2. Implement green building designs and services and strengthen the low-carbon infrastructure and the electricity resilience of public facilities

Design urban plans that align with Taiwan's local climate and ecosystems, draft measures for adapting Taiwan to future climate and environmental changes, thereby building a foundation for green buildings, ecocities, and a sustainable homeland, and engage in the R&D of sustainable building technologies that align with the four aspects of the EEWH certification system (ecology, energy-saving, waste reduction, and health). Meanwhile, promote legislation and practical applications as a stepping stone to strengthening the development of the green building industry and creating a sustainable and healthy environment. Ensure the electricity resilience of public facilities by such methods as self-generation, storage, and distribution of renewable electricity, create backup power solutions for unexpected outages, and use small or micro grids to strengthen the electricity resilience of science parks or large residential complexes and reduce their dependence on external sources of energy. Urge populated rural areas that have the potential to generate renewable electricity (e.g., tribal villages or farming communities) to build facilities to generate, store, and distribute renewable electricity, thereby supplementing urban renewable electricity demand. Replace old facilities with new energy-efficient options, such as fiber optic networks, server rooms, backbone networks, and submarine cables, to reduce energy consumption and increase the operational efficiency of the entire network. Encourage wastewater treatment plants to generate power from biogas, improve the energy efficiency of their biogas power generation equipment, and incorporate a smart energy management system to optimize energy generation and distribution and supply energy for use in other fields. In the meantime, upgrade incinerator furnaces to greener options with increased combustion efficiency and lower carbon footprint, and adopt SRF technology to promote the use of low-carbon and highly efficient fuels in local power grids to realize local energy supply solutions.

2.3. Build a low-carbon public transport network

Expand the scope of public transport strategies and spatial transformation designs, refine the public transport network step by step, effectively increase the efficiency of public transport, and improve the urban space design in such a manner that effectively integrates public transport stops/stations, pedestrian paths, and bike lanes to create a public transport-centered city. Meanwhile, adjust and transform field designs based on the growing demand for EV charging, and incorporate charging facilities into urban plans and designs. On the one hand, introduce policies to guide the development of domestic low-carbon transport industries and to attract investments in low-carbon transportation infrastructure, thereby creating an ecosystem of low-carbon transport related industries. On the other hand, adopt behavioral change theories in contemporaneous with evaluation methods to develop strategies and methods that inspire behavioral changes from various aspects of society, including education, laws, and incentives, and engage in the R&D and assessment of net-zero emission evaluation models to accurately determine the effectiveness of carbon reduction efforts.

2.4. Promote green recreational industries and guide green lifestyle behaviors

Collaborate with travel associations to organize travel industry transformation workshops, explore green travel problems and solutions, ramp up the transformation efforts of travel agencies, and guide people to travel sustainably. Infuse the concept of sustainable agriculture into registered leisure farms and agro-tourism spots, use agricultural, forestry, fishery, and livestock resources to develop itineraries that offer agricultural experiences, including agroecological recycling practices and agri-food education, and create a net-zero green lifestyles sphere.

2.5. Promote the decarbonization of the healthcare system and build a green public health environment

Install carbon inventory systems suitable for medical institutions to analyze their GHG emissions and suggest carbon reduction measures, and strengthen healthcare worker skills through training and observational learning activities. Suggest carbon reduction actions and provide subsidies for medical institutions to replace old equipment and obtain external verification (e.g., ISO certification). Meanwhile, implement environmental justice and fairness in health policies to reduce pollution-induced health problems and increase the resilience of the health infrastructure, thereby making public health facilities and services more effective.

2.6. Strengthen social communication and citizens' net-zero environmental literacy and promote industry transition to low-carbon emissions

Join forces with private and business organizations and use posters, instructional materials, and information related to lifestyle transition to organize promotional campaigns that encourage green net-zero lifestyles. Use literacy surveys and carbon performance evaluations as the basis for developing a carbon reduction pathway to achieve green net-zero lifestyles by 2050. Develop systematic transition strategies that focus on sports-related issues, cross-ministry collaboration, and social communication and provide them as a reference for ministries to solve social and humanistic problems that may occur in the transition to net-zero. Promote the knowledge of climate change and net-zero emissions, reinforce people’s climate risk awareness and response capability, develop educational materials for citizens to learn about climate adaptation and green net-zero lifestyles, and disseminate relevant knowledge through various channels including social media, audios and videos, and science forums. Ramp up awareness campaigns and build consensus through collaborations with social media and self-media (Facebook, YouTube, podcasts, videos, live streams) platforms. Deepen the learning of environmental topics in the 12-year basic education system by integrating core concepts such as net-zero emissions, resource recycling, energy, and just transition into environmental education, and by enriching teaching resources, enhancing teachers’ professional knowledge and skills, optimizing student learning environment, and urging youth actions. Build net-zero sustainability literacy among teachers and students, realize net-zero green lifestyles behaviors, and foster resilient, net-zero conscious citizens.

With the government leading by example and the encouragement of the private sector, integrate net-zero concepts into Taiwan's digital infrastructure, industries' digital transformation, and government procurement initiatives to promote the low-carbon transition of public services with technological innovation as a catalyst. Use financial mechanisms including the Green and Transition Finance Action Plan and Guidelines for Sustainable Finance Certification to help industries navigate through the low-carbon transition.

2.7. Conduct social research surveys to identify barriers to green lifestyles

Keep abreast of global trends related to green net-zero lifestyles, examine the results of questionnaire surveys and data analysis to determine the public perception of the importance of the 31 measures and 6 main aspects of green net-zero lifestyles, conduct focus group interview on barriers to green net-zero lifestyles, collect suggestions, launch cross-ministry collaboration to develop solutions to those barriers, and incorporate them into ministries' subsequent policy plans and reviews.

Target 4.3. Achieve green manufacturing and circular economy

Strategy 1: Promote a circular economy comprising sustainable production and consumption

1.1. Promote sustainable production

Provide consultation on green manufacturing and design, help companies develop smart evaluation tools for green manufacturing, and organize programs to diagnose and verify green manufacturing activities, thereby promoting green factory label, clean production certification, and green product verification systems. Integrate emerging environmental protection technologies into smart technology R&D, assess the carbon efficiency or economic benefits of pollution control equipment, renewable raw materials, low-carbon/alternative fuels, consolidate these data, and then implement low-carbon transition across industries through such measures as replacing old equipment, reducing emissions at the source, increasing the use of renewable energy, and integrating energy resources. At the product design stage, consider the product's environmental impact throughout its life cycle, and use materials and designs that are recyclable, reusable, or biodegradable. Encourage AIoT-based operations in industries to reduce waste of resources and increase recycling rate.

Concert efforts to conduct an inventory of pig farms that have not set up biogas reuse (power generation) facilities, and work with the Ministry of Environment to promote the reuse of manure wastewater resources and provide guidance on setting up compost sheds, biological treatment machines, and chicken manure composting facilities. Assist maritime waste recycling companies to establish carbon footprint and carbon emission baselines as models for assessing the economic and environmental benefits of commercial products, and provide carbon emission verification application and carbon footprint consultation and counseling services to enhance the role of maritime waste in the green product supply chain.

Strengthen companies' ability to manage sustainable production, set up an industrial smart disaster prevention expert platform through technical guidance on industrial safety to reinforce risk early warning mechanisms and independent management capability. In response to international specifications and standards, assist companies to strengthen their sustainability disclosure. Through cross-sector matchmaking and guidance lectures, apply advanced AI technology in environmental control to effectively improve factory environmental management and reduce pollutant emissions.

1.2. Promote sustainable consumption

Expand business opportunities in the green market, refer to the EU Ecodesign for Sustainable Products Regulation (ESPR), promote green products and green procurement demonstrations, engage in international green manufacturing exchange activities, increase consumer confidence in sustainable products, and enable sustainable consumption patterns. Assist SMEs by sharing with them case studies or information about regulatory verification to keep them abreast of international laws and standards, and strengthen their use of green marketing techniques to facilitate their venture into the green consumer market. Implement the interconnected integration of resources and information involving “logistics vehicle” within and outside the business system, and establish real-time tracking and resource distribution/sharing services to promote low-carbon logistics. Expand the scope of green procurement to include products with Friend of the Sea certification, adopt different propaganda methods to underline the value of products made from recycled ocean waste and foster public recognition of these products. Include in green procurement performance evaluation the following: products or services of circular procurement nature under inter-entity supply contracts, internationally certified products, and products prioritized for “rent rather than own”, and expand the scope of green product procurement items to provide more options for SMEs invested in green production.

Strategy 2: Develop technologies to achieve material circularity

2.1. Engage in the R&D of low-carbon technology and recycled materials

Conduct inventory of critical raw materials, build a green digital database, form smart circular economy alliances, conduct an inventory of, and develop critical circular raw materials. Establish field demonstrations of green manufacturing and promote the high-value application, testing, and verification of recycled materials.

Develop high-value recycling technologies in multiple fields such as plastics, textiles, aluminum, agricultural waste resources, and construction waste. For plastic waste, develop technologies to recycle and convert them into petrochemical raw materials, and convert textile waste into recycled polyester. Meanwhile, promote technologies that use low-carbon, high-quality circular aluminum materials, and encourage the technical verification of aluminum recycling production lines. For the food container packaging sector, evaluate applications for recycled plastic technology to ensure compliance with standards. In agriculture, develop circular technologies that recycle and concert agricultural waste resources into reusable materials and energy, and improve agricultural waste resource processing technologies, such as the high-value application of pineapple leaves and banana false stem. Recycle and reuse construction materials, renewable energy and energy storage equipment, electronic products, critical strategic materials, and plastics to achieve low-carbon emissions. Provide guidance on recycling and converting valuable construction waste resources into reusable materials, aggregates, and energy for reuse in downstream industries, thereby promoting waste recycling and reuse. Reduce process waste and promote the internal circulation and upcycling of materials. Strive for the end goal of helping companies develop green circular products and services through expert consultation, guidance, and technological R&D to achieve carbon reduction and a circular economy.

2.2. Promote green circular education and develop interdisciplinary talent

Organize promotional campaigns and educational programs to introduce consumers to the recycling and reuse of polymer materials. Train people to become high-caliber professionals in circular materials, green manufacturing, design source management, and digital and smart applications. Guide industries to engage in the innovation of pollution control technology and organize green technology workshops. Organize education and training workshops on sustainability and circular economy to help keep SMEs abreast of the global trends and development in this area.

Strategy 3: Foster local green supply chains

3.1. Strengthen the ability of supply chains to go green and create a sound green eco-supply chain

Form a green digital supply chain system composed of resource recycling companies, adopt digital energy/resource flow analysis technologies, discover and bridge recycling gaps, and in turn fortify the integrity of supply chains. Foster an environment for the green design industry, urge supply-chain companies at home and abroad to collaboratively develop green designs for critical industries such as electronics, energy, and petrochemical, collaborate with associations to adopt environmental safety management and digital verification, and establish demonstration cases. Encourage supply-chain companies to implement carbon disclosure, with large companies leading by example, establish a carbon management system, and use digital tools to drive supply chain transformation across industries – this strategy will involve creating a guidance team, distributing the government's guidance resources, and building a Digital Twin Transformation Guidance Network, with ministries collaborating to produce and publish industry action guidelines. Connect circular economy communities and operate and maintain green information platforms to drive business models for circular agricultural products or services, increase the commercial value of waste resources, and form alliances, thereby advancing the entire industry chain toward green, sustainable development.

