Innovations and Achievements

Beijing Future Science City
Sustainable Development Practice

UN-HABITAT
未来科学城 FUTURE SCIENCE CITY
十方御道

UN-HABITAT

Beijing Future Science City Sustainable Development Practices: Innovations and Achievements

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Executive Summary

As a key area for scientific and technological innovation and sustainable development in China, Beijing Future Science City has always taken "Science + City" integration and development as its core concept since its construction launched in 2009, and has deeply practiced the United Nations Sustainable Development Goals (SDGs). It has made remarkable achievements in the fields of scientific and technological innovation, ecological protection, smart city construction and social inclusion, providing demonstrative Chinese solutions for the sustainable development of global cities.

Top-level design and planning innovations for sustainable development

Beijing Future Science City has developed a sustainable development indicator and standard system covering the whole cycle. The 42-indicator system released in 2013 laid the foundation for the development. *The 2035 Development Indicator System* released in 2019 included 28 indicators focused on four major fields including technological innovation., and 17 indicators led the low-carbon transformation in the 2024 Green and Low-Carbon Evaluation Indicator System for Buildings. Meanwhile, Beijing Future Science City has led the development of ISO37108, the world's first international standard for sustainable development of business districts, and passed the ISO37101 international standard pilot program, forming a closed loop of planning and implementation of "indicator guidance - standards implementation- dynamic evaluation".

Green infrastructure and ecological environment improvement

By the end of 2024, 70 buildings had been awarded with green building labels, with a total floorage of 5,470,000 square meters, and 90% are of two-star grade or above. The sponge city of whole area achieved "one center, two Zones, three rivers", and the total annual runoff control rate of waterfront parks has reached 97%. Municipal facilities such as underground comprehensive pipeline corridor system and garden-style recycled water plant have reached international leading level. The urban green space rate of the city was increased to 56%, and the proportion of blue and green space exceeded 40%. In 2024, the average annual concentration of PM2.5 was reduced to 27.1 micrograms/cubic meter, and the rate of days meeting standards reached 83.1%. The ecological environmental quality has achieved fundamentally improvement.

Energy resource management and intelligent transformation

In the field of energy resource management and intelligent transformation, a multi-resource complementary energy system and intelligent resource management model have been developed. Through diversified application of renewable energy such as solar energy and ground-source heat pumps, it realizes the synergistic complementary of multiple energies, and the breakthroughs in "cold, heat and power" triple-supply and hydrogen energy technology in the Regional Energy Center promote the low-carbon transformation; water resource management forms the whole-chain mode of "rainwater collection-recycled water utilization-water conservation technology", and waste management builds the mode of "gas collection-sorted treatment-resource transformation". The energy carbon monitoring and management platform was built to realize the intelligent management of the entire process of energy production, transmission and consumption, and the intelligent upgrading of regional energy system is carried out to enhance the efficiency of energy utilization and resilience of the system, and provide efficient resource guarantee for sustainable urban development, and accelerate the formation of digital economy enterprise clusters.

Social inclusion and cultural-ecological synergy

The public participation mechanism covers the entire planning process, with women accounting for more than 30% of the workforce, and an all-age-friendly community has been built with an "elderly-child" integration center. The public services are balanced of high quality, introduced 14 famous municipal schools and constructed Beijing GoBroad Hospital and other high-end medical facilities. Historical and cultural heritages such as Gonghua City and Chaozong Bridge have been systematically protected, and projects such as the Beijing Wenyu River Park Future Intelligence Valley have realized the organic integration of culture and ecology, forming the characteristic development mode of "technology + ecology + culture".

Innovative Practices and International Impact

Beijing Future Science City has achieved the industrialized application of technologies such as natural gas Combined Cooling, Heating, and Power (CCHP) and hydrogen energy development. In the field of medicine and health, significant breakthroughs have been made in gene editing and cell therapy. Beijing Future Science City led the publication of the ISO 37108 international standard and has been designated as an ISO 37101 pilot city. It has been awarded domestic honors such as the "China Industry-University-Research Cooperation Innovation Demonstration Base." As its international influence continues to expand, its zero-carbon city construction cases have been incorporated into the draft of an ISO international standard.

Innovation-driven "Three Synergies" Sustainable Development Model-Beijing Future Science City Model

With science and technology innovation as the core engine, Beijing Future Science City has built a unique sustainable development model through the three dimensions of "industry-city synergy", "science-education synergy", and "ecological synergy". This model has not only promoted the high quality of the region but also provided valuable experiences for the sustainable development of global cities.

(1) Industry-city synergy: integration of industry and city

- Industries lead city development: Beijing Future Science City focuses on the development of frontier areas such as advanced energy, medicine and health, and advanced manufacturing, and promotes breakthroughs

in key core technologies and the transformation of results through the construction of national laboratories, new research and development institutions and other high-level innovation platforms, bringing together the world's top scientific research talents and innovation resources. The development of these industries not only provides the city with a driving force for economic growth but also puts forward new needs and directions for urban development.

- City supports industrial development: Beijing Future Science City attracts and retains high-end talents by improving urban infrastructure and public services by creating a livable and workable environment. For example, building all-age friendly communities, optimizing the transportation network, and upgrading education and medical resources to achieve a work-life balance and enhance the attractiveness and competitiveness of the city. This "industry-city synergy" model realizes the positive interaction between industry and city and promotes the sustainable development of the region.

(2) Science-education synergy: deep integration of education, research and industry

- Research promotes industrial upgrading: Relying on the innovative resources of universities and scientific research institutions, Beijing Future Science City strengthens cooperation between industry, education and research and promotes the transformation of scientific and technological achievements. It provides intellectual support for scientific and technological innovation by building high-level innovation platforms, gathering top scientific research talents, and promoting the deep integration of education and scientific research.
- Industry supports for education and scientific research: The industrial development of Beijing Future Science City provides universities and scientific research institutions with rich practice scenarios and financial support. Through the establishment of joint laboratories and industrial incubation bases, it promotes in-depth cooperation between universities and enterprises and accelerates the industrialization of scientific research results. This "science and education synergy" model realizes the virtuous cycle of education, scientific research and industry, and enhances the innovation ability and core competitiveness of the region.

(3) Ecological synergy: organic integration of ecological protection and urban construction

- Integration of ecological concepts and urban construction: The Beijing Future Science City adheres to the concept of "ecological priority", which combines ecological protection with urban construction, and builds an ecological pattern of blue and green intertwining. By promoting green buildings, sponge city construction and utilization of renewable energy, improving the quality of urban ecological environment.
- Urban development promotes ecological protection: Through the development of smart city and garden city, Beijing Future Science City continues to improve the level of refinement and intelligence of urban management and the ecological environment, reducing the pressure of urban operation on ecological environment. This "ecological synergy" model realizes a win-win situation between ecological protection and urban construction and enhances the city's sustainable development capability.

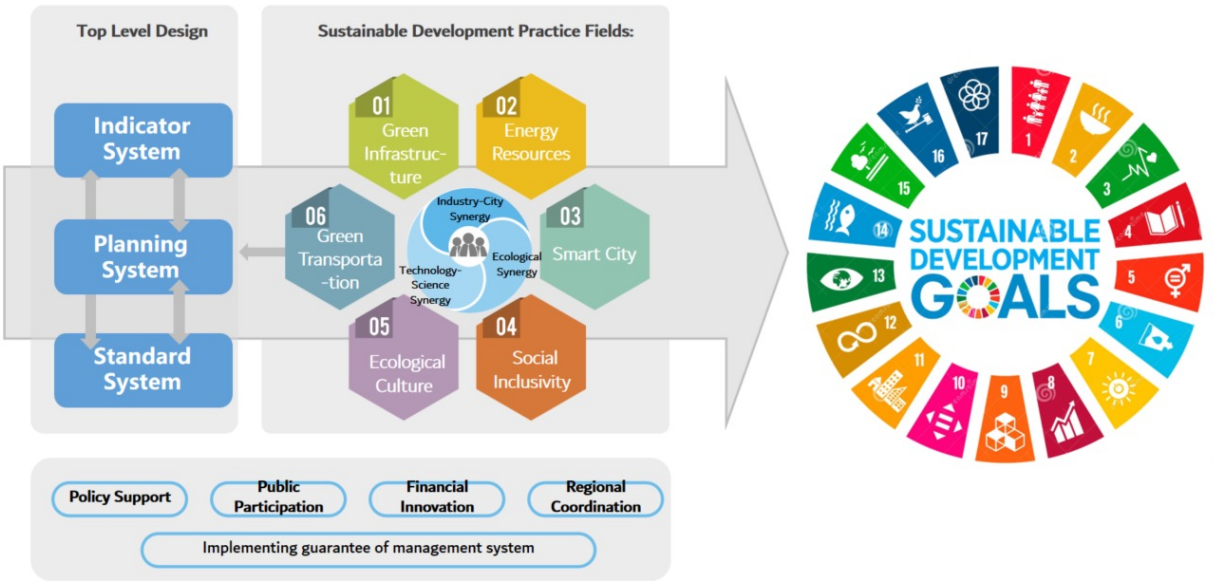


Figure1 Beijing Future Science City "Three Synergies" Sustainable Development Model

CHAPTER ONE

FOREWORD

1.1
Background and Purpose

Beijing Future Science City as a key area for scientific and technological innovation and sustainable development in China, since its construction started in 2009, has adhered to the concept of integrated development of "science + city" and is committed to building a world-leading technological innovation highland and ecological smart city. After fifteen years of development, Beijing Future Science City has made remarkable achievements in science and technology innovation, green low-carbon development, smart city development, and social inclusivity, exploring a replicable and scalable path to sustainable development, and providing China solutions and wisdom for the sustainable development of global cities.

