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The Fifth Science and Technology Master Plan (2023-2027) Announced

The Ministry of Science and ICT (“MSIT”; Minister Lee Jong-Ho) announced that the Fifth Science and Technology Master Plan (2023-2027) was published on December 14 (Wednesday) at the Deliberative Council Meeting of the Presidential Advisory Council on Science and Technology (PACST).

The Fifth S&T Master Plan is the overarching plan that lays out Korea’s medium-to-long-term goals and basic direction of national scientific and technological development, pursuant to the Framework Act on Science and Technology, and reflects the 29 national tasks of the Yoon Suk-yeol administration related to science and technology; it will be implemented by over 40 ministries, agencies and committees for the next five years.

The major elements of the Fifth S&T Master Plan are as the following:

1. Background & Progress

Amid a series of grand challenges—namely, global competition for technological dominance, supply chain crisis, climate change, digital transformation, low birth rates, population ageing, and compounding disasters, major countries are concretizing their science and technology strategies and revamping their implementation systems to maintain their technology leadership and address national challenges.

Korea has emerged as the tenth largest economy in the world through scientific and technological development. Korea’s quantitative indicators, such as R&D intensity and researcher-to-population ratio, are world-class, and scientific and technological achievements, such as academic papers and triadic patent families, are outstanding. However, there are also concerns over the decreasing research population and capabilities due to population decline, sluggish private R&D investment, and labor mismatch in the R&D sector, which stresses the necessity of securing growth drivers to address the economic downturn.

As the role of science and technology is becoming more important than ever amid such global and domestic challenges, the scope of the Fifth S&T Master Plan has been extended to include strategies that will help Korea address national and/or global challenges and become a leading nation for science and technology; the previous versions were focused on improving R&D system and developing technologies.

A committee composed of about 120 private-sector experts from industry, academia and research institutes, encompassing sectors from economy and society to humanities, was established (December 2021) to identify tasks in consideration of the role of science and technology in economy, society and culture. The general public also provided diverse input through the Participative Online Platform for Science and Technology or the Civic Engagement Group (30 people).

Moreover, Science and Technology Industry Meetings (October 21, November 3) and public hearings (November 7, November 11) were held to receive comments from the public and develop policies based on people's opinions and participation.

2. Vision & Major Objectives

The Fifth S&T Master Plan, with the vision of creating “A Bold Future Led by Science, Technology and Innovation,” has the following objectives: 1) Strengthen national R&D strategies, 2) Foster an innovative S&T ecosystem led by the private sector, and 3) Address national challenges with S&T.

(Stronger R&D Strategies) To address challenges Korea is facing, the MSIT will set concrete missions and deadlines and establish a Mission-oriented R&D Innovation System to accomplish those missions, in order to pool its policy resources for areas that need urgent responses, such as nurturing critical and emerging technologies and achieving carbon neutrality by 2050.

(Private Sector-led) Korea will expand private-sector's participation in policy making process by operating a public-private consultative group on a regular basis to reflect the private sector's demand in all stages of national R&D strategies, from their planning to investment, and foster a science and technology innovation ecosystem that is centered around the private sector by developing an innovation capacity evaluation system to provide tailored support to businesses.

(Address Grand Challenges) Korea will address socioeconomic issues faced by the country, such as carbon neutrality, digital transformation and disasters/crises, with science and technology, while proactively responding to future challenges directly related to the survival of the country, such as supply chain/resources and space/ocean.

In order to implement these along with the vision and major objectives, three strategies, 17 tasks and 50 subtasks have been suggested, and the government will develop a progress evaluation system for each strategy and task to facilitate the implementation of the Fifth S&T Master Plan and continuously provide feedback.

3. Pillars

【Strategy I】 Advance S&T System for Qualitative Growth

- ① **(Mission-oriented)** To prepare for the age of competition for technology dominance, Korea will secure its technological sovereignty by nurturing and managing twelve critical and emerging

technologies. The Korean government will introduce a Mission-oriented R&D System for addressing national challenges, such as critical and emerging strategies and carbon neutrality, and promote high-risk and challenging research projects to secure irreplaceable original technologies.

* Set missions → Develop R&D strategy implementation plans → Make strategic investments and implement the strategies flexibly → Assess mission accomplishment

- ② **(Research Environment)** A long-term researcher support program (up to 10 years) will be created to ensure a stable, researcher-centered research environment. The government will also promote open and joint use of research data and equipment to accelerate a qualitative growth of research outcomes, while facilitating a smooth adoption of the researcher-centered research support system.
- ③ **(R&D Achievement)** Regulations will be improved to boost, spread, use and protect outstanding research outcomes. To promote strategic and efficient investment, the government will allocate and coordinate inter-governmental budget and secure the timeliness of R&D investment by introducing a fast-track system for preliminary feasibility study and increasing the limit of preliminary feasibility study criteria. The private sector will be encouraged to take part in all stages of R&D and the support for scaling up R&D will be expanded.
- ④ **(Key Talent)** Amid the rapidly changing technological/economic/social landscapes, Korea will focus on nurturing and securing key research workforce for emerging industries and technologies. It will also use the “contract quota system” and “contract department system” for high-tech industries, such as semiconductor, to attract outstanding foreign talent, while supporting mathematics and science capacity building at primary and secondary schools and expanding re-skilling of incumbent workers.
- ⑤ **(Science as Culture)** The government will provide support for “Science Communication Fellowship” to expand communication between the general public and scientists and researchers to lay a stronger foundation for science and technology across the society and culture. “Neighborhood Science Museums (tentative)” and online scientific content will be developed and distributed to promote science as culture that can be enjoyed in daily lives.