In the green transformation of local industries and SMEs, focus on promoting green production technologies based on the use and scale of resources in local industrial clusters, and foster local resource recycling companies to establish real-life cases of low-carbon recycling and green circular economy, and accelerate the overall green transformation of the entire cluster. Provide government subsidies or rewards to incentivize low-carbon transition among small- and medium-sized suppliers and fortify their commitment to green operations. For the offshore wind power industry, focus on developing low-carbon application technologies and assisting wind power system operators to develop energy-efficient processes. Concurrently, through an inventory of green supply chains, identify local low-carbon circular materials, and assist SMEs to extend product lifecycles and develop applications, subsequently creating a local circular industry chain. Set up regional agricultural waste resource recycling sites in major counties and cities to improve recycling efficiency and reduce transportation costs and carbon emissions. Consider the importance of full forest utilization and recycling of forest resources and collaborate with local tribes to manage a forest waste recycling system, which drives the reuse of resources and also creates learning and job opportunities for indigenous peoples.

3.2. Align domestic industrial regulations with the global landscape

Keep abreast of environmental laws and policies, concert actions to set carbon reduction targets for supply chains, draft recommendations for regulatory adaptation, build mechanisms for industrial, government, and academic sectors to exchange environmental laws and technical know-how, assist with guidance programs for resource recycling companies, including guidance on compliance, building carbon management capability, and adopting circular economy measures or low-carbon technology, and help them become a part of the local green supply chain. Refer to EU regulatory amendments, enforce the adoption of circular materials in products, and effectively incentivize R&D initiatives in the industrial sector.

Target 4.4. Ensure stable electricity supply and decarbonization of electricity production

Strategy 1: Develop smart grids and energy storage technology

1.1. Strengthen power grid infrastructure and increase power grid resilience

(1) Strengthen renewable energy grids

I. For offshore wind power grid strengthening projects, aim to strengthen seven connection lines at seven stations by 2030 to increase the offshore wind grid connection capacity by 11 GW.

II. For PV grid connection projects, aim to strengthen ten connection lines at nine stations by 2030 to increase the solar PV grid connection capacity by 6.5 GW.

III. Launch dynamically renewable energy grid projects based on power source development locations and massing.

(2) Reduce regional inter-grid transmission problems

I. Improve power transmission capacity: By 2030, expand the capacity of transmission lines in the Longtan–Zhongliao section of the Ultra-High-Voltage Transmission (UHVT) Line #1 and the 345 kV Longqi (South)–Renwu line (from 1,000 MW to 3,000 MW); and expand the capacity of the Longtan–Emei line and Yihe–Zhongliao line along the UHVT #2, and the Zhuyuan–Zhongliao section of the UHVT #3 (from 2,000 MW to 3,000 MW).

II. Supply power directly to Southern Taiwan Science Park: By 2030, supply power from Yunlin–Chiayi–Tainan PV hotspots directly to the Southern Taiwan Science Park (STSP).

III. Assess the feasibility of high-voltage direct-current transmissions.

(3) Adopt power quality control facilities to strengthen power system stability

I. By 2030, install ±200 MVAR static synchronous compensators (STATCOM) in Changgong Substation, Yongxing Switching Station, STSP Substation, and Zhuyuan Substation.

II. Continuously review and incorporate power quality control equipment to strengthen power system stability.

(4) Upgrade or enhance the responsiveness of traditional power plants

I. Strengthen the responsiveness of natural gas-fired combined-cycle units (e.g., Datan No. 7, 8, and 9 units, Xingda, Taichung, Hsieh-ho, Tongxiao Phase II, and Dalin natural gas-fired combined-cycle units).

II. Adopt one-on-one natural gas-fired combined-cycle units.

III. Between 2030 and 2050, increase the ramp rate of natural gas-fired combined-cycle units from 5%/min to 7%/min.

(5) Achieve accurate forecasting of renewable power generation

I. Improve the accuracy of renewable energy forecasting. By 2030, reduce the day-ahead and hour-ahead forecasting errors for wind power generation to within 8% and 4%, respectively; reduce the day-ahead and hour-ahead forecast errors for solar PV power generation to within 10% and 5%, respectively.

II. Revise the "Technical Guidelines for Parallel Connection of Renewable Energy Power Generation Systems" to regulate changes in renewable energy output and the support for system frequency and voltage and require renewable energy companies to assume responsibility for system stability.

III. Monitor in real time 28 GW of renewable energy by 2030 to keep abreast of the status of more than half of renewable energy sources.

IV. Continuously improve access to real-time renewable energy information and forecasting accuracy, and review and formulate grid connection standards for renewable energy and various other emerging resources.

(6) Adopt energy storage systems

I. Set 2025 targets for power grids (1,000 MW) and power generation (500 MW).

II. Set 2030 targets for power grids (3,000 MW) and power generation (2,500 MW). (Targets must be continuously reviewed with the development of renewable energy and power grids based on a general assessment of the methods by which energy structures and power systems are integrated and strengthened.)

(7) Refine demand response management measures

I. Reach 3,000 MW by 2030 in demand response schemes.

II. Change the time slots in the time-of-use pricing system.

III. Promote time-of-use rates for EVs.

IV. Extend the summer pricing period for high-voltage users.

V. Continuously promote different time-of-use rates, review the time slots in the time-of-use pricing system, and expand demand response to include low-voltage users and promote this with the help of aggregators.

(8) Expand the electricity market

I. Continue to promote the Energy Trading Platform and develop different trading schemes and measures to improve the electricity trading market.

II. Promote the entry of emerging resources (e.g., energy storage and EVs) into the electricity market.

(9) Promote the integration of power grid information and communication system

I. Deploy 6 million users in the low-voltage advanced metering infrastructure (AMI) by 2030.

II. Establish 185 smart substations by 2030 (this includes adopting IEC-61850 in secondary substations, replacing IEC-61850 automated equipment in substations or transmission-grade digital protection relays).

III. Continue to establish low-voltage AMI and smart substations.

IV. Continue to develop big data/AI/localized grid management application technologies.

(10) Improve regional distribution and dispatching

I. By 2030, achieve 90% of incidents in which power downstream of automated feeders is restored within 5 minutes.

II. By 2030, install energy management systems (EMS) in seven regional dispatch centers nationwide.

III. By 2030, install advanced distribution management systems (ADMS) in 21 power distribution and dispatch centers nationwide.

IV. Continuously develop regional dispatch and microgrid operation models.

1.2. Enhance the ability to manage renewable energy generation and improve power generation forecasting technology

(1) Develop and employ advanced technologies for meteorological surveillance, analysis, and forecasting to improve the ability to forecast power generation from renewable energy sources; use AI and big data technologies to develop renewable power generation forecasting technology with high spatial and temporal resolution (within minutes and hundred meters) to ensure the safe and stable operation of power grids.

(2) Establish mechanisms for verifying renewable power generation forecasts: Assess the capability of different renewable power generation forecasting systems and the consistency and accuracy of the forecasts, and

then based on the results, establish mechanisms for certifying the systems to assure the quality of renewable power generation forecasting systems.

(3) Employ meteorological information and AI technology to support various types of power planning and management decisions required for power generation, transmission, distribution, and operation, and also to support the optimal configuration of the entire power system from production to user ends.

1.3. Improve smart grid and energy storage facility standards and specifications

(1) Improve smart grid interoperability and security-related standards or specifications, and build capacity for testing and verifying interoperability between smart grids and renewable energy products.

(2) Build capacity for testing the cybersecurity of grid device systems to enhance the cybersecurity of smart grids.

(3) Develop standards for large-scale energy storage systems, and build capacity for testing and ensuring the security of large-scale energy storage systems (ESS) and the functional safety of battery management systems (BMS), thereby creating a safe and sound operating environment for energy storage systems.

(4) Expand the scope of lithium-ion battery energy

storage facility testing to bridge safety testing gaps, integrate specifications for the establishment and installation of lithium-ion battery ESS testing systems, and develop non-lithium-ion battery testing technologies.

(5) Build capacity for testing EV ultra-high power charging facilities.

1.4. Improve disaster mitigation and safety assessment technologies for the use of green energy equipment and ESS in building spaces

(1) Improve technologies for preventing fire, mitigating disasters, and assessing the safety of using energy storage equipment in buildings.

(2) Improve technologies for preventing fire, mitigating disasters, and assessing the safety of using building-integrated photovoltaics (BIPV).

1.5. Develop frontier technologies for smart grids and ESS and foster talent

(1) Encourage interdisciplinary collaboration between academia and research institutes to conduct research on smart grids and energy storage technologies, build domestic research capacity, foster R&D skills in relevant fields.

(2) Develop advanced smart grid technologies, including diverse virtual power plant applications, user management technology, and microgrid applications and demonstrations, address the regional and variable

nature of renewable energy, and enhance grid resilience and flexibility.

(3) The R&D of smart grids and energy storage technologies will be focused on distributed, regional systems, long-term energy storage, digital grids, and smart grid management. Accordingly, integrate the interdisciplinary research of both the academic and research sectors into the development of forward-looking smart grid technologies, and through this, address the regional and variable nature of renewable energy to improve power supply stability and achieve carbon reduction goals.

1.6. Promote sustainable aviation fuels (SAF)

Establish a SAF platform; in terms of usage, add SAF flights at Taoyuan, Songshan, and Kaohsiung airports and require flag carriers to use at least 5% SAF; in terms of supply, secure SAF sources, permit the import of cooking oil waste and prohibit its export, and enforce rules to mandate that fuel suppliers must provide SAFs.

Strategy 2: Develop electricity decarbonization and energy conservation technologies

2.1. Promote diverse renewable energy policies and technologies

(1) Offshore wind power: Taiwan has developed strategies to implement its offshore wind power plan in three phases – Demonstration Incentives, Zones of Potential, and Zonal Development. Currently the plan

is in the Zonal Development phase, in which developers and electricity users are encouraged by a price competition mechanism to sign the Corporate Power Purchase Agreement (CPPA) to support domestic green electricity demands. The plan for the Zonal Development phase is to distribute a capacity of 1.5 GW annually from 2026 to 2035 in two-year phases, releasing a total of 15 GW. The ultimate objective is to develop emerging offshore wind power technologies, expand the usable areas for offshore wind power generation, and concurrently develop technologies and industries that operate and maintain offshore wind power to keep offshore wind farms in Taiwan running at optimal efficiency.

(2) Hydrogen (ammonia) energy:

I. Hydrogen energy: Promote hydrogen blending, gradually increase the use of hydrogen gas, with the aim of achieving hydrogen blending over the long-term, and generate stable zero-carbon electricity. The collaboration between Taipower and Siemens on “hydrogen blending power generation technology” demonstrated 5% hydrogen blending power generation in Hsinta Power Plant in 2025. Encourage domestic companies to adopt commercial stationary fuel cell power generation systems and offer incentives to expand the domestic distributed power network.