This report aims to comprehensively summarize the sustainable development practices, innovations and achievements of Beijing Future Science City over the past 15 years, focusing on its practices and innovations in sustainable top-level design and strategic planning guidance, green infrastructure construction, energy and resource management, smart city development, community participation and social inclusivity, ecological environmental conservation, cultural and natural heritage preservation and inheritance, as well as green transportation, showing the comprehensive progress and remarkable achievements of Beijing Future Science City in the field of sustainable development. At the same time, this report aims to in line with the United Nations Sustainable Development Goals (SDGs), especially SDG11 on the sustainable development of cities and communities, and to provide useful reference and inspiration for other cities and regions around the world in implementing the SDGs.

1.2

UN-Habitat's Support and Collaboration

The United Nations Human Settlements Programme (UN-Habitat), is the focal point for all urbanization and human settlement matters within the United Nations system. It works with global cities to address the environmental, social and economic challenges of urbanization through knowledge sharing and capacity building. The sustainable development practices and innovations of Beijing Future Science City are of broad relevance to science cities around the world. Therefore, **UN-Habitat has cooperated with Beijing Future Science City to co-develop this report, which provides a model for global cities to follow by summarizing and promoting Beijing Future Science City's practical experiences and innovations in the field of sustainable development.** This collaboration not only showcases China's leading practices in sustainable urban development but also provides global cities with concrete paths to achieve the United Nations Sustainable Development Goals (SDGs), especially SDG11 (Sustainable Cities and Communities), and further promotes the development of global cities in a more inclusive, safe, resilient and sustainable direction.

In the course of cooperation, UN-Habitat has provided Beijing Future Science City with technical guidance on sustainable development and capacity-building support for relevant personnel of Beijing Future Science City to enhance its professional capacity in the field of sustainable development. In addition, UN-Habitat proactively promotes exchanges and cooperation between Beijing Future Science City and other international cities and scientific research institutions, and shares the successful experience of Beijing Future Science City through organization of international conferences and other activities, so as to promote the replication and dissemination of the experiences and enhance its global influence.

CHAPTER TWO

OVERVIEW OF BEIJING FUTURE SCIENCE CITY

2.1
Positioning and Development Strategy

Located in the southeastern part of Changping District, Beijing Future Science City is one of the main platforms of the Beijing International Center for Science and Technology Innovation, with a planning area of 170.6 square kilometers. It is positioned as a world-leading technological innovation highland, it focuses on the three core areas of medicine and health, advanced energy, and advanced manufacturing, and is committed to creating a technological innovation pilot zone, a collaborative innovation pioneer zone, a technology talent gathering area, and an innovation and entrepreneurship demonstration city. Adhering to the concept of "ecological priority", it aims to build an ecological pattern of blue and green, realizes the deep integration of science and technology innovation and urban life, and promote the high-quality development of the region.

Beijing Future Science City is not only a highland of science and technology innovation, but also a comprehensive area with complete urban functions. Different from traditional science and technology parks, the planning and development of the Beijing Future Science City fully embodies the development concept of "Science + City", aiming to create a modernized city that is pleasant to live in, pleasant to work in, and has complete functions.

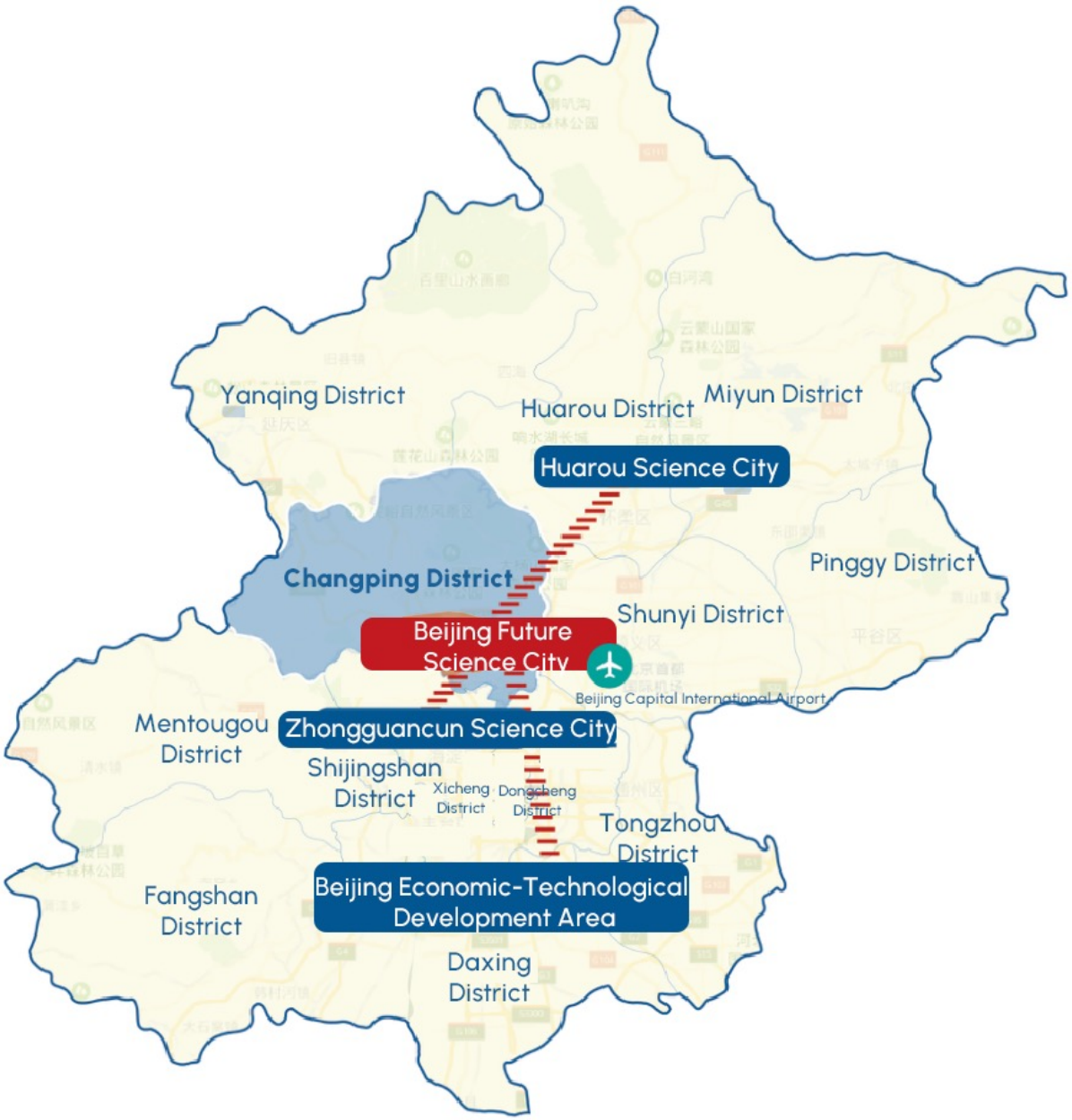


Figure2 Location of Beijing Future Science City

2.2

Core Functional Areas and Industrial Layout

Following the basic principles of functional perfection, factor concentration and land intensification, Beijing Future Science City has developed a spatial pattern of "two zones and one center", forming two major clusters of innovation factors in the east and west. The "two zones" are the main function areas of Beijing Future Science City, building a fully functional R&D and innovation community that is pleasant to live and work in; the "one center" is the ecological green center of Beijing Future Science City, connecting the two zones and building an ecological development pattern of intertwining blue and green, and blending the water with the city. Through years of construction and development, Beijing Future Science City has formed the innovation pattern of "two valleys and one park" (Energy Valley, Life Valley and Shahe Higher Education Park).