[Strategy II] Improve Innovation Capabilities and Foster an Open Ecosystem

- ① **(Private Sector-Led)** A comprehensive support that encompasses R&D/commercialization, finance and regulation to improve the private sector’s innovation capabilities. Business R&D support, such as the five-stage tailored innovation R&D support at business affiliated research institutes, will be advanced with a focus on technology innovation, and industry-specific private R&D cooperation standing committees will be operated to reflect businesses’ demand in government R&D planning and investment.
- ② **(University & Government-funded Research Institutes)** The government will nurture universities as research hubs to facilitate the accumulation of R&D outcomes and capabilities, such as universities’ technologies, workforce, equipment and data, and assign specific missions to each government-funded research institutes to secure critical and emerging technologies.

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- ③ **(Starting Businesses)** Ministry of Education, Science and ICT, SMEs and Startups and other Ministries shall work with together to create and advance the virtuous cycle of startups by providing support focused on starting deep tech-based businesses, discovering prospective items, growing the scale, and starting over. Government fund of funds (FOF) and other financial support measures shall be closely coordinated to provide support.
- ④ **(Regional Innovation)** Installation of dedicated regional institutes for science and technology shall be expanded to 17 cities and provinces. Regional Science and Technology Strategy Meeting will be newly launched to closely coordinate policies and budgets between the central and local governments. Pivoting on regional R&D hubs, R&D on growth engines tailored for each region will be strengthened.
- ⑤ **(S&T Diplomacy)** Centering on the SDGs, the government will secure a leadership position in S&T and revitalize overseas support hubs to provide full support to domestic businesses to enter overseas markets. The MSIT plans to advance diplomatic cooperation in S&T by taking the lead in setting international S&T and ICT agendas, and expanding strategic international joint researches.

【Strategy III】 Resolving National Pending Issues through S&T and Preparing for Future

- ① **(Carbon Neutrality)** In order to contribute to achieving the 2030 NDC and 2050 Carbon Neutrality Goal, Korea will establish a strategic plan to implement critical technologies to achieve carbon neutrality, secure critical technologies for energy independence and low carbon emission for key industries, and build a scientific response system.
* Evaluation guidelines for R&D, planning, and investment in carbon neutrality will be utilized.
- ② **(Digital Transformation)** The government will secure critical technologies including intelligent semiconductors, 6G mobile communications, and quantum technologies and make preparations in advance to speed up the diffusion of digital transformation by digitalizing the overall industries and nurturing new industries. The connection between the public and private data platform will be expanded, and tailor-made data will be diffused to all areas.
- ③ **(Health and Welfare)** Intelligent technologies will be actively utilized as a means to prepare for the health and welfare demand that will be increased drastically due to low birth rate and aging population. A foundation to utilize personal health information will be laid to ensure healthy lives for people, by realizing customized health care. Also, the government will grow the scale of R&D in synthetic biology, digital biotechnology and other advanced biotechnologies, at the same time focusing on enhancing regulations that undermine the development of bio-industry.
- ④ **(Disaster and Crisis Management)** Korea will use science and technology to take preemptive measures against future risks and build a safe society. The government will operate a disaster and safety data-sharing platform and develop damage mitigation technologies to establish disaster and safety management system. Also, the government will develop disaster scenarios to manage future risks, thereby strengthening the social resilience and capacity to respond to disasters.

- ⑤ **(Supply Chain & Resources)** Korea will boost R&D for technological independence in critical items in order to secure strategic autonomy of our industries and respond to the reshuffling of the global supply chain. The government will also build stronger global supply chain management capacity by carrying out joint explorations of resources such as minerals, energy and food with international parties, and conducting research on overseas production such as resources.
- ⑥ **(National Defense & Security)** Korea will bolster investment in emerging future technologies, such as artificial intelligence, in connection with strategic defense technologies to secure cutting-edge S&T capacity in national defense. Through many forms of flexible private-military cooperation and international cooperation, Korea will nurture strong military forces equipped with S&T, defending the national sovereignty in cyber space.
- ⑦ **(Space & Ocean)** Korea will continue to push for the development of the next-generation launch vehicle and the lunar exploration project in order to expand our space territory, reinforcing international cooperation. The government plans to redouble its efforts in developing exploration technology to study the unexplored territories in the oceans and polar regions, so as to improve access and make use of those areas.

4. Key Technologies to Nurture : National Strategic Technologies

The Fifth S&T Master Plan presents the 12 National Strategic Technologies* to nurture with key focus over the next five years (announced at the First General Meeting of the Presidential Advisory Council on Science and Technology, November 2022). The Mission-Centered R&D Innovation System has been implemented with the goal of securing a super gap in technologies by mobilizing all capacities of the government and the private sector.

* ①Semiconductor and display, ②secondary battery, ③advanced mobility, ④next-gen nuclear power, ⑤advanced biotechnology, ⑥aerospace and marine technology, ⑦hydrogen, ⑧cyber security, ⑨AI, ⑩next-gen communications, ⑪advanced robotics and manufacturing, ⑫ quantum technology.

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