II. Ammonia energy: Develop efficient ammonia-to-hydrogen conversion technology, including efficient catalysts, reactors, and burners for ammonia conversion at moderate temperatures, diversify the development of self-generating hydrogen technologies, develop critical technologies for integrating ammonia-fed fuel cells, and develop “low-carbon fuel cells” power generation applications.

(3) Solar energy:

I. Prioritize rooftop systems: Conduct inventory to promote the installation of solar rooftop systems in public and campus buildings, mandate the use of green electricity, at least 10% for heavy electricity users, and in specific factories, and revise the Renewable Energy Development Act to regulate the installation of PV systems on newly constructed, expanded, or renovated buildings of a certain scale.

II. Increase land value by using ground-level land for multiple purposes: With compound land utilization as the focus, prioritize promoting lands that have achieved social consensus and are not associated with any environmental or ecological disputes, including aquavoltaic farms, lands unsuitable for agricultural operations, and polluted lands/landfills, and promote the installation of PV systems on idle lands in industrial zones to revitalize idle lands.

III. Develop agriculture in combination with green energy in an orderly manner, and amend applicable laws and regulations accordingly. If there is need for aquaculture technology, provide assistance through the relevant units of the Ministry of Agriculture.

(4) Geothermal energy:

I. Have the Geological Survey and Mining Management Agency and state-owned enterprises (SOEs) engage in exploration and development initiatives, and provide demonstration rewards to disperse exploration risks among SOEs: The Agency has been conducting surface geothermal explorations at ten sites across Taiwan (Datun Mountain, Ruisui, Yanping, Wulu, Guguan, Chunyang, Dongpu, Baolai, Taian, and Guanziling) to collect information on the potential of geothermal energy. SOEs (Taipower and CPC) have taken the lead in developing and setting up geothermal sites to increase well drilling capacity. CPC in collaboration with Academia Sinica drilled Taiwan's first 4,000-meter deep geothermal well at Yuanshan in Yilan to assess the deep heat sources in the area. The Regulations Governing Rewards for the Demonstration of Geothermal Power Generation will be enforced to help disperse early exploration risks among participating companies and encourage private participation in geothermal exploration and development.

II. Amend regulations relations to directional wells to reduce the use of land beneath earth's surface: Make plans to amend the "Renewable Energy Development Act" to exempt certain-depth directional wells from owner's consent, compensate the owner accordingly, and reduce land use control restrictions.

(5) Biomass: Continuously adjust the wholesale-purchase rates of biomass-generated electricity, encourage demonstration rewards to drive the development of the biomass energy industry, and ensure the reasonable use of domestic sources of biomass materials (animal manure, biomass waste, and agroforestry materials) to pragmatically promote the installation of power generation systems that use agroforestry materials, mash gas, and other sources of biomass materials; and subsidize marsh gas power generators if initial setup cost exceeds the wholesale-purchasing parameters – this increases setup willingness and helps promote the development of

biomass energy in Taiwan. Develop efficient biomass energy conversion technologies (such as gasification and anaerobic digestion technology) to facilitate multi-source applications.

(6) Marine energy: Continue to provide support in the form of wholesale-purchase rates, and assist in tackling application and setup challenges and in optimizing cross-ministerial communications; develop frontier marine energy technologies, conduct marine hydrological and ecological surveys, and supplement marine energy information and potential to increase investment in the marine energy industry and promote diversified marine energy development.

2.2. Develop renewable energy testing and verification technologies

(1) Develop floating and hybrid offshore wind power testing and verification technologies: Establish and install technologies for testing and verifying floating and hybrid offshore wind farms, develop non-destructive testing methods, and strengthen robot-assisted testing technologies.

(2) Develop large-sized and novel solar PV testing and verification technologies: Build capacity for testing and verifying large-sized and novel solar PV systems, formulate sea-based PV technology guidelines, and set up relevant testing and verification technologies.

2.3. Develop geologic carbon sequestration and surveillance technologies

(1) The Energy Administration, Taipower, and CPC jointly implemented a Carbon Capture and Storage (CCS) Trial Program and had set up field trials at Taichung Power Plant and Tiezhen Mountain in Miaoli County. The Energy Administration supported the development and verification of CCS monitoring technology, which can be applied in the field trials to verify that the geological conditions of Taiwan are feasible for CCS. The objective of this program is to commercially operate CCS in the future, which will be based on the geological survey data of land- and sea-based CCS and organized in accordance with the ISO standards, the National Standards of the Republic of China (CNS), and applicable laws and regulations promulgated by the Ministry of Environment. International CCS projects and the development experiences of Japan, Australia, Norway, Europe, the United States, and Canada are also described in the program to promote public awareness of CCS through social communication.

(2) Distributed acoustic sensing (DAS) technology: Create ground- or well-based DAS systems to record seismic wave data, develop optimized vibration recognition algorithms, and develop vertical seismic profiles (VSP) imaging technology to monitor the distribution and migration of clumped isotopes of

carbon dioxide at earth's subsurface within the CCS test site.

(3) Magnetotelluric monitoring technology: Create land-based or underwater electromagnetic exploration systems, develop electromagnetic signal receiver modules, and establish subsurface electrical conductivity baseline before storing the captured carbon underground at the CCS test site; monitor and analyze the changes in subsurface electrical conductivity caused by the injected carbon dioxide. Combine this process with other geophysical monitoring technologies to improve the resolution of the clumped isotopes of carbon dioxide stored in deep geological formation.

2.4. Develop efficient energy conservation technologies

(1) Explore moisture-absorbing materials and air-conditioning systems that control temperature and humidity separately, and develop innovative insulation materials to improve product electrothermal efficiency

I. Explore low-temperature recyclable moisture-absorbing materials and components and liquid desiccant dehumidifiers, use innovative materials and system architecture to control temperature and humidity independently, address the energy loss from supercooling traditional steam compressors for dehumidification purposes, and recover waste heat from condensers to reduce system energy consumption.

II. Explore high-performance insulation core materials, electric heaters, and commercial cold chain equipment; for electric heaters, improve the energy performance and at the same time develop instant (tankless) heat pump products to address the low efficiency of traditional resistive heating and for future application in industrial high-temperature heat pump products; for commercial cold chain equipment, develop low-carbon refrigerants and AI-powered smart control technology and improve domestic energy efficiency testing standards to bridge technical gaps.

(2) Build autonomy in the development of critical components and systems for semiconductor plant facilities, and use AI as copilot for optimal management

I. Improve domestically produced oil-free centrifugal compressors for in-plant applications, explore critical and auxiliary heat dissipation components for advanced oil-free air compressors to reduce system energy loss (pressure loss, heat loop loss, and leakage); and create a smart energy management platform to effectively control multiple compressors, and use AI to predict usage and optimize system parameters in real time.

II. Explore industrial energy management technologies, use AI to optimize the energy use of in-plant systems (air conditioners, air compressors, and drying processes), and use automated reporting to establish benchmarks for peer comparison of in-plant electricity consumption, which helps reduce electricity consumption in the semiconductor industry.

(3) Adopt wide-bandgap semiconductors (WBGSs) and develop new power conversion architecture

I. Apply high-frequency and low-loss WBGS devices, develop new power conversion architecture and driving strategies, and improve conversion efficiency to meet the market demand for miniature, low-loss, low-cost power supply equipment in AI information equipment markets.

II. Explore digital power control technologies, improve the average conversion efficiency of power supply equipment under different load power rates, integrate domestic semiconductor industries, and strengthen their leadership in the international community.

2.5. Develop frontier electricity decarbonization and energy conservation technologies and foster talent

(1) Fund research projects to encourage both academic and research sectors to develop emerging and frontier technologies relating to electricity decarbonization, alternative energy sources, and energy conservation (e.g., hydrogen energy, carbon capture), build up domestic research capacity, and foster skilled R&D talent.

(2) Develop frontier clean energy technologies: Consider the factors that drive the expansion of semiconductor manufacturing and EV promotion policies in the midst of the AI boom, and also Taiwan's electricity demand which is projected to grow annually at some 2.5% on average from 2024 to 2028, ensure a stable power supply while at the same time continuously promote the development, adoption, and application of renewable and forward-looking energy sources to align with international net-zero standards, assist industries with net-zero transition, and promote research on alternative energy sources such as marine energy, hydrogen energy, and geothermal energy to help reduce carbon emissions from electricity generation.

(3) Develop an internationally aligned monitoring, verification, accounting (MVA) system for CCS and CFE projects: Tap into Taiwan's experience with Taiwan Renewable Energy Certificates (T-REC) and

the relevant markets to develop internationally aligned CCS/CFE MVA methods and non-renewable energy CFE certificate mechanisms, which will support the demonstration of large-scale (ten-thousand-ton level) CCS technologies and the growth and commercial innovation of integrated technology verification test sites to promote the development of CCS and CFE industry ecosystems.

V. Strategies and Division of Labor for Important Measures

The Plan, which will be implemented by 19 government agencies, contains 4 goals, 16 targets, 53 strategies, and 249 measures related to the strategies. Table 4 lists the strategies and division of labor for the important measures.

Table 4. Strategies and division of labor for important measures

Goal	Target	Strategy	Measures	Ministerial Departments
1. Strengthen Smart Tech Ecosystem and Build an AI Island	1.1. Develop the Five Trusted Industry Sectors	1. Develop next-gen semiconductors, build innovative R&D platforms, and accelerate the research, development, and innovation of IC technology	1.1. Vertically integrate and promote the autonomous development of compound semiconductors to establish an ecosystem-based industrial model	Ministry of Economic Affairs / National Science and Technology Council
			1.2. Launch Å-generation semiconductor and compound semiconductor R&D projects	
			1.3. Promote heterogeneous integration and the R&D and innovation of advanced chip technologies, build the next-gen semiconductor capacity, and revitalize the HPC application market, including AI servers, multi-functional robots, and drones	
		2. Deeply cultivate AI-based core technologies, improve computing performance, and expand applications	2.1. Build a national AI computing technology and equipment development center	
			2.2. Discuss and establish national standards and specifications for HPC	

Goal	Target	Strategy	Measures	Ministerial Departments
1. Strengthen Smart Tech Ecosystem and Build an AI Island	1.1. Develop the Five Trusted Industry Sectors	2. Deeply cultivate AI-based core technologies, improve computing performance, and expand applications	2.3. Deeply cultivate AI-based core technology and continue to boost momentum in AI research	National Science and Technology Council / Ministry of Economic Affairs / Academia Sinica / Ministry of Transportation and Communications / Ministry of Digital Affairs
			2.4. Use AI to enable smart monitoring and emergency decision-making	
			2.5. Combine the capacity of industries, academia, and research institutes to research and develop autonomous AI-based core technologies and industry-specific application models for Taiwan	
			2.6. Join forces with industry associations to guide all sectors of the industry to adopt AI applications	
		3. Deploy next-gen communications technology, align with international standards, and accelerate cross-disciplinary applications	3.1. Develop 6G autonomous technology and establish an international presence	Ministry of Economic Affairs / Academia Sinica / National Science and Technology Council, Ministry of Digital Affairs
			3.2. Make forward-thinking plans for 6G spectrum resources to ensure sufficient supply and efficient use	
			3.3. Encourage industries to partake in international communication standards organizations and expand business opportunities in the areas of	