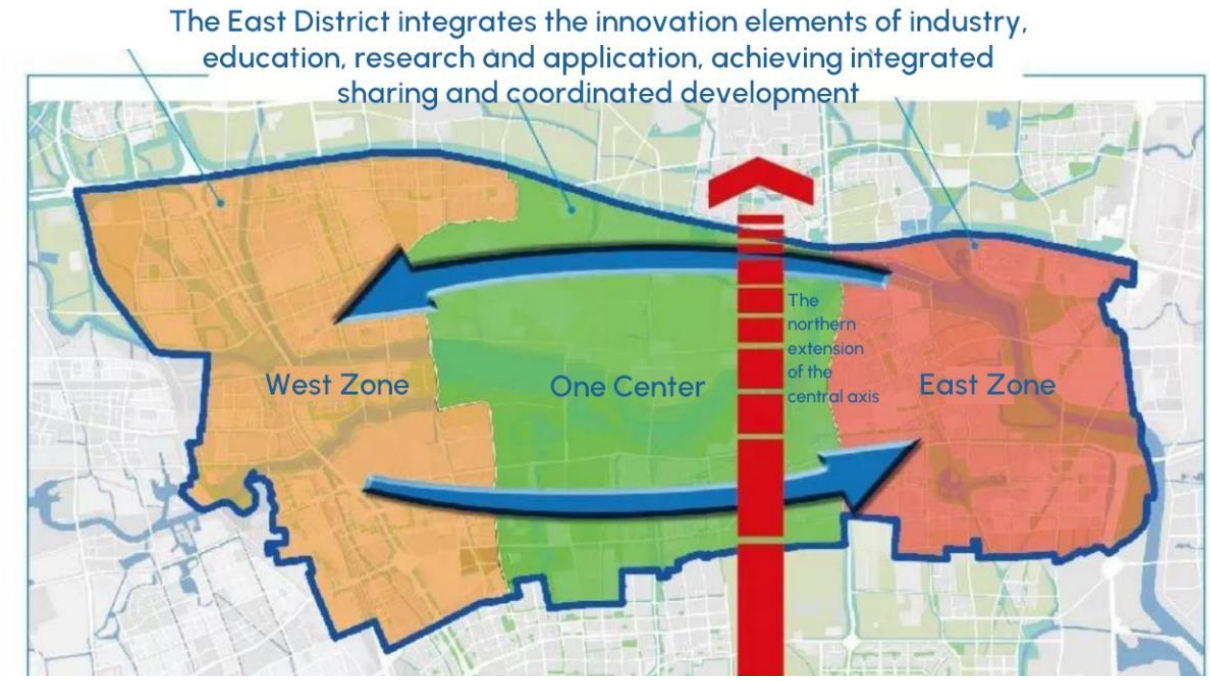


Figure3 The spatial pattern of "two Zones and one center" of Beijing Future Science City

East zone of Beijing Future Science City: The east zone of Beijing Future Science City has a planned area of 44.3 square kilometers, with a total construction land of 24.8 square kilometers, a planned resident population of about 280,000, and about 177,000 jobs. The East Zone focuses on energy sector, building the "Energy Valley", which has gathered more than 140 branches and technology-based enterprises under 15 central enterprises, forming a full-cycle innovation chain of science and technology research and development, technical services, and results conversion. Energy Valley is led by cutting-edge technologies such as "energy internet", "hydrogen energy and fuel cells" and "energy digitalization", and has built a whole industry chain covering energy production, transmission, storage and application. The whole industry chain has been constructed, covering energy production, transmission, storage and application. Meanwhile, a number of national and Beijing key laboratories and engineering technology centers have been built in the East zone providing strong support for scientific and technological innovation in the energy field.

West zone of Beijing Future Science City: The west zone of Beijing Future Science City has a planned area of 62.5 square kilometers, with a total construction land of 48.3 square kilometers, a planned resident population of about 310,000, and about 337,000 jobs. With life science as its core, the West Zone has built the "Life Valley", gathering top R&D institutions such as the Beijing Institute of Life Sciences and the National Protein Science Center, as well as more than 600 innovative pharmaceutical and healthcare enterprises, making it an important highland for global life science innovation. Shahe Higher Education Park is located in the western part of Beijing Future Science City, undertaking the important tasks of cultivating high-quality talents, promoting scientific and technological innovation, and facilitating regional economic development. It houses a number of famous institutions of higher education, including Beihang University, Beijing University of Posts and Telecommunications, Beijing Normal University, etc. It has built two demonstration bases for school-city fusion, five training bases for industry-teaching fusion, and five university-enterprise collaborative open laboratories.

Eco-green center: The Eco-Green Center has a planned area of 63.8square kilometers, with a total construction land area of 14.1 square kilometers, a planned resident population of about 100,000, and about 35,000 jobs. The Eco-Green Center is the ecological core of Beijing Future Science City, which will enhance the connectivity and stability of the ecosystem through the construction of ecological corridors, biological corridors, and parks and green spaces, to build an ecological base of intertwined blues and greens. A number of ecological recreational spaces, such as waterfront parks and wetland parks, are planned within the Eco-Green Center, providing residents with a wealth of leisure and recreational venues. At the same time, the Eco-Green Center also undertakes the important functions of regional ecological restoration and environmental improvement through ecological restoration projects, enhancing the ecological environment quality of the region.

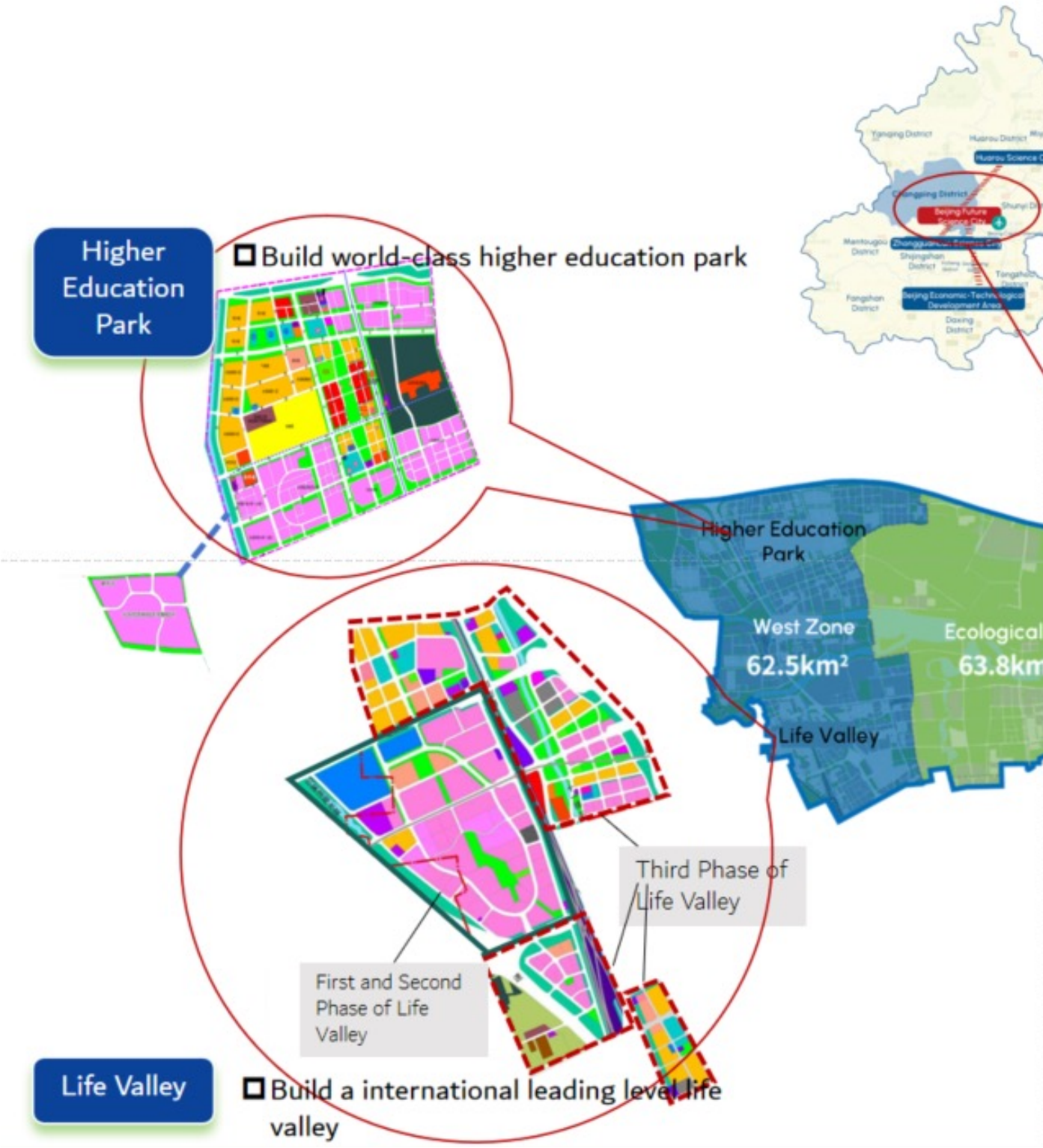
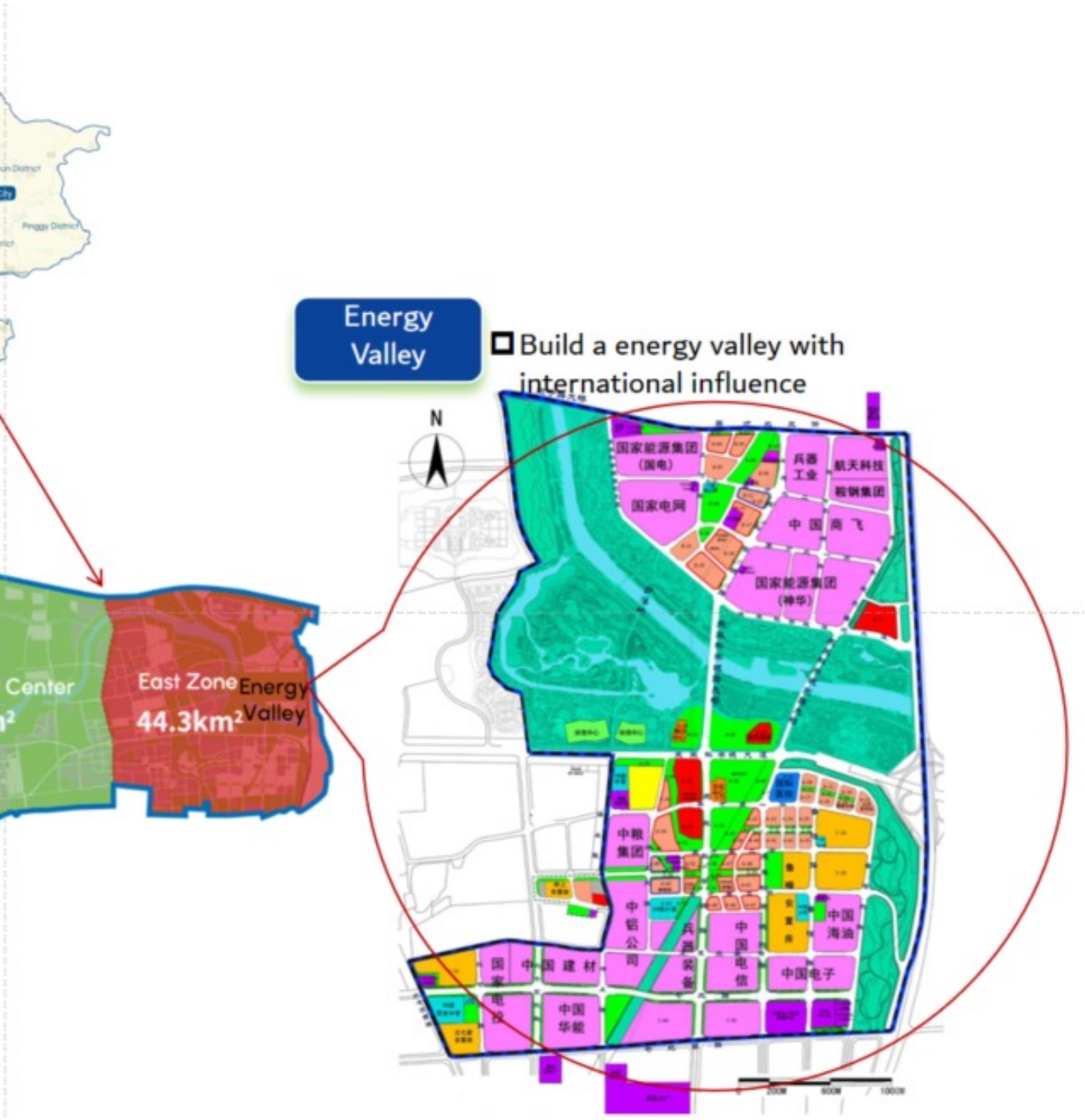


Figure4 Functional layout of Beijing Future Science City


Energy Valley
Build a energy valley with international influence
N
East Zone
44.3km²
Energy Valley
Center
国家能源集团（国电）
国家电网
兵器工业
航天科技
中国商飞
国家能源集团（神华）
中粮集团
中铝公司
中国建材
中国电信
中国海油
中国电子
中国华能

CHAPTER THREE

SUSTAINABLE DEVELOPMENT PRACTICES

3.1

Sustainable Top-level Design and Strategic Planning Guidance

This chapter in line with SDG11.3 and SDG11.A. By constructing a sound top-level design and strategic planning system, including the formulation of a sustainable development indicator system and standards, Beijing Future Science City has actively explored the strengthening of urban planning and management capacity, and provided scientific guidance and a normative framework for the realization of inclusive and sustainable urban development. At the same time, the planning of Beijing Future Science City focuses on synergistic planning with neighboring regions, which promotes coordinated inter-regional development and reflects its support for national and regional development planning.

3.1.1 Top-level design and development of sustainable development indicator system and standards

Beijing Future Science City attaches great importance to top-level design and planning leadership in its practices of sustainable development. By establishing a comprehensive sustainable development indicator system and standard system, it provides scientific guidance and a normative framework for the high-quality development of the city. These indicators and standards not only cover economic, social, environmental and other dimensions, but also closely integrate with the development strategy and actual needs of the Beijing Future Science City, ensuring the effective implementation of sustainable development goals.

Develop a sustainable development indicator system

At the early stage of its development and construction, Beijing Future Science City established

a sustainable development path of "indicator-led, entire process control", and the sustainable development indicator system released in 2013 covered 42 indicators, centering on the five core concepts of "innovation, openness, humanism, low-carbon, and coexistence", and takes into account the balanced development of society, economy, resources and environment. The release of the indicator system provides programmatic guidance for the urban planning and construction of Beijing Future Science City, ensuring scientific and forward-looking construction. Most of the indicators reached or even exceeded the international advanced level, such as the requirement that by 2020 , the ratio of technology income to R&D investment was greater than or equal to 6%; the proportion of green buildings with two-star rating or above is greater than 70%, and three-star rating is greater than 40%.

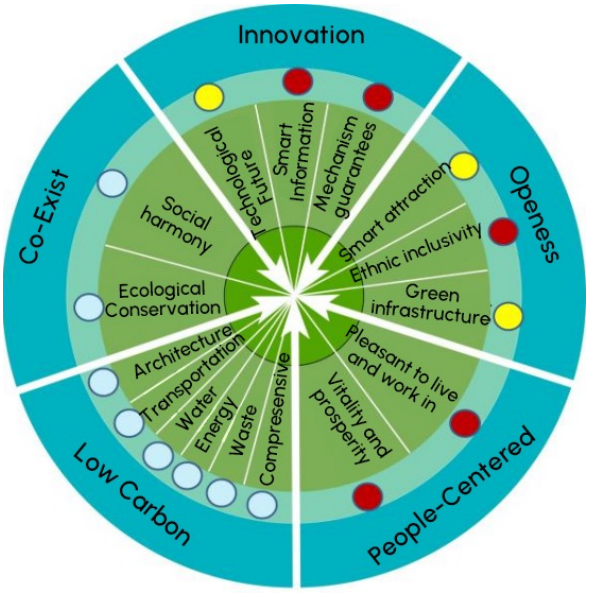


Figure5 Beijing Future Science City Indicator System Framework

In 2019, *Beijing Future Science City 2035 Development Indicator System* was released, focusing on four major areas of technological innovation, resource concentration, ecological livability and smart city construction, with a total of 28 indicators. This indicator system further clarifies the development direction of Beijing Future Science City and provides specific quantitative targets for the city's mid- and long-term development. For example, the indicator system proposes that by 2035, the utilization rate of renewable energy in the newly built area should reach 10%, and the proportion of blue and green space should reach 50%, etc. These specific indicators provide clear guidelines for the sustainable development of the city.

In 2024, the green and low-carbon evaluation index system for buildings was released, containing 17 specific indicators to lead the construction and development of the city from multiple dimensions. The index system covers the entire life process of the building, and through the combination of controlling and encouraging indicators, it guides the building projects to fully implement the green and low-carbon requirements in the design, construction and operation phases, which strongly guarantees the construction and operation of green and low-carbon buildings in Beijing Future Science City.