Goal	Target	Strategy	Measures	Ministerial Departments
1. Strengthen Smart Tech Ecosystem and Build an AI Island	1.1. Develop the Five Trusted Industry Sectors	3. Deploy next-gen communications technology, align with international standards, and accelerate cross-disciplinary applications	communications technology and international supply chain collaboration	Ministry of Economic Affairs / Academia Sinica / National Science and Technology Council, Ministry of Digital Affairs
			3.4. Strengthen the ability to develop space communications autonomously	
			3.5. Build a seamless and highly integrated communications network to make Taiwan's networks more resilient	
			3.6. Assist industries to adopt different communication and sensing technologies and environmental equipment	
		4. Optimize cybersecurity capability, build a trusted digital ecosystem, and adopt AI technology for optimal security assistance	4.1. Build a digital government cybersecurity governance environment, promote public–private collaboration on intelligence sharing, and deepen cyber defense and response resilience	Ministry of Digital Affairs / Ministry of Economic Affairs, Ministry of the Interior, National Science and Technology Council
			4.2. Keep abreast of frontier cybersecurity technology, create a sound industrial ecosystem, and strengthen the cybersecurity resilience of core industries	
			4.3. Promote AI-powered cybersecurity and build an AI network active defense R&D ecosystem	

Goal	Target	Strategy	Measures	Ministerial Departments
1. Strengthen Smart Tech Ecosystem and Build an AI Island	1.1. Develop the Five Trusted Industry Sectors	4. Optimize cybersecurity capability, build a trusted digital ecosystem, and adopt AI technology for optimal security assistance	4.4. Develop high bandwidth transmission interface and cognitive computing technology for AI chiplet, and implement verification for international output	Ministry of Digital Affairs / Ministry of Economic Affairs, Ministry of the Interior, National Science and Technology Council
			4.5. Upgrade security and surveillance products with AI and protect citizens' confidential data	
			4.6. Develop a smart search and rescue (SAR) decision support system to integrate cross-agency intelligence and assistive SAR operations	
			4.7. Promote the autonomous R&D and integration of AI technology and applications, and safeguard digital sovereignty in the era of AI to promote overall industrial upgrading	
		5. Strengthen collaborations on military-to-civilian technology, accelerate national defense transformation, and reinforce the country's autonomy in national defense R&D	5.1. Adopt innovative technology and strengthen autonomy in military aircraft repair and maintenance	Ministry of Economic Affairs / Ministry of Digital Affairs, National Science and Technology Council, Ministry of National Defense
			5.2. Integrate the capacity and resources of industries, academia, and research institutes, and continue to build defense autonomy	

Goal	Target	Strategy	Measures	Ministerial Departments
1. Strengthen Smart Tech Ecosystem and Build an AI Island	1.1. Develop the Five Trusted Industry Sectors	5. Strengthen collaborations on military-to-civilian technology, accelerate national defense transformation, and reinforce the country's autonomy in national defense R&D	5.3. Tap into domestic markets to promote the R&D and transfer of military–civil dual-use technology	Ministry of Economic Affairs / Ministry of Digital Affairs, National Science and Technology Council, Ministry of National Defense
			5.4. Establish military–civil exchange channels to reach a consensus on issues and needs related to national defense and cybersecurity	
	1.2. Promote plans for frontier technology	1. Develop quantum computers, quantum communication devices, and peripheral components, and promote the development and application of quantum software technology	1.1. Strengthen the stability of quantum systems and reduce quantum decoherence	National Science and Technology Council / Ministry of Economic Affairs, Academia Sinica, Ministry of Digital Affairs
			1.2. Increase qubit scalability and strengthen quantum error correction (QEC) technique	
			1.3. Develop and produce critical technologies required for large quantum computers	
			1.4. Develop cryogenic control circuits and modules, among other quantum computer components that industries need	
			1.5. Reduce R&D costs and promote commercial applications	

Goal	Target	Strategy	Measures	Ministerial Departments
1. Strengthen Smart Tech Ecosystem and Build an AI Island	1.2. Promote plans for frontier technology	1. Develop quantum computers, quantum communication devices, and peripheral components, and promote the development and application of quantum software technology	1.6. Develop quantum key distribution technology and build quantum networks	National Science and Technology Council / Ministry of Economic Affairs, Academia Sinica, Ministry of Digital Affairs
			1.7. Encourage transnational cooperation and promote investments in commercial applications	
			1.8. Establish theory-supported high-level quantum programming languages and quantum algorithms	
			1.9. Ramp up exploration efforts in quantum computer applications	
			1.10. Develop post-quantum cryptography (PQC) and post-quantum zero-knowledge proofs	
			1.11. Develop quantum silicon IP chips and testing technology, and urge industries to migrate to PQC	
		2. Develop medium/low Earth orbit (MEO/LEO) satellite manufacturing technology, and establish the ability to launch	2.1. Strengthen cross-sector collaboration, enhance Taiwan's technological capability in satellite components, and develop resilient satellite communication networks	National Science and Technology Council / Ministry of Economic Affairs, Ministry of

Goal	Target	Strategy	Measures	Ministerial Departments
1. Strengthen Smart Tech Ecosystem and Build an AI Island	1.2. Promote plans for frontier technology	spacecrafts and manufacture space-related components	2.2. Strengthen autonomy in R&D, establish a complete supply chain, and develop space weather prediction models	Digital Affairs, Ministry of Transportation and Communications
		3. Fortify basic marine research and exploration capability, develop marine atmospheric environmental monitoring, and protect marine ecosystems and biodiversity	3.1. Fortify basic marine research	Ocean Affairs Council / National Science and Technology Council, Academia Sinica, Ministry of Agriculture, Ministry of Transportation and Communications
			3.2. Enhance ocean space monitoring capability	
			3.3. Safeguard the ocean environment and biodiversity	
		4. Integrate biomedical and health care technologies, build collaboration mechanisms, and attract foreign and domestic investments in pharmaceutical R&D	4.1. Integrate innovative biomedical technologies across disciplines	Ministry of Health and Welfare / National Science and Technology Council, Ministry of Economic Affairs, Academia Sinica, Ministry of Agriculture
			4.2. Effectively integrate medical and health care resources	
		5. Develop frontier energy-related technologies such as	5.1. Improve frontier energy technologies and carbon reduction efficiency	National Science and Technology Council /

Goal	Target	Strategy	Measures	Ministerial Departments
1. Strengthen Smart Tech Ecosystem and Build an AI Island	1.2. Promote plans for frontier technology	low-carbon (decarbonization) and negative emissions technologies	5.2. Support the R&D of negative emissions technology and promote technology translation and validation	Ministry of Economic Affairs, Ministry of Environment, Academia Sinica, National Development Council, Ministry of Agriculture
		6. Build a data-empowered environment	6.1. Create a new data management framework	Ministry of Digital Affairs
			6.2. Make plans for the development of data convergence	
			6.3. Develop, test, and deploy privacy-enhancing technologies	
	1.3. Deepen democratic partnerships	1. Promote innovative chip applications and tech diplomacy and forge ties with international democratic partners	1.1. Cultivate a local IC design ecosystem, accelerate high-value chip commercialization, and co-create new industry value	National Science and Technology Council / Ministry of Economic Affairs, Ministry of Foreign Affairs
			1.2. Gather chip startups from around the world and transform Taiwan into an international IC design hub	

Goal	Target	Strategy	Measures	Ministerial Departments
1. Strengthen Smart Tech Ecosystem and Build an AI Island	1.3. Deepen democratic partnerships	1. Promote innovative chip applications and tech diplomacy and forge ties with international democratic partners	1.3. Deepen international cooperation to make Taiwan’s semiconductor industry more competitive	
			1.4. Recruit talents from world-class universities	
		2. Build a technically strong democratic supply chain	2.1. Build a cluster of drone industries and accelerate technological R&D and industrial upgrading	Ministry of Economic Affairs / National Science and Technology Council, Ministry of National Defense
			2.2. Expand into foreign markets to bolster the international competitiveness of Taiwan’s drone industry	
			2.3. Strengthen autonomy in drone critical technologies	
		3. Continue to ramp up the protection of Taiwan’s core critical technologies	3.1. Protect Taiwan’s core critical technologies from various aspects	Ministry of Economic Affairs / Ministry of Agriculture, National Science and Technology Council, Ministry of Digital Affairs, Ministry of National Defense
			3.2. Promote chip cybersecurity vulnerability assessment capabilities	
			3.3. Promote AI-powered cybersecurity technology and create an environment conducive to AI-enabled active defense R&D ecosystem	

Goal	Target	Strategy	Measures	Ministerial Departments
1. Strengthen Smart Tech Ecosystem and Build an AI Island	1.3. Deepen democratic partnerships	3. Continue to ramp up the protection of Taiwan's core critical technologies	3.4. Build platforms for dialogues with think tanks in democratic partner countries to shape cooperation consensus among nations and international opinions	
	1.4. Strengthen efforts to develop talents with foresight	1. Invest in the quality of higher education, education research, and internationalization	1.1. Support domestic higher education development and strengthen students' ability to foster core competencies	Ministry of Education
			1.2. Assist private universities to provide better salary and benefits for faculty members	
			1.3. Develop higher education characteristics and enhance the quality of instruction	
			1.4. Create a bilingual learning environment and develop talents with international communication skills	
			1.5. Deepen the international development of universities and recruit talents from world-class universities	

Goal	Target	Strategy	Measures	Ministerial Departments
1. Strengthen Smart Tech Ecosystem and Build an AI Island	1.4. Strengthen efforts to develop talents with foresight	2. Implement education that drives the development of visionary talents	2.1. Strengthen measures that support the development of talented scholars with expertise in humanities and social science	Ministry of Education / National Science and Technology Council, Ministry of Agriculture, Ministry of Health and Welfare, Academia Sinica
			2.2. Promote the cultivation of talents with interdisciplinary foresight and applied skills	
		3. Facilitate international bilateral exchange of visionary talents	3.1. Encourage universities to promote talent exchange	Ministry of Education / National Development Council, Ministry of Economic Affairs, Ministry of Agriculture, Ministry of Foreign Affairs
			3.2. Build a strategic partner talent network for unobstructed access to international research engagements	
2. Drive Twin Transformation with Innovation and Promote Balanced Development Across Industries	2.1. Promote industrialization of AI and intelligentization of industries	1. Combine generative AI and chips to promote innovative transformation across industries	1.1. Strengthen AI-clustered R&D of high-performance chips	Ministry of Economic Affairs / National Science and Technology Council, Ministry of Digital Affairs, Ministry of Transportation and Communications, Financial Supervisory Commission, Ministry of Agriculture
			1.2. Promote locally trusted large language models (LLMs) and applications	
			1.3. Promote the adoption of AI in SMEs and build an AI ecosystem for the service industry	
			1.4. Promote the integration of AI software and hardware facilities in smart machinery	

Goal	Target	Strategy	Measures	Ministerial Departments
2. Drive Twin Transformation with Innovation and Promote Balanced Development Across Industries	2.1. Promote industrialization of AI and intelligentization of industries	2. Attract international top AI companies to set up R&D center in Taiwan	2.1. Attract international AI companies to establish R&D center in Taiwan	Ministry of Economic Affairs / National Science and Technology Council
			2.2. Promote a Southern Taiwan Silicon Valley	
		3. Promote smart agriculture and fishery and a self-reliant food supply chain	3.1. Develop smart agricultural and fishery technologies	Ministry of Agriculture / Ministry of Economic Affairs, Ministry of Transportation and Communications
			3.2. Build a farmers' knowledge database	
			3.3. Develop climate-smart agriculture (CSA)	
		4. Align with international AI specifications and focus on niche applications in Taiwan	4.1. Improve Taiwan's laws and standards to build an environment that facilitates the development of AI industries	Ministry of Economic Affairs / Ministry of the Interior, National Science and Technology Council, Ministry of Digital Affairs
			4.2. Promote AI applications in the construction industry	
			4.3. Adopt AI tools and promote their use in manufacturing	
			4.4. Raise AI compliance awareness	
			1.1. Seize hold of technologies and talent that are critical to industries and promote	Ministry of Economic Affairs / National

Goal	Target	Strategy	Measures	Ministerial Departments
2. Drive Twin Transformation with Innovation and Promote Balanced Development Across Industries	2.2. Promote balanced development across industries	1. Encourage Taiwanese industries to be a part of the global supply chain	the development of forward-looking industries	Science and Technology Council, Ministry of Digital Affairs, Ministry of Health and Welfare
			1.2. Forge ties with international industries and vie for opportunities to collaborate with overseas entities	
		2. Promote commercial innovation applications	2.1. Adopt digital innovation technology and promote the application of commercial innovation services	Ministry of Economic Affairs / Ministry of Digital Affairs, Ministry of the Interior
			2.2. Drive technological applications and business innovation and expand international industrial cooperation and innovation services	
			2.3. Promote digital transformation and innovative applications in the construction industry	
		3. Develop financial technology (FinTech) for service diversification	3.1. Relax limitations on the scope of business trials and access to patent licensing, and expand the momentum of FinTech innovation	Financial Supervisory Commission / Ministry of Digital Affairs

Goal	Target	Strategy	Measures	Ministerial Departments
2. Drive Twin Transformation with Innovation and Promote Balanced Development Across Industries	2.2. Promote balanced development across industries	3. Develop financial technology (FinTech) for service diversification	3.2. Permit the operation of virtual asset businesses, explore FinTech development opportunities, and support finance transformation	Financial Supervisory Commission / Ministry of Digital Affairs
			3.3. Strengthen digital trust through fundings and guidance resources	
		4. Promote the balanced development and internationalization of science and industrial parks	4.1. Accelerate the revitalization and transformation of existing parks and integrate park resources	Ministry of Economic Affairs / National Science and Technology Council, Ministry of Environment, Ministry of Agriculture
			4.2. Expand industrial parks and increase industry diversity to achieve balanced development across regions	
			4.3. Connect science parks to the capacity of industry, academia, and research institutes, and strengthen technological innovation	
			4.4. Establish an overseas distribution channel for science parks and connect it to international markets	

Goal	Target	Strategy	Measures	Ministerial Departments
2. Drive Twin Transformation with Innovation and Promote Balanced Development Across Industries	2.3. Create a trusted supply chain	1. Use innovative technology to make the economy more resilient and supply chains more secure	1.1. Encourage technological R&D among semiconductor, 5G, and optoelectronic industries	Ministry of Economic Affairs / Ministry of Agriculture, Ministry of Digital Affairs, Ministry of Health and Welfare
			1.2. Establish domestic self-sufficiency in drones and vehicles to ensure secure supply chains for both civilian and defense industries	
			1.3. Promote the application of smart technology to achieve agricultural sustainability and enhance food security	
			1.4. Maintain and operate mechanisms and platforms for engaging in two-way dialogue with countries in the New Southbound policy, and strengthen the clustering of backup bases for overseas-based Taiwanese businesses	
			1.5. Adopt zero trust cybersecurity solutions and carry out cybersecurity maturity assessments to strengthen the cybersecurity of industrial supply chains	

Goal	Target	Strategy	Measures	Ministerial Departments
2. Drive Twin Transformation with Innovation and Promote Balanced Development Across Industries	2.3. Create a trusted supply chain	2. Strengthen the security of critical energy resource supply	2.1. Strengthen the regional allocation of water resources and the resilience of water supply, and enhance the safety of critical water infrastructure	Ministry of Economic Affairs / National Science and Technology Council, Ministry of Agriculture
			2.2. Promote energy transition and strengthen the resilience of electrical grids and gas supply	
			2.3. Achieve net-zero emissions and stable power supply, develop alternative renewable energy sources, and ensure the security of energy supply	
	2.4. Accelerate the twin transformation of SMEs	1. Promote the digital transformation of SMEs	1.1. Provide differentiated guidance and support for SMEs	Ministry of Economic Affairs / Ministry of Digital Affairs, Ministry of Transportation and Communications
			1.2. Promote innovation, R&D, and transformation	
			1.3. Promote smart transformation and verification	
			1.4. Foster digital talent through public–private partnerships	

Goal	Target	Strategy	Measures	Ministerial Departments
2. Drive Twin Transformation with Innovation and Promote Balanced Development Across Industries	2.4. Accelerate the twin transformation of SMEs	2. Improve SMEs' ability to carry out climate actions	2.1. Assist with promotional campaigns and empowerment	Ministry of Economic Affairs / Ministry of Digital Affairs, Ministry of Environment
			2.2. Provide consultation and diagnosis	
			2.3. Strengthen decarbonization consulting	
			2.4. Support sustainable innovations	
			2.5. Provide financial support	
	2.5. Invest in future generation of industry talent	1. Reinforce the Five Trusted Industry Sectors and strengthen the development of advanced tech talent	1.1. Integrate the capacity of industry, government, academia, and research institutes to build a talent pipeline comprising skilled professionals capable of developing and solving real-world problems of satellite and next-gen communication technologies	Ministry of Economic Affairs / Ministry of Education, National Science and Technology Council, Ministry of Digital Affairs, Overseas Community Affairs Council
			1.2. Pool international resources to increase the talent/R&D/design capacities of the satellite and next-gen communication industry	
			1.3. Bolster the teaching capacity of higher education institutions to cultivate industry-required talent	

Goal	Target	Strategy	Measures	Ministerial Departments
2. Drive Twin Transformation with Innovation and Promote Balanced Development Across Industries	2.5. Invest in future generation of industry talent	1. Reinforce the Five Trusted Industry Sectors and strengthen the development of advanced tech talent	1.4. Strengthen satellite system engineering and R&D capacity and foster critical next-gen communication talent	Ministry of Economic Affairs / Ministry of Education, National Science and Technology Council, Ministry of Digital Affairs, Overseas Community Affairs Council
			1.5. Leverage the teaching and technical capacities of industries, academia, and research institutes at home and abroad to continuously promote semiconductor talent training	
			1.6. Have public and private sectors cooperate to foster industrial AI application skills and accelerate industry-wide adoption of AI	
			1.7. Deepen the training capacity of industries, academia, and research institutions to build a diverse talent ecosystem	
			1.8. Expand the scope of international exchange and cooperation in critical areas and enhance the internationalization of talents and industries	
			1.9. Assist academic and research institutions to strengthen case sourcing and	

Goal	Target	Strategy	Measures	Ministerial Departments
2. Drive Twin Transformation with Innovation and Promote Balanced Development Across Industries	2.5. Invest in future generation of industry talent		early incubation mechanisms for germination programs	
		2. Invest in vocational education and foster technology talent (including green collar talent)	2.1. Strengthen the collaborative efforts of industries, the government, academia, and research institutes to establish a talent development system, and promote talent matching with industry needs, exchange, and cooperation	Ministry of Education / Ministry of Labor, Ministry of Environment, Ministry of Agriculture, Ministry of Transportation and Communications
			2.2. Reinforce talent development plans, implementation actions, and reward mechanisms to facilitate talent development	
		3. Enhance the training and development of elite athletes and sports professionals	3.1. Adopt a four-tier athlete training system and foster elite athletes for Taiwan	Ministry of Education
			3.2. Cultivate sports-related professionals including referees and anti-doping seed educators	

Goal	Target	Strategy	Measures	Ministerial Departments
3. Use Smart Inclusive Technologies and Create a Diverse, Inclusive, and Equitable Society	3.1. Create benefits for diverse group of people	1. Promote Long-term Care 3.0, increase accessibility to care technology, and alleviate caregiving burden	1.1. Promote smart care and the development of smart fields	Ministry of Health and Welfare / Ministry of Economic Affairs, Ministry of Digital Affairs, Ministry of Agriculture
			1.2. Promote green care in farming communities, and develop food and agriculture education and horticultural therapy courses to achieve healthy aging in place	
			1.3. Attach importance to user needs and feedback, promote interdisciplinary alliances across the industry chain, and establish field-linked business models	
			1.4. Offer fundings as a tool to facilitate innovation and development in the business sector	
		2. Promote in-home care and expand public health care services	2.1. Provide different home care service models to meet the medical needs of elderly people with disabilities	Ministry of Health and Welfare / Ministry of Economic Affairs
			2.2. Provide fundings as a tool to facilitate innovation and development in the business sector	

Goal	Target	Strategy	Measures	Ministerial Departments
3. Use Smart Inclusive Technologies and Create a Diverse, Inclusive, and Equitable Society	3.1. Create benefits for diverse group of people	3. Adopt smart technology to facilitate disease prevention and health promotion for all ages	3.1. Promote the National Physical Fitness Technology Program	Ministry of Health and Welfare / Ministry of Economic Affairs, Ministry of Education, National Science and Technology Council
			3.2. Promote and launch Sports for All across all sectors of society and industry	
			3.3. Build a flexible and resilient pandemic prevention and monitoring system, and formulate precise pandemic preparedness and prevention strategies	
			3.4. Develop a smart healthcare pandemic prevention system and pandemic prevention reporting advance alert mechanism	
			3.5. Concert inter-ministerial collaborative efforts and continuously integrate the pandemic research capacity of academic and research institutions to ensure solid groundwork for pandemic prevention	

Goal	Target	Strategy	Measures	Ministerial Departments
3. Use Smart Inclusive Technologies and Create a Diverse, Inclusive, and Equitable Society	3.1. Create benefits for diverse group of people	4. Strengthen public digital services that support vulnerable and polyethnic groups	4.1. Continuously improve system functions and data analysis to provide a reference for planning subsidy policies to support vulnerable groups	Ministry of Health and Welfare / Ministry of Economic Affairs, Ministry of Digital Affairs, Ministry of the Interior, Ministry of Transportation and Communications, Ministry of Education, Academia Sinica
			4.2. Develop AI module tools	
			4.3. Establish a next-generation electronic medical record (NGEMR) platform and promote NGEMR systems	
			4.4. Promote the integration and application of biomedical and health data and facilitate the compliant application of real-world data	
			4.5. Organize cross-life cycle health behavior surveys	
			4.6. Expand health big data and adjust application measures	
			4.7. Provide guidance on preparing school-age children for school and provide multi-faceted assistance to help children finish school	
			4.8. Develop people-centered, innovative, convenient, and sustainable smart government services	