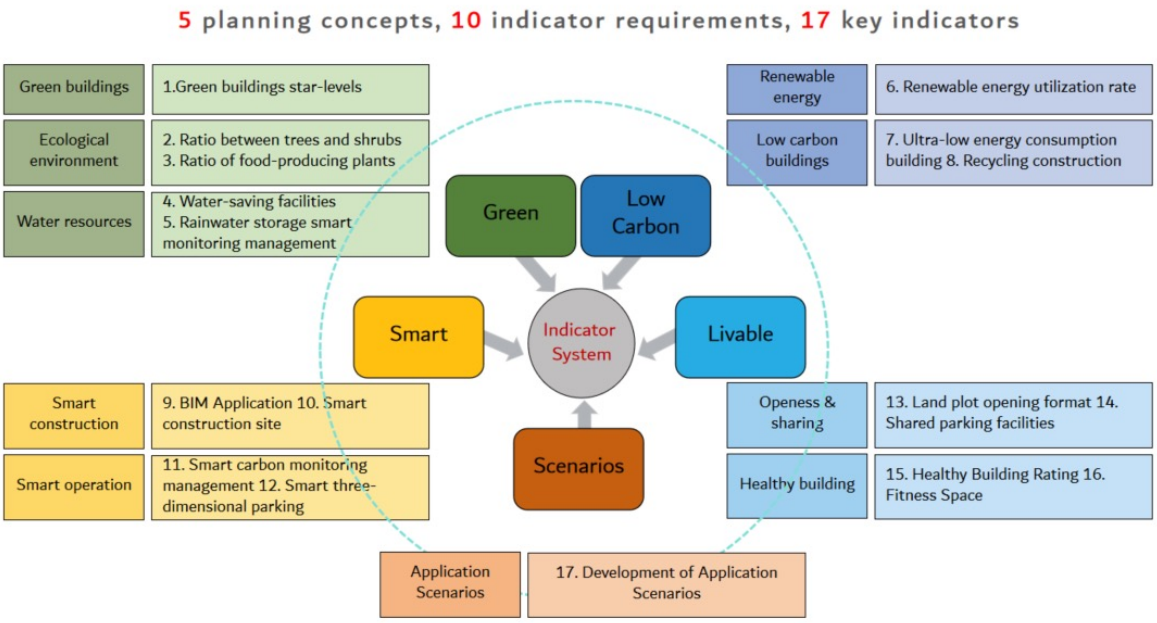


Figure6 Green and Low Carbon Evaluation Indicator System for Buildings in Beijing Future Science City

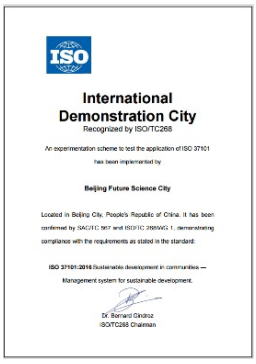
Develop and implement standards for sustainable urban development

Beijing Future Science City actively participates in the development of international and national standards and promotes the standardization process of sustainable urban development. In September 2015, Beijing Future Science City signed the *Sino-French Cooperation Letter of Intent on the Standardization of Sustainable Development of Business Districts* with the City of Vélizi, Paris, France, and led the development and launch of the world's first international standard for the sustainable development of business districts, ISO37108, in September 2022. The standard provides a scientific management tool for business district managers to promote the improvement of their management performance and core competitiveness. The typical practice of sponge city construction in Beijing Future Science City has been incorporated into this international standard as a practical case, which further enhances the influence of Beijing Future Science City in the field of international sustainable development.

In 2018, with the core objective of enhancing urban sustainable development capabilities, Future Science City took the lead in benchmarking against ISO 37101, the core standard for sustainable development management systems. This initiative earned high recognition from the chairs of ISO/TC 268 and the ISSCC (International Sustainable Settlements Certification Council), resulting in the issuance of the Global Sustainable Development Pilot City Certificate.

In 2023, Future Science City conducted the world's first ISO 37108 conformity assessment and was awarded the inaugural conformity certificate. By 2025, Beijing Future Science City officially attained the status of "Global Sustainable Development Demonstration City." This milestone signifies that Future Science City has reached a new height in the implementation of international sustainability standards, providing a practical model for sustainable urban development on a global scale.

Global Sustainable Development Pilot City Certificate and Plaque



Global Sustainable Development Demonstration City Certificate and Plaque

Figure7 Certificates and Plaques

In China, Beijing Future Science City also actively participates in the development of national standards for sustainable urban development and actively contributes its practical experience in sustainable development, such as GB/T40757 "Methods for Assessing the Potential for Sustainable Development of Cities and Communities", and GB/T 40763 "Local Implementation Guidelines for GB/T 40759 in Business Districts". In addition, Beijing Future Science City has led the compilation of two group standards, participated in the compilation of two group standards, and researched and compiled six park standards, providing standardized references for the sustainable development of domestic cities.

Figure8 Various types of urban sustainability standards issued by Future Science City (partial)

Integration and implementation of indicators and standards systems

Beijing Future Science City has deeply integrated the sustainable development indicator system with the standard system and established an entire-process evaluation and dynamic implementation assessment mechanism. By incorporating the indicator system into the land supply planning conditions and the approval process of construction projects, it ensured the implementation of the indicator system. For example, in the core area of "Energy Valley", Beijing Future Science City has constructed a well-developed green building control system by signing a green eco-construction agreement with the resident central enterprises, adding green eco-planning indexes (6+4 items) to the planning conditions for land supply of listed plots, and carrying out green eco-indicator evaluations and technical reviews during the construction process of the projects, covering the entire process of green building control system. It has also carried out evaluation of green eco-indicators and technical review during the construction process of the project, and constructed a comprehensive green building whole-process control system covering the stages of planning, design, construction, acceptance and operation of the project to ensure that the green building standards are deeply integrated into every construction detail.

At the same time, Beijing Future Science City has also established an information management platform to realize the entire-process management of the green ecological evaluation work and improve the efficiency of project management. Through information technological approaches, Beijing Future Science City was able to monitor and assess the implementation of various indicators in real time, identify problems and make adjustments in a timely manner to ensure the smooth realization of various sustainable development goals.

In addition, Beijing Future Science City is actively exploring a dynamic assessment mechanism for the indicator system, optimizing and adjusting the indicator system at the right time according to the assessment of urban development. Through regular assessment of the implementation of the indicator system, combined with the new needs and trends of urban development as well as technological progress and other factors, the indicators are optimized and adjusted in a timely manner to ensure the scientificity and applicability of the indicator system. For example, Beijing Future Science City has optimized the green and low-carbon evaluation index system for buildings in 2024, and added evaluation indexes for ultra-low-energy-consumption buildings, healthy buildings and other emerging fields, further enhancing the forward-looking and leading nature of the index system.

By developing a complete system of sustainable development indicators and standards, Beijing Future Science City not only realizes scientific, standardized and refined urban planning, construction and management, but also provides valuable experience and reference for the sustainable development of global cities.

3.1.2 Planning control and continuous improvement of the sustainable development planning system

Led by the sustainable development index system, Beijing Future Science City has created a well-developed sustainable development planning system to ensure that the city's construction and development are consistent with SDGs.

Building a complete sustainable development planning system

At the beginning of the development and construction, based on the conventional planning (master planning, detailed planning, urban design, etc.) and based on the goal of creating a green eco-city, Beijing Future Science City further compiled and completed special green eco-planning for transportation, energy, comprehensive utilization of water resources, low-carbon development, waste management, biodiversity protection, slow-moving transportation system and other green ecological special planning. After a long period of active promotion and systematic accumulation, the sustainable development planning of Beijing Future Science City has become increasingly complete and the innovative concepts have been deepened. By the end of 2024, Beijing Future Science City has released more than 50 plans and special studies in different specialized fields and spatial scopes, comprehensively covering all areas of sustainable urban development.

Integration of sustainable development concepts into planning

Beijing Future Science City has carried out the concept of sustainable development throughout its planning practice, and it has become the core guideline for promoting the high-quality development of the region. Through scientific and reasonable spatial layout, Beijing Future Science City combines "Energy Valley", "Life Valley" and Ecological Green Center, realizing the synergistic development of industry and ecology. At the same time, the plan focuses on the efficient use of resources and recycling, actively introduces green and low-carbon technologies, and promotes energy transformation, energy conservation and emission reduction. At the social level, Beijing Future Science City optimizes public services and improves the quality of life with the concept of "Science + City", which promotes the gathering of talents and the inclusive development of society. This multi-dimensional sustainable development planning practice not only creates a livable and workable innovation plateau for Beijing Future Science City, but also provides valuable experience in urban planning, demonstrating the harmonious symbiosis between scientific and technological innovation, ecological protection, economic development and social progress.

Focusing on the integration of multiple regulations and strategic blank spaces to enhance the integrity and achievability of the planning system

Beijing Future Science City takes ecological priority and sustainable development as the core in the planning, integrates various types of plans such as the master plan and ecological environmental protection plan, breaks down the barriers between plans by setting up a cross-sectoral coordinating mechanism, consults widely with all parties, gives full consideration to various factors such as the economy, society, environment, etc., and pays attention to the convergence of objectives, unification of indexes and spatial coordination among different plans, so as to realize the organic integration of various types of plans. At the same time, the Beijing Future Science City focuses on planning flexibility. In the planning, it not only reserves enough space for the upgrading of scientific research devices, but also provides

flexibility for long-term development through the setting of strategic blank space.

Innovative planning and implementation management to ensure effective implementation of the planning

The planning and implementation management of Beijing Future Science City is centered on dynamic management and policy support to ensure the implementation of the plan through high starting point planning, scientific layout and synergy of multiple subjects. On the one hand, through the dynamic monitoring and evaluation mechanism of planning, the content of planning is adjusted in a timely manner, land resource management is optimized, and the efficiency of resource allocation is enhanced. On the other hand, with the help of multi-dimensional support in terms of financial funds, financial innovation, land policies and talent services, a solid guarantee is provided for the implementation of planning. At the same time, it strengthens organizational coordination and cross-regional cooperation, promotes synergistic management and project landing of various departments, and forms an efficient, flexible and synergistic implementation management system, which lays a solid foundation for the implementation of the SDGs of Beijing Future Science City.

Focusing on public participation to enhance social acceptance of planning implementation

Beijing Future Science City attaches great importance to the role of the public in the preparation and implementation of planning and actively builds a platform for public participation. At the planning stage, opinions and suggestions from residents, enterprises, experts and other parties are widely solicited through a combination of online and offline methods, so that the plan fully reflects the needs and wishes of the public. For example, questionnaire surveys, hearings and mailboxes for collecting opinions were conducted to enable the public to participate deeply in the discussion and decision-making of the planning. During the implementation process, the public will be regularly informed of the planning progress, to accept social supervision. At the same time, the public is encouraged to participate in urban construction and management, such as carrying out volunteer activities and community co-construction, so as to enhance the public's sense of ownership and responsibility, improve the social acceptance and support for the implementation of the planning, and form a good situation in which the government, enterprises and the society participate together.

By constructing a perfect sustainable development planning system, Beijing Future Science City has integrated he concept of sustainable development into various plannings, focusing on the integration of multiple regulations and strategic blank space, innovating the management of planning implementation and actively guiding public participation, to ensure the scientific nature, achievability and social acceptance of the planning, which has provided a solid guarantee for the city's sustainable development and provided valuable experience for other cities to reference.

3.2 Green Infrastructure Development

This chapter in line with SDG 11.1, SDG 11.5, and SDG 11.C. Through green building construction and sponge city construction practices, Beijing Future Science City has not only made efforts to provide safe and sustainable housing, but also resilient to disasters such as urban flooding, protected residents' lives and properties, and reduced economic losses caused by disasters by constructing a sponge pattern in the whole area and sponge-type infrastructures. In addition, its technological applications and innovative practices in green building and sponge city construction provide lessons that can be drawn on for other regions and help promote the development of sustainable buildings.

3.2.1 Move toward green, constructing high-star green buildings

In the context of global sustainable development, green building has become a key element of sustainable urban development. Beijing Future Science City has closely matched this trend and taken the construction of high-star[1] graded green buildings as its core task, running through the whole process of planning and design, construction to operation and management, and is committed to creating a green building benchmark cluster. By the end of 2024, a total of 55 buildings in Beijing Future Science City have received the green building label, with a total floor area of 4,068,400 square meters, of which more than 80% will be two-star or above, and more than 50% will be three-star or above.

[1] Green building star rating is an evaluation system that measures a building's environmental impact and resource utilization efficiency throughout its life cycle. In China, green buildings are divided into four grades: basic, one-star, two-star and three-star. Green buildings of one-star, two-star and three-star grades should meet all the requirements of the control items, and the score of the scoring items of each type of index should not be less than 30% of the full score of its scoring items. When the total score reaches 60 points, 70 points and 85 points, the green building grade is one-star, two-star and three-star respectively. Three-star is the highest level of green building standard in the green building evaluation system, representing the highest level of sustainable development in the field of construction.

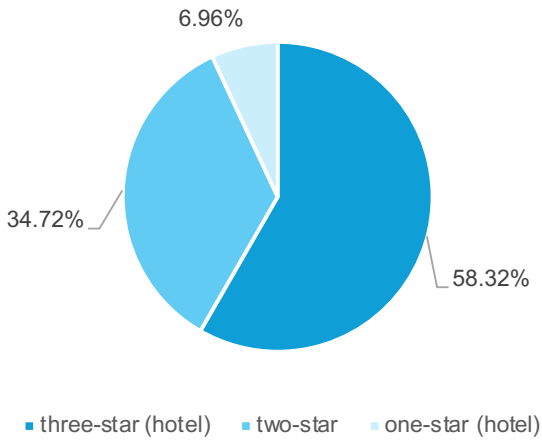


Figure6 Green and Low Carbon Evaluation Indicator System for Buildings in Beijing Future Science City

Planning guidance, set high standards for green building development goals

Beijing Future Science City clarifies green building development goals in the planning stage, such as requiring the proportion of two-star and above green buildings to be greater than or equal to 70%, and the proportion of three-star green buildings to be greater than or equal to 40%. Released in the year 2024, "Implementation Plan for Green and Low-Carbon Construction of Buildings in Beijing Future Science City" further puts forward that by 2035, the proportion of three-star new buildings in key areas, such as "Energy Valley By 2035, the proportion of three-star new buildings in key areas such as "Energy Valley", "Life Valley" and "Higher Education Park" will reach more than 60%; the proportion of healthy buildings will reach 500,000 square meters; and the comprehensive application of green and low-carbon industrial technologies will be realized.

Implementing the new concept of green building

Beijing Future Science City actively implements the concept of "four good" (good house, good district, good community, good city), explores the standardized construction of good houses, and takes a multi-pronged approach to improve the quality of regional living and urban functions. On the one hand, Beijing Future Science City has taken the lead in introducing the "good house" design scheme in the process of land grant, and Lot F of Life Park Phase III has become the first residential project with the "good house" design scheme to enter the market in Beijing. At the same time, Beijing Future Science City also actively explores the path of standardized construction of good houses, combining the relevant national policies and its own development needs, and strictly controls all aspects of architectural design, construction technology and material selection to ensure that each residential building meets high standards of living quality. On the other hand, it actively promotes the application of new materials and technologies for green buildings. For example, the R&D headquarters building of Beixin Building Materials in Beijing Future Science City has realized the organic combination of high performance, low cost, greening and assembling through the application of innovative materials and assembling construction, and has become a benchmark project for green buildings. In the process of promoting new materials and technologies, Beijing Future Science City strictly followed the relevant national norms to ensure that all applied materials and technologies are strictly tested and certified and comply with the national green building evaluation standards and relevant technical specifications. At the same time, it has also established a perfect quality supervision system to supervise the whole construction process of green building projects to ensure the effective implementation of all technical measures and guarantee the building quality and performance.

In addition, Beijing Future Science City also focuses on the connection and implementation of relevant national policies, actively responds to national policy requirements on green building, assembly building and other fields, and integrates national policy requirements into all aspects of good house construction. Through the

above measures, Beijing Future Science City has actively explored the standardized construction of good houses while implementing the new concept of green building, and strictly implemented the relevant national norms, laying a solid foundation for improving the quality of regional living and urban functions, and also providing other regions with experience that can be drawn upon.

Innovative green building full life cycle control mechanism

In order to implement the green building requirements of the Sustainable Development Indicator System, Beijing Future Science City has signed a green eco-construction agreement with the central enterprises in the core area of Energy Valley, added green eco-planning indexes (6+4) in the planning conditions for land supply of listed plots, and carried out the evaluation and technical review of green eco-indicators in the construction process of the project. Technical review during the construction process of the project, etc. A comprehensive green building whole-process control system has been developed, covering all stages of project planning, design, construction, acceptance and operation, ensuring that green building standards are deeply integrated into every construction detail. The innovation of this mechanism not only improves the management efficiency of green building projects, but also provides a strong guarantee for the high-quality development of green buildings.

Typical green building project: Beijing Future Science City Future Center

Located at the eastern gateway location, the Future Center of Beijing Future Science City is constructed according to the dual standards of three-star green building and LEED gold certification, with a total construction area of 265,000 square meters and a total project investment of RMB 1.84 billion. The project adopts the design concepts of landscape architecture and landscape architecture to create a symbiotic environment of people, architecture and nature. Through the design of three-dimensional landscape and three-dimensional space, the building and natural landscape are integrated with each other to create a healthier and ecological office living environment.

Technical characteristics of the project

- Green Design Concept: Design techniques such as elevated ground floors, roof gardens, and sunken plazas integrate natural landscapes into the built environment.
- Rainwater management: rain gardens and sunken green spaces are installed to initially purify and retain rainwater by utilizing the natural filtration of vegetation and soil.
- Intelligent technology application: Adoption of an intelligent monitoring system for metering and monitoring of electricity, water, energy and gas consumption to enhance the efficiency of operation and maintenance.
- Sponge city practice: implement the sponge city concept, through permeable paving, rainwater storage ponds and other facilities, regulating rainwater drainage flood peaks, reducing the pressure on the municipal rainwater pipe network drainage.