Goal	Target	Strategy	Measures	Ministerial Departments
3. Use Smart Inclusive Technologies and Create a Diverse, Inclusive, and Equitable Society	3.1. Create benefits for diverse group of people	4. Strengthen public digital services that support vulnerable and polyethnic groups	4.9. Utilize emerging technologies to enhance the administrative efficiency and decision-making accuracy of government agencies	Ministry of Health and Welfare / Ministry of Economic Affairs, Ministry of Digital Affairs, Ministry of the Interior, Ministry of Transportation and Communications, Ministry of Education, Academia Sinica
			4.10. Strengthen the security and surveillance of digital systems and infrastructure resilience	
			4.11. Adopt AI technology to increase the accuracy of rules of risks	
			4.12. Promote the construction of communication networks in rural areas	
	3.2. Increase inclusivity	1. Combine technological applications, and ramp up efforts to preserve/revitalize cultural heritage and to promote education	1.1. Use digital technology to help promote archaeological data	Ministry of Culture / Hakka Affairs Council, National Science and Technology Council
			1.2. Incorporate contemporary creativity and technologies to present intangible cultural heritage in a new light	
			1.3. Promote the revitalization and regeneration of industrial and cultural heritage	

Goal	Target	Strategy	Measures	Ministerial Departments
3. Use Smart Inclusive Technologies and Create a Diverse, Inclusive, and Equitable Society	3.2. Increase inclusivity	1. Combine technological applications, and ramp up efforts to preserve/revitalize cultural heritage and to promote education	1.4. Set up a complete Liudui cultural content management system	Ministry of Culture / Hakka Affairs Council, National Science and Technology Council
			1.5. Incorporate digital data into local walking tours	
			1.6. Infuse into science parks the diverse cultural elements of neighboring areas to promote local co-prosperity	
		2. Promote the development of multi-cultural industries	2.1. Establish a National Language Research and Development Center to preserve and develop Taiwan's language culture	Ministry of Culture / Ministry of Health and Welfare, Hakka Affairs Council, Ministry of Economic Affairs
			2.2. Promote the revitalization of local arts and cultures	
			2.3. Use technology to optimize Hakka Tour services and boost the development of Hakka tourism and cultural industries	
			2.4. Use emerging technologies to increase the value of multi-cultural industries	
			2.5. Adopt digital technology to increase the competitiveness of creative life industries	

Goal	Target	Strategy	Measures	Ministerial Departments
3. Use Smart Inclusive Technologies and Create a Diverse, Inclusive, and Equitable Society	3.2. Increase inclusivity	2. Promote the development of multi-cultural industries	2.6. Make museum services culturally and technologically accessible to diverse groups of people	Ministry of Culture / Ministry of Health and Welfare, Hakka Affairs Council, Ministry of Economic Affairs
			2.7. Encourage intergenerational collaboration to pool interdisciplinary resources and provide innovative community services	
			2.8. Evaluate the feasibility of integrating technology into the field of culture and its impact on cultural art creation	
			2.9. Introduce S&T research resources to develop original works that feature experimental and cultural contents	
			2.10. Strengthen the role of public media in increasing the global visibility of Taiwan's perspectives and cultures	
			2.11. Use technology to expand the forms of creative art and guide public participation in experiencing the application of cultural technology	

Goal	Target	Strategy	Measures	Ministerial Departments
3. Use Smart Inclusive Technologies and Create a Diverse, Inclusive, and Equitable Society	3.2. Increase inclusivity		2.12. Integrate the capacity of legal entities and establish channels for international cooperation and marketing	
		3. Employ smart technology to build a friendly, inclusive environment free of discrimination and of barriers to digital technological services	3.1. Develop horticultural therapy technology and evaluation tools and promote a new industry combining agriculture and geriatric services	Ministry of Health and Welfare / Ministry of Economic Affairs, Ministry of Agriculture, Ministry of the Interior, National Science and Technology Council
			3.2. Develop courses, training programs, and operating models that encourage middle-aged and elderly adults to be more actively involved in farming	
			3.3. Launch campaigns to destigmatize mental illness and build a friendly society	
			3.4. Adopt an evidence-based approach to develop friendly prevention and care strategies for communicable disease cases	
			3.5. Optimize senior living and community environments and improve older adults' quality of life	
			3.6. Enhance the basic digital skills of new immigrants	

Goal	Target	Strategy	Measures	Ministerial Departments
3. Use Smart Inclusive Technologies and Create a Diverse, Inclusive, and Equitable Society			3.7. Build a sound environment for women entrepreneurship	
			3.8. Strengthen women's participation in scientific research and create a women-friendly research environment	
	3.3. Balance regional development	1. Balance urban–rural development and stimulate regional revitalization	1.1. Develop integrated care models for rural areas	Ministry of Health and Welfare / National Development Council, Ministry of Economic Affairs, Ministry of Agriculture, Ministry of the Interior
			1.2. Develop precision medicine	
			1.3. Reinforce the rural healthcare network	
			1.4. Promote regional governance for regional revitalization	
			1.5. Improve the regional revitalization support system	
			1.6. Refine land valuation systems	
			1.7. Shape urban and rural characteristics and strengthen business district marketing	
			1.8. Promote young farmer guidance and innovation in farming communities	

Goal	Target	Strategy	Measures	Ministerial Departments
3. Use Smart Inclusive Technologies and Create a Diverse, Inclusive, and Equitable Society	3.3. Balance regional development	2. Construct a smart and secure transportation system	2.1. Engage in technological innovation to create a better and safer transportation environment	Ministry of Transportation and Communications / National Science and Technology Council
			2.2. Support transportation-related academia research and talent development, and promote the development of road traffic safety technologies	
		3. Build a smart secure homeland	3.1. Create a smart social safety net	Ministry of Health and Welfare / Ministry of the Interior
			3.2. Use AI to optimize social safety net and implement family-centered services	
			3.3. Strengthen medical resource dispatch and stockpile management for disaster response to ensure emergency supply and social stability	
			3.4. Establish a risk case early warning module, and develop a mental health case management decision-making platform to strengthen front-end prevention and crisis management mechanisms	
			3.5. Develop mental health support service programs that align with local demands,	

Goal	Target	Strategy	Measures	Ministerial Departments
3. Use Smart Inclusive Technologies and Create a Diverse, Inclusive, and Equitable Society	3.3. Balance regional development	3. Build a smart secure homeland	and increase public mental health services and resources	Ministry of Health and Welfare / Ministry of the Interior
			3.6. Strengthen building resilience and durability, and promote research on smart earthquake resistance and wind engineering technologies	
			3.7. Enhance regional environment's disaster resistance	
			3.8. Reinforce forensic analysis technologies and knowledge to safeguard social stability and public safety	
			3.9. Strengthen digital intelligence and technology training to enhance police resilience and investigation capability	
			3.10. Optimize medical technology specifications and applications to facilitate more effective infectious disease surveillance and prevention	
			3.11. Establish a zoonotic disease surveillance and early warning mechanism and build a pandemic-ready talent pool	

Goal	Target	Strategy	Measures	Ministerial Departments
	3.3. Balance regional development	3. Build a smart secure homeland	3.12. Use smart technologies to strengthen digital services and improve medical information protection mechanisms	
4. Promote Green Lifestyles and Circular Economy and Strive for Net-Zero Emissions and Sustainability	4.1. Ramp up efforts to adapt to climate and environmental changes	1. Leverage net zero technology to maximize the effectiveness of interdisciplinary climate governance capacity	1.1. Build models to evaluate net-zero emissions analysis platforms and establish a key net-zero strategy technical parameter database	Ministry of Environment / National Science and Technology Council, Ministry of Agriculture, Ministry of Transportation and Communications Academia Sinica
			1.2. Integrate net-zero technologies and resources across disciplines and promote climate services for net-zero emissions	
			1.3. Establish a national scientific research and application platform for emerging energies and generate CFE	
			1.4. Enhance climate risk disaster management capability and improve infrastructure in response to climate change	
			1.5. Promote a climate adaptation research ecosystem and strengthen the scientific research capacity required for evidence-based climate governance	

Goal	Target	Strategy	Measures	Ministerial Departments
4. Promote Green Lifestyles and Circular Economy and Strive for Net-Zero Emissions and Sustainability	4.1. Ramp up efforts to adapt to climate and environmental changes	2. Accelerate amendments to laws and regulations related to climate adaptation	2.1. Draft amendments to the Climate Change Response Act and improve climate adaptation actions	Ministry of Environment / Ministry of Transportation and Communications, Ministry of Economic Affairs
			2.2. Draft amendments to meteorology-related laws and improve the environment for the development of the meteorological industry	
			2.3. Continuously review energy and industry adaptation implementation guidelines	
			2.4. Review transportation system adaptation guidelines	
		3. Develop a biodiversity database for Taiwan	3.1. Develop the Taiwan Biodiversity Information Alliance (TBIA) and establish data integration and open data standards	Ministry of Agriculture / Ocean Affairs Council, Ministry of Economic Affairs, National Science and Technology Council
			3.2. Expand river ecology survey efforts	
			3.3. Conduct inventory of biological and ecological resources and establish conservation and restoration plans	

Goal	Target	Strategy	Measures	Ministerial Departments
4. Promote Green Lifestyles and Circular Economy and Strive for Net-Zero Emissions and Sustainability	4.1. Ramp up efforts to adapt to climate and environmental changes	4. Improve climate risk monitoring capabilities and develop smart monitoring systems, early warning technology, real-time response systems, and interdisciplinary climate adaptation technology	4.1. Improve IoT setups in smart cities	Ministry of Environment / National Science and Technology Council, Ministry of Agriculture, Ministry of Economic Affairs, Ministry of Transportation and Communications, Ministry of Digital Affairs, Ministry of Health and Welfare, Ministry of the Interior, Academia Sinica
			4.2. Strengthen research on the health impact of climate change and promote global sharing of health and climate data	
			4.3. Develop smart technologies and applications for satellite positioning, mobile mapping, and three-dimensional surveying and mapping	
			4.4. Set up an agricultural meteorological data center to strengthen agriculture-related disaster alert and reporting applications	
			4.5. Strengthen the debris flow and large-scale landslide response mechanisms and build an evidence-based disaster prevention system	
			4.6. Expand flood monitoring capacity	
			4.7. Improve the Sensor-based Water Resources Operating Platform with Internet of Things (a.k.a. IoW Platform)	
			4.8. Build teams to foster industrial competitiveness, and erect an industrial	

Goal	Target	Strategy	Measures	Ministerial Departments
4. Promote Green Lifestyles and Circular Economy and Strive for Net-Zero Emissions and Sustainability	4.1. Ramp up efforts to adapt to climate and environmental changes	4. Improve climate risk monitoring capabilities and develop smart monitoring systems, early warning technology, real-time response systems, and interdisciplinary climate adaptation technology	cooperation platform to expand business opportunities	Ministry of Environment / National Science and Technology Council, Ministry of Agriculture, Ministry of Economic Affairs, Ministry of Transportation and Communications, Ministry of Digital Affairs, Ministry of Health and Welfare, Ministry of the Interior, Academia Sinica
			4.9. Set up diverse heterogeneous emergency response networks and verify the public protection and disaster relief (PPDR) system	
			4.10. Strengthen the resilience of the transport infrastructure and maintain management technology	
			4.11. Strengthen port environment and vessel monitoring alert technology	
			4.12. Strengthen the ability to keep abreast of climate risks and enhance warning and real-time response systems	
			4.13. Develop observation and telemetry technologies, expand the seismic monitoring network, and establish a regional monitoring network	
			4.14. Promote climate forecasting in cross-disciplinary climate adaptation technologies to mitigate the impact of extreme weather events	

Goal	Target	Strategy	Measures	Ministerial Departments
4. Promote Green Lifestyles and Circular Economy and Strive for Net-Zero Emissions and Sustainability	4.2. Promote net-zero lifestyles and a just transition	1. Ensure just transition for different individuals, groups, industries, and regions	1.1. Ensure equal development opportunities for individuals, industries, and groups to share the positive outcomes of net-zero transition	Ministry of Environment / National Development Council, National Science and Technology Council, Ocean Affairs Council, Ministry of Labor, Ministry of Transportation and Communications, Ministry of Economic Affairs, Ministry of Education, Financial Supervisory Commission
			1.2. Improve the dispute handling mechanism to facilitate the transition to net zero	
			1.3. Promote cross-disciplinary and cross-departmental collaborations and deepen people's understanding and practice of just transition	
			1.4. Reduce impact on stakeholders and realize the core value of leaving no one behind	
		2. Encourage net-zero lifestyles and promote citizen transition to low-carbon lifestyles	2.1. Promote zero-waste low-carbon diet and environment-friendly green consumption behaviors	Ministry of Environment / Ministry of Agriculture, National Science and Technology Council, Ministry of Transportation and
			2.2. Implement green building designs and services and strengthen the low-carbon infrastructure and the electricity resilience of public facilities	

Goal	Target	Strategy	Measures	Ministerial Departments
4. Promote Green Lifestyles and Circular Economy and Strive for Net-Zero Emissions and Sustainability	4.2. Promote net-zero lifestyles and a just transition	2. Encourage net-zero lifestyles and promote citizen transition to low-carbon lifestyles	2.3. Build a low-carbon public transport network	Communications, Financial Supervisory Commission, Ministry of Labor, Ministry of Health and Welfare, Ministry of Education, Ministry of Economic Affairs
			2.4. Promote green recreational industries and guide green lifestyles behaviors	
			2.5. Promote the decarbonization of the healthcare system and build a green public health environment	
			2.6. Strengthen social communication and citizens' net-zero environmental literacy and promote industry transition to low-carbon emissions	
			2.7. Conduct social research surveys to identify barriers to green lifestyles	
	4.3. Achieve green manufacturing and circular economy	1. Promote a circular economy comprising sustainable production and consumption	1.1. Promote sustainable production	Ministry of Economic Affairs / Ministry of Agriculture, Ocean Affairs Council
			1.2. Promote sustainable consumption	

Goal	Target	Strategy	Measures	Ministerial Departments
4. Promote Green Lifestyles and Circular Economy and Strive for Net-Zero Emissions and Sustainability	4.3. Achieve green manufacturing and circular economy	2. Develop technologies to achieve material circularity	2.1. Engage in the R&D of low-carbon technology and recycled materials	Ministry of Economic Affairs / Ministry of Health and Welfare, National Science and Technology Council, Ministry of Agriculture, Ministry of Environment, Ministry of the Interior
			2.2. Promote green circular education and develop interdisciplinary talent	
		3. Foster local green supply chains	3.1. Strengthen the ability of supply chains to go green and create a sound green eco-supply chain	Ministry of Economic Affairs / National Science and Technology Council, Ministry of Agriculture
			3.2. Align domestic industrial regulations with the global landscape	
	4.4. Ensure stable electricity supply and decarbonization of electricity production	1. Develop smart grids and energy storage technology	1.1. Strengthen power grid infrastructure and increase power grid resilience	Ministry of Economic Affairs / Ministry of Transportation and Communications, Ministry of the Interior, National Science and Technology Council
			1.2. Enhance the ability to manage renewable energy generation and improve power generation forecasting technology	
			1.3. Improve smart grid and energy storage facility standards and specifications	

Goal	Target	Strategy	Measures	Ministerial Departments
4. Promote Green Lifestyles and Circular Economy and Strive for Net-Zero Emissions and Sustainability	4.4. Ensure stable electricity supply and decarbonization of electricity production	1. Develop smart grids and energy storage technology	1.4. Improve disaster mitigation and safety assessment technologies for the use of green energy equipment and ESS in building spaces	Ministry of Economic Affairs / Ministry of Transportation and Communications, Ministry of the Interior, National Science and Technology Council
			1.5. Develop frontier technologies for smart grids and ESS and foster talent	
			1.6. Promote sustainable aviation fuels (SAF)	
		2. Develop electricity decarbonization and energy conservation technologies	2.1. Promote diverse renewable energy policies and technologies	Ministry of Economic Affairs / National Science and Technology Council, Ministry of Agriculture, Ocean Affairs Council
			2.2. Develop renewable energy testing and verification technologies	
			2.3. Develop geologic carbon sequestration and surveillance technologies	
			2.4. Develop efficient energy conservation technologies	
			2.5. Develop frontier electricity decarbonization and energy conservation technologies and foster talent	

VI. S&T Development Goals of Government Departments and Agencies

Academia Sinica

Academia Sinica aims to achieve global excellence in research, fulfill key social responsibilities, and recruit and cultivate outstanding talents.

Ministry of the Interior (MOI)

The MOI implements a whole-of-the-society defense resilience policy, which aims to achieve the following objectives: ensure a sound homeland planning system and increase its capacity for compound disaster prevention and rescue; use infographics in disaster prevention and rescue, strengthen critical infrastructure protection, and provide emergency medical care and refuge facilities for whole-of-the-society defense resilience; increase the value-added applications and dimension of spatial data to improve public services and strengthen the digital resilience of critical infrastructure; strengthen forensic technology and professional knowledge to maintain social stability and public safety; keep abreast of cybersecurity hijacking, increase the capacity for technological investigations into cyber attacks, and strengthen the security of information and communication networks for whole-of-the-society defense resilience; technologically strengthen passenger identity verification to safeguard national security; construct a digitally empowered diverse environment, set up smart monitoring, and increase digital resilience; build a smart search and rescue dispatch system to digitally integrate cross-agency intelligence and assisted search and rescue operations; build smart emergency medical networks, provide a one-stop data platform for cross-agency information collaboration, and ensure emergency medical preparedness for whole-of-the-society defense resilience; adopt AI technology to realize smart online household registration application services; use AI to promote data governance and develop a wide range of smart services, including standard data management, automated data refining, smart data application, and value-added data services; and improve the accuracy of disaster prediction and early warning, enhance citizens' disaster prevention and mitigation capabilities, and increase emergency evacuation capacity for whole-of-the-society defense resilience.

Ministry of National Defense (MND)

In line with the forward-looking requirements for weapons R&D and the predicted trends of national defense technology development, the MND aims to leverage the strengths of domestic academia, engage in foundational technology research for the early phases of weapon system development, and foster national defense science and technology research capacity.

Ministry of Finance (MOF)

The MOF aims to innovate ICT and applications to enhance the value-added benefits of AI; deepen the application of AI to refine tax data analysis and enhance the efficiency of review assistance; expand the scope of local tax online services and improve relevant services; streamline cloud invoice services, making them more user friendly to increase the value and efficiency of application; incorporate AI technology to refine system functions and optimize service processes; engage in the digital innovation of tech-based inspection operations to achieve safer and more efficient custom clearances; upgrade technological inspection equipment to strengthen the capacity of border enforcements; refine AI applications to strengthen the performance of customs operations; leverage public cloud infrastructure to promote cloud-generation fiscal services; promote the integration of tax services into public cloud platforms to optimize the quality of public services; and integrate public cloud environment with AI technologies to provide excellent customs clearance services.

Ministry of Education (MOE)

The MOE aims to promote interdisciplinary innovation and cooperation between the humanities and science and technology (S&T) and cultivate interdisciplinary talents; bolster the development of forward-looking S&T talents and strengthen industry–academia–research ties to activate value creation pathways from research results; increase the quality of higher education and recruit international forward-looking talent to promote the internationalization of higher education; and refine the diverse talent cultivation system in industry–academia collaborations and foster industry talents with key competencies and internationally competitive industry talents to bolster industry competitiveness.

Ministry of Justice (MOJ)

The MOJ aims to build a sound judicial investigations and enforcements database, integrate information platforms and systems, promote cross-disciplinary integration of information resources and services, and leverage AI and other emerging technologies to enhance the quality and performance of justice administrations; enhance cybersecurity defense capability and promote resource sharing to create a stable, secure environment for legal operations; develop AI assistant prosecutors to aid prosecutors in handling case reviews and public appeals, thereby increasing the efficiency and accuracy of prosecutions to attain the ultimate goal of achieving justice in the judicial system; use digital technologies to promote the technological innovation of prison administrations and strengthen the effectiveness of the judicial system in safeguarding human rights; and use generative AI to summarize prosecution documents for structured organization, which will serve as the basis for information integration and provide a quantitative reference for the rational allocation of anti-fraud resources and the development of appropriate rehabilitation treatments, thereby improving the quality of criminal policies and the efficiency of crime prevention.

Ministry of Economic Affairs (MOEA)

The MOEA aims to guide industrial innovation, transformation, and development patterns, strengthen the value of industrial innovation and R&D, and build the sustainable foundation of the industrial environment.

Ministry of Transportation and Communications (MOTC)

The MOTC aims to create a low-carbon transportation environment and achieve the transportation sector's GHG emission reduction targets; keep abreast of the momentum of international sea and air transportation, strengthen the transformation of smart applications, improve the functions of international sea and air transportation hubs, build international logistics capabilities, and promote the upgrading of sea and air transportation industries; strengthen the resilience of the transportation infrastructure and maintain management technologies to enhance the facilities' climate adaptation capability; gain insight into the characteristics of sea weather and climate change conditions in commercial ports, use emerging technologies to monitor and more effectively ascertain regional characteristics, and enhance ports' smart disaster prevention and climate adaptation capabilities; integrate the environmental monitoring systems of commercial ports, expand valued-added IT applications, commit to the R&D of coastal and port bay disaster prevention and mitigation technologies, and increase emergency preparedness and response efficiency; through technological and technical applications, induce mobility behavior change to reduce carbon emissions, ensure the mobility rights and enhance the safety of vulnerable road users, strengthen the field innovation, implementation, and verification of the Internet of Vehicles (IoV) as well as the industrial application of Taiwan's Cooperative Intelligent Transport Systems (C-ITS); strengthen meteorological/marine weather (cross-disciplinary), disaster prevention, and smart IT applications; and improve earthquake, tsunami, and volcano monitoring and early warning capabilities, and reinforce earthquake precursors analysis technology.