U.S. Green Building Council
LEED for New Construction

3.2.2 Following the nature and creating a high level of sponge city in the whole region

Beijing Future Science City upholds the concept of "adapting to nature" and is committed to creating a sponge city in the whole region. Through scientific planning and practice, it can effectively cope with urban flooding, rainwater runoff and other problems, and improve the resilience of the city and its ecological quality. The sponge city construction practice fully embodies the principle of "planning leadership, source emission reduction, process control, end management", and realizes the organic combination of ecological benefits and urban functions.

Building a sponge pattern for the whole region

In the sponge city construction, Beijing Future Science City has built a sponge space pattern of "one center, two Zones and three rivers" through planning. This pattern takes the ecological green center as the core, connects the east and west Zones, and through the ecological restoration and treatment of Dongsha River, Wenyu River and Nansha River, it forms a blue-green interwoven ecological base, which provides a solid spatial foundation for the construction of sponge city.

Construction of sponge-type Infrastructure

In the construction of municipal roads, permeable brick sidewalks, rainwater ecological ditches and other designs are used to enhance the rainwater absorption capacity of roads, while optimizing the layout of the rainwater pipe network to improve drainage efficiency. In addition, parks and green spaces also gave full play to the sponge functions, such as the Wenyu River Park, through the construction of permeable paving floors, sunken green spaces, rainwater storage ponds and other facilities, to achieve the natural accumulation of rainwater, natural infiltration and natural purification.

Enhanced rainwater runoff management

Beijing Future Science City has adopted entire-process control measures in the management of rainwater runoff. On the one hand, rainwater storage facilities, such as rainwater storage ponds and wetlands, are rationally laid out to store and purify rainwater, effectively reduce the peak value of rainwater runoff, and reduce the pressure on the urban drainage system. For example, a number of rainwater storage ponds have been set up in urban roads and parks to collect and purify early rainwater and improve rainwater quality.

On the other hand, the use of intelligent water system, real-time monitoring and regulation of stormwater pipe network, pumping stations and other facilities to achieve the fine management of rainwater. Through intelligent monitoring equipment, real-time grasp of the operational status of the rainwater pipe network, timely detection and resolution of pipe network blockage, waterlogging and other issues to ensure smooth discharge of rainwater.

Riverside Avenue Pervious Concrete

East Road High Bearing Permeable Paving

Figure10 Sponge-type Infrastructure

Green Roof

Rain Garden

Figure11 Sponge-type Infrastructure

Sponge city typical case: rainwater runoff management system for Beijing Future Science City Waterfront Park

Beijing Future Science City Waterfront Park is one of the important projects in the sponge city construction, and the construction of its stormwater runoff management system fully embodies the concept of process control. The park is located in the core area of Beijing Future Science City, covering an area of about 3.14 square kilometers, and is an important ecological leisure space and rainwater storage hub in the region. Through systematic rainwater runoff management measures, the project realizes the natural accumulation, natural infiltration and natural purification of rainwater, while reducing the risk of flooding during heavy rainfall and improving the quality of the regional water environment.

Sponge city facilities:

- Permeable paving: Permeable bricks and permeable concrete are widely laid on the roads and squares around the park to increase the infiltration capacity of rainwater and reduce surface runoff. The area of permeable pavement reaches 198,000 square meters.
- Rain gardens: Several rain gardens were constructed to initially purify and retain rainwater by utilizing the natural filtering action of vegetation and soil. The rain gardens cover a total area of 463 square meters.
- Sunken green space: 1.3 million square meters of sunken green space was constructed, with types including regulated rain gardens, storage rain gardens, and infiltration pond experimental areas.
- Rainwater Storage Ponds: The park has constructed a number of rainwater storage ponds with a total volume of 530,000 cubic meters, 840 cubic meters of water storage modules, 287 meters of quick-discharge dragons, and 12 infiltration wells.
- Ecological wetland: set up ecological wetland and biofilter at the rainwater discharge outlet to carry out deep purification of rainwater after treatment in the storage tank to ensure that it meets the discharge standards.

Waterfront Parks' permeable pavements

Project effectiveness

Since the implementation of the project, according to the projected average rainfall in Beijing for many years, the amount of rainwater collected and utilized annually can reach 3,360 cubic meters, and the total annual runoff control rate can reach 97%.

3.2.3 Strengthening the foundation and building high standard municipal infrastructures

With the goal of building a modern, intelligent, green and low-carbon municipal infrastructure system, Beijing Future Science City aims to comprehensively improve the efficiency and resilience of urban operations through the application of innovative technologies and systematic planning and implementation, and provide solid support for sustainable development.

Building a comprehensive municipal facilities system

Beijing Future Science City has constructed a municipal facilities system covering water supply, drainage, energy, sanitation and other fields, which comprehensively improves the efficiency of urban operation and the quality of life of residents. In terms of water supply, a high-standard water supply pipeline network system has been built to ensure the water demand of residents and enterprises in the area. The drainage system adopts the rainwater and sewage diversion mode, effectively improving the efficiency of sewage treatment and the city's flood prevention capacity. Meanwhile, through the construction of water reclamation plants and water reuse facilities, the recycling of water resources has been realized, promoting the construction of a water-saving city. In the field of energy, Beijing Future Science City has constructed an efficient energy supply system, including an energy center and comprehensive energy stations, to ensure the stability and efficiency of energy supply. For sanitation facilities, Beijing Future Science City has built a pneumatic waste system. Together, these comprehensive measures build an efficient, green and intelligent municipal infrastructure system, providing a solid guarantee for the sustainable development of the city.

Typical municipal infrastructure project: garden type water reclamation plant in Beijing Future Science City

In 2014, Beijing Future Science City, with the design principles of "low-carbon, high-efficiency and ecology", built a world-leading garden-type water treatment facility, with a daily treatment scale of 80,000 cubic meters, a long-term planning of 110,000 cubic meters, and a service area of up to 46.98 square kilometers. The project aims to realize efficient recycling of water resources through advanced wastewater treatment technology and ecological restoration, and to create a demonstration project integrating ecological landscape and wastewater treatment functions.

Specific measures

- Underground Sewage Treatment: All 23 tanks and equipment are placed underground or semi-underground, and the whole process of sewage treatment is completed in the underground closed tanks.
- Ecological landscape design: the ground part was built into fountains, fish ponds, planting flowers and trees, the greening rate of the plant is as high as 39%, forming a garden-like environment.
- Recycled Water Utilization: Through water reclamation plants and water reuse facilities, the recycling of water resources has been realized, and the construction of water-saving cities has been promoted.

Project effectiveness

- Environmental benefits: Enhanced the quality of the regional ecological environment through ecological restoration and landscape design.
- Economic benefits: Efficient wastewater treatment and reclaimed water utilization system reduced operating costs and improves water utilization efficiency.
- Demonstration effect: This project, as a landmark project of Beijing Future Science City, provides experiences of construction of wastewater treatment facilities as references for other areas.

Organic integration of municipal facilities construction and ecological protection

During the construction of municipal facilities, Beijing Future Science City emphasized ecological protection and environmentally friendly design. For example, in road construction, permeable paving and ecological slope protection technologies are used to reduce rainwater runoff and soil erosion; in the construction of the sewage treatment plant, ecological restoration of wetlands is combined to create a demonstration project that combines ecological landscape and sewage treatment functions. By organically combining the construction of municipal facilities with ecological protection, Beijing Future Science City not only improves the carrying capacity of urban infrastructure, but also creates an ecological environment that is pleasant to live and work in.

Integrated Pipe Corridor and Intelligent Pipe Network System: Smart City "Lifeline"

Beijing Future Science City has built a leading underground comprehensive pipeline corridor system in the core area, integrating five major types of pipelines, such as heat, water supply, recycled water, electricity, information, etc., and reserving space for sewage and drinking water pipelines, so as to realize "one-time planning and intensive construction". More than 140 intelligent monitoring cameras are installed in the pipeline corridor to monitor the operation status in real time, and the manhole cover is equipped with a tilt alarm device to ensure safe and controllable. In addition, the main road of Beijing future science city is planning to install smart manhole Cover Monitors, liquid level monitors, noise recorders, gas intelligent monitoring terminals and other equipment, to realize the full coverage of water, electricity, heat and gas pipelines, to achieve intelligent management.

Figure12 Beijing Future Science City's Core Area of Comprehensive Pipeline Corridor

3.3

Energy and Resource Management

This chapter in line with SDG11.6 and SDG11.B. The achievements of Beijing Future Science City in renewable energy application, efficient use of water resources and waste recycling demonstrate its efforts to reduce the impact on the urban environment, enhance the efficiency of urban resource utilization, improve air quality and reduce waste emissions. At the same time, through the construction of an intelligent energy system, it has improved the efficiency of resource utilization, enhanced the city's ability to adapt to climate change, and constructed a resilient urban environment.