Ministry of Labor (MOL)

The MOL aims to promote research on workplace safety, health, and labor protection, establish autonomous, fair, and just labor relationships, create healthy and safe work environments, and enhance labor rights, safety, and health.

Ministry of Agriculture (MOA)

The MOA aims to promote agricultural innovation, increase the practicality of scientific research, develop new net-zero technologies, improve resilience, increase carbon sinks, maintain the health of plants and animals to ensure supply and security, conserve natural ecosystems to achieve the sustainability of environmental resources, implement digital transformation, and attach importance to social science.

Ministry of Health and Welfare (MOHW)

The MOHW aims to foster a healthy, happy society, ensure a safe living environment, prevent and control major diseases in citizens, sustainably provide high quality medical services, build excellent care service systems, improve social welfare systems, strengthen infrastructure, and develop biomedical and health care industries.

Ministry of Environment (MOENV)

The MOENV aims to promote green lifestyles, strengthen climate and environmental adaptation capabilities, and strive for net zero sustainability; promote turning waste into resources, establish a management system, revive the resource circular economy, and achieve environmental sustainability; manage chemical substances and integrate information more effectively to combat disaster risks and challenges using a multi-faceted approach; develop new generation environmental monitoring and sensing technologies, and use smart technologies to promote environmental health and safety; optimize Internet of Things (IoT) based environmental quality sensing systems, deepen AIoT applications, and promote technological innovation; and develop satellite-based air pollution and GHG remote observation technologies to enhance the spatial resolution of observations.

Ministry of Culture (MOC)

The MOC aims to build cross-disciplinary collaboration platforms for cultural technology industries; adopt practice-based talent training models; establish cultural venues as exhibition platforms; build cultural technology brand enterprises; establish publicly accessible, educational, and inspirational venues for cultural technology, arts, and digital convergence; and foster Taiwan's global influence in promoting sustainable development.

Ministry of Digital Affairs (MODA)

The MODA strives to create trusted network environment; optimize cybersecurity tools, improve platform mechanisms, and strengthen joint defense systems; deepen defense technologies to protect critical infrastructure and trusted network environment; enhance the digital resilience of networks and society; strengthen digital networks, improve backup response capabilities, and enhance network resilience; encourage digital innovation and promote digital empowerment for all to create a resilient society; advance the digital transformation of the public and private sectors; accelerate digital transformation, upscale the digital industry, and expand into international markets; optimize the smart government, and promote data convergence and data governance.

National Development Council (NDC)

Through the Asia Silicon Valley Development Plan 3.0, the NDC aims to assist in realizing the vision of becoming an "Innovation Economy and Smart Nation," drive the international exportation of AIoT, and develop a thriving startup rainforest ecosystem; use links to emerging smart technologies to integrate smart technologies into electronic document exchange services, document archive information systems, and the security measures of document archive information and communications systems.

National Science and Technology Council (NSTC)

The NSTC aims to facilitate the cross-disciplinary consolidation of S&T governance and strive for twin transformation to build a smart island; build basic research capacity, commit to innovation efforts, and integrate core scientific research resources to generate synergy; gain insight into society's needs, nurture diverse talent, and deepen international cooperation to seize global opportunities; expand the scope of industry–academia collaboration to encourage innovation and entrepreneurship, and foster a healthy Taiwan with the value of humanities and social sciences as the catalyst; guide industries to transform and develop unique characteristics, thereby facilitating the balanced development of sustainable parks across regions.

Ocean Affairs Council (OAC)

The OAC aims to achieve a smart, safe, and sustainable ocean—for a smart ocean: continue to conduct basic surveys, use emerging technologies, convert data into information, and seek solutions to ocean issues; for a safe ocean: use surveillance technologies and data analytics to enhance response capability, ensure the safety of marine activities and coastal communities, and reduce risks to the environment and the people in it; for a sustainable ocean: provide solutions to address Taiwan's ocean issues; and use innovative technologies to facilitate the upgrading of the maritime industry, promote green economic models, encourage industries, academia, and research institutions to jointly develop production methods that harmonize the environment, and maintain ecological balance and health.

Council of Indigenous Peoples (CIP)

The CIP aims to strengthen and increase access to wireless broadband in indigenous areas, pool resources from authorities in charge of smart applications, and use ICT software and hardware solutions as well as application services to promote digital applications in indigenous communities, care for indigenous peoples, improve their quality of life, drive industrial innovation, and ultimately bridge the digital divide in indigenous communities. The CIP strives to implement a net zero technology think tank and build a model for indigenous communities to engage in low-carbon production with increased carbon capture capacity; strengthen the nutrition care process for older adults who live alone and are registered on the IT system of the Indigenous Peoples Cultural Health Station; assist older adults who live alone in using AI technologies to ensure their safety and care at home; deepen the digital governance system, integrate central and local resources, analyze data, identify pain points, and develop solutions to serve as the basis for policy formulation, mid to long term planning, and budget allocation for indigenous peoples.

Hakka Affairs Council (HAC)

The HAC aims to use technology to provide tourists with insights into local Hakka cultures, thereby elevating their experience when touring in Hakka communities; design and develop a smart Hakka Tour sightseeing map that provides tour routes and itinerary suggestions; use Web AR and IoT technologies to set up a virtual stamp collection system along the Raknus Selu Trail and a tung tree flowering forecast system, provide comprehensive digital guide services in real time, and attract tourists to visit during tung tree blossom seasons, thereby boosting the development of Hakka tourism and cultural industries.

Public Construction Commission (PCC), Executive Yuan

The PCC aims to improve its public cloud systems for more effective and transparent management, thereby facilitating digital transformation; use AI to support data analysis and decision making, and strengthen construction quality to achieve sustainable development; reinforce the government’s privacy and data security, ensure data access compliance, and reduce cybersecurity risks; integrate cloud into AI applications, create an efficient, transparent, secure digital governance model to more effectively manage public construction projects, promote smart city development, ensure information security and privacy protection, and realize the government’s vision for digital innovation.

Directorate-General of Personnel Administration (DGPA), Executive Yuan

The DGPA aims to use AI and innovative information technologies to develop smart, sustainable government human resources; comprehensively enhance the AI literacy of public servants, and reinforce the innovative application of AI in government policies, administrative management, and public services.

National Palace Museum (NPM)

The NPM aims to adopt digital technologies to implement digital transformation and digital enhancement of its collections, exhibitions, education, and research in hopes of becoming technologically empowered to provide "professional services as an open, diverse, friendly, inclusive, and sustainable entity," and combine technology with culture to align with international communities, thereby becoming a museum for everyone in Taiwan and around the world.

Nuclear Safety Commission (NSC)

The NSC aims to reinforce its atomic energy control technologies to safeguard public safety; ensure the proper use of atomic energy technologies to enhance social wellbeing; and develop next-generation energy technologies to achieve net-zero emissions for sustainability.

Taiwan Transportation Safety Board (TTSB)

The TTSB aims to increase the quality and efficiency of occurrence investigations and reinforce the management of safety improvement suggestions by improving its technological capacity to conduct occurrence investigations; and thereby improve transportation safety by conducting safety research to promote the exchange of safety information and conducting impartial investigations into major incidents to avoid recurrences.

VII. S&T Resource Allocation of the Central Government

The development of Taiwan's S&T policies is based on multiple mechanisms of government agencies, including important meetings (e.g., the National Science and Technology Conference, Strategy Review Board meetings, Bio Taiwan Committee meetings, and Science & Technology Advisory meetings), the Executive Yuan's key initiatives (e.g., the Five Trusted Industry Sectors promotion plans, six core strategic industry promotion plans, and six major regional flagship projects), and the strategic areas of the ministries' initiatives (e.g., technological development and industrialization). Based on the consensus and conclusion report of the 12th National Science and Technology Conference, the National Science and Technology Development Plan proposes the main goals and targets of S&T development for the period from 2025 to 2028. As one of the sources of Taiwan's S&T policies, the Plan will be implemented by all participating agencies across the government, which shall adjust and allocate existing resources in accordance with policy objectives and promotion strategies.

Regarding the government's S&T resource allocation, all agencies concerned will present their plans with required budgets which will be based on the main policy initiatives of the Executive Yuan, agencies' S&T development plans, and conclusions of major meetings. The plans proposed by the agencies concerned will be reviewed by the BOST and MOST and then presented to the Executive Yuan for final approval. The agencies concerned will then write up a budget proposal, which is then submitted to the Legislative Yuan for review. In 2024, the central government's overall S&T budget is NT$151.7 billion, with the S&T budget demands for 2025 to 2028 estimated to be NT$159.5 billion, NT$180 billion, NT$ 189 billion, and NT$198.5 billion, respectively

(Table 5). Relevant strategies will be adjusted in a rolling manner based on the actual amount allocated.

Table 5. Estimated S&T budget for 2025–2028

Unit: NT$ 100 million; %

Year	2025	2026	2027	2028
Overall S&T budget	1,595	1,800	1,890	1,985
GDP estimate	268,148	276,192	284,478	293,013
Ratio	0.60	0.65	0.66	0.68

Data source: NSTC

Notes:

(1) The Directorate-General of Budget, Accounting and Statistics estimated the 2025 GDP growth to be 3.29%. The NDC estimated the GDP growth for 2025–2028 to be approximately 3.2% (estimated interval 2.8%–3.6%). The budgets after 2025 are tentatively estimated using an annual GDP growth of 3%.

(2) This budget plan is for reference only. To preserve fiscal stability and consider the impact of the amendments to the Act Governing the Allocation of Government Revenues and Expenditures, the annual budget will be revised in a snowballing manner based on the overall S&T budget approved by the Executive Yuan, and any obsolete or ineffectual plans will be reviewed to realize the spirit of zero-based budgeting.

VIII. Implementation and Performance Tracking

The Plan is composed of two parts: “overall national S&T development” and the “S&T development in different government agencies.” The implementation and tracking are described below:

Regarding the overall national S&T development, the Plan contains 4 goals, 16 targets, and 53 strategies, due to be jointly implemented by S&T related agencies and Academia Sinica. All participating agencies are required to produce an annual progress report, and the NSTC is in charge of compiling the reports. According to Article 9 of the Fundamental Science and Technology Act, the government shall present a written statement once every two years describing the visions, strategies, and current status of scientific and technological development. Therefore, to address domestic and global changes, at the mid-term of its implementation, the Plan will be rolling revisions or cross-agency coordination meetings will be held depending on target achievement status.

Part 2 of the Plan involves the S&T development goals and strategies of government agencies and S&T areas, as well as resource planning for 2025–2028. Specifically, government agencies will present their funding needs in the form of a plan. The Executive Yuan will follow the Operating Procedure for the Early Review of S&T Development Plans to approve the plan, which will be carried out accordingly once the budget is approved by the Legislative Yuan approves the budget plan. The implementation results of the plan and relevant performance reports are evaluated by the relevant authorities based on the plan’s management attributes.

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