3.3.1 Energy Transition, Constructing Green and Smart Energy System

Guided by the "Dual Carbon" goals, Beijing Future Science City takes the development and utilization of renewable energy and the smart construction of the energy system as the core pathways for energy transition. It has established a specialized energy platform—Beijing Future Science City Smart Energy Co., Ltd.—which takes overall responsibility for the investment, construction and operation of the regional integrated energy system in the Future Science City. By building a clean energy system featuring multi-energy complementarity, intelligence and high efficiency, it strives to develop an integrated energy demonstration pioneer zone characterized by innovation-driven development, pioneering leadership, demonstration-driven effects and integrated co-construction, so as to provide solid energy support for the sustainable development of the city.

Innovative Application of Renewable Energy and Carbon Reduction

Future Science City is actively developing renewable energy sources such as geothermal and solar power, accelerating the construction of a green, low-carbon regional energy supply system. Multiple regional energy systems have been completed or are under planning across Energy Valley, Life Valley, and the Higher Education Park.

By leveraging a smart energy management platform and a professional team, the city has

enhanced the precision and intelligence of its energy project management. This approach ensures high-quality energy supply services while simultaneously achieving energy conservation and carbon reduction.

Ground-source heat pump (GSHP) technology is widely utilized for building heating and cooling within Future Science City. By the end of 2025, the total area served by heat pump heating is expected to reach approximately 4.11 million m², with GSHP technology alone covering 2.65 million m². A landmark project is the East Erqi Integrated Energy System—the first integrated energy station in Changping District invested in and constructed by Future Science City. Using GSHP as its primary technical route, the system integrates air-source heat pumps and water thermal storage through multi-energy coupling to provide reliable heating and cooling for a 260,000 m² area. With renewable energy accounting for 67% of its heating supply, the project is projected to reduce carbon emissions by approximately 2,000 tons annually. Additionally, the Life Science Park Phase III Integrated Energy Center currently under construction in Life Valley employs "geothermal + energy storage" coupling technology. This center will serve an area of 460,000 m², with renewable energy providing 65% of the heating load, resulting in an estimated annual carbon reduction of 5,980 tons.

Project of renewable energy utilization: all-green power park in Beijing Future Science City[2]

The State Grid Corporation of China (Beijing Future Science City Campus) is located in the "Energy Valley" of Beijing Future Science City, with five State Grid-affiliated units, and the total area of its office, research, experimental, and comprehensive service buildings exceeds 265,000 square meters. To achieve the "Dual Carbon" goals, the park promotes green power consumption through market-oriented trading channels.

Specific measures

- Procurement of green power in large quantities through the green power trading market.
- Construction of a photovoltaic power generation system, with solar photovoltaic power generation systems installed on the roofs of the two main buildings in the park to generate electricity from solar energy.
- Replacement of commuter shuttles with all-electric buses for electric substitution of shuttle transportation.
- Infrastructure renovation and energy-saving measures to improve the efficiency of energy use by renovating infrastructure such as heat lines and water system lines in the laboratory building.

[2] https://baijiahao.baidu.com/s?id=1823623830097122694&wfr=spider&for=pc

Beijing Future Science City has continued to coordinate and promote the energy-saving and carbon-reduction retrofitting of existing buildings. Relying on the park's energy and carbon management platform, it has implemented dual-control management over building energy consumption and carbon emissions, and is advancing the development of a near-zero carbon benchmark park. The energy-saving retrofitting project of the Future Center in the Southern Area of Beijing Future Science City has realized intelligent operation and maintenance through the upgrading of automatic control systems and the retrofitting of floor control devices, achieving an energy-saving rate of 14% and an estimated annual carbon emission reduction of 621 tonnes.

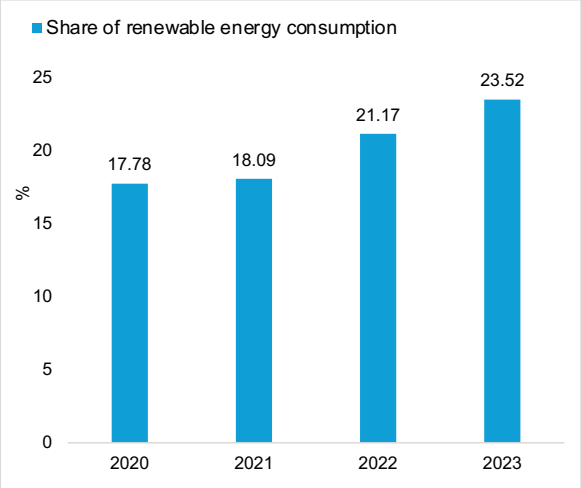


Figure13 Renewable Energy Consumption Percentage in Beijing Future Science City[3]

Smart technologies empower energy system upgrade

In the construction of energy supply hardware facilities, Beijing Future Science City has built an advanced energy transmission network. Various types of energy pipelines are laid in the underground comprehensive pipeline corridors, and the power lines and heat pipelines are respectively designed with high reliability and highly efficient insulation technology to ensure the safety and stability of energy transmission.

In June 2024, Beijing Future Science City launched the energy and carbon monitoring and management platform project, taking the "11151" general architecture system as the core, i.e., "an intelligent energy IOT access network", "an energy and carbon data center", "an energy and carbon modeling algorithm center", "five energy and carbon business sections" and " one BI for executives", comprehensively covering energy production, transmission and management, as well as the energy and carbon industry. The platform is the first regional carbon emission monitoring and management platform on the governmental side with the application mode of "Carbon Meter-Terminal-System" in Beijing City. Followed the plan, the platform has been officially launched in 2025.

3.3.2 Multiple measures to promote the efficient use of water resources

Through systematic planning and innovative practice, Beijing Future Science City has explored a new path for the synergistic development of efficient water resource utilization and ecological protection by starting from rainwater utilization, recycled water utilization and other aspects to comprehensively improve the efficiency of water resource utilization.

[3] Data collection form

Figure14 Beijing Future Science City Energy and Carbon Monitoring Management Platform

Figure15 Stormwater Drainage Distribution in Future Science Center

Figure16 Future Science City Drainage Nullah

Rainwater harvesting: maximizing the potential for rainwater resource utilization

Beijing Future Science City carries out the concept of sponge city construction in depth and builds an all-round rainwater utilization system. Through various measures such as "seepage, stagnation, storage, purification, utilization and drainage", rainwater runoff is effectively controlled. The total length of the existing rainwater main and secondary pipelines in the Beijing Future Science City has reached 215.7 kilometers, within 10.0 kilometers combined flow pipelines, accounting for about 5% of the total length of the existing rainwater pipelines; and the length of rainwater nullahs is about 9.5 kilometers.

According to the " Sponge City Plan for Beijing Future Science City", the new construction of land storage facilities storage volume is about 50,000 cubic meters, calculated that the typical annual volume of rainwater can be collected about 4,547,600 cubic meters, 5% of rainwater resources utilization rate ; if the municipal road initial rainwater runoff pollution collection and purification of rainwater volume of the use of the calculation, the annual rainwater resources utilization rate can be increased to 5.7%. [4]

In terms of the construction of specific facilities, Beijing Future Science City vigorously promotes facilities such as recessed green space, permeable paving and rain gardens. For example, in the public green space and building communities, the recessed green space is lower than the surrounding ground, which can effectively collect and retain rainwater and increase the amount of rainwater infiltration; and the permeable paved ground enables rainwater to quickly infiltrate into the ground and reduce surface water accumulation. These facilities not only realize the local consumption and utilization of rainwater, but also reduce the risk of urban flooding.

Figure17 Future Science City Rain Garden

[4] Future Science City Sponge City Plan

Recycled water utilization: building a well-structured recycled water utilization system

Beijing Future Science City is fully committed to improving its reclaimed water utilization system and increasing reclaimed water utilization rate. The total length of existing reclaimed water pipelines in Beijing Future Science City is about 128.5 kilometers, and the Energy Valley's reclaimed water pipeline network achieving 100% coverage; there are four modern reclaimed water plants within the area,[5] with a combined capacity of 290,000 m3/day. To meet the diverse needs of different users, Beijing Future Science City employs a differential pressure water supply method. Low-pressure water supply is used for river and lake environmental water, with independent supply pipelines laid along municipal roads and river green belts. Industrial and municipal miscellaneous water have higher and similar pressure requirements, so their reclaimed water pipelines are combined for unified distribution. In terms of reclaimed water pipeline planning, existing pipelines are fully utilized, and a loop-shaped network layout is adopted in conjunction with municipal roads. Approximately 150 kilometers of new main reclaimed water pipelines are planned, and four river replenishment points will be established, effectively ensuring the supply of reclaimed water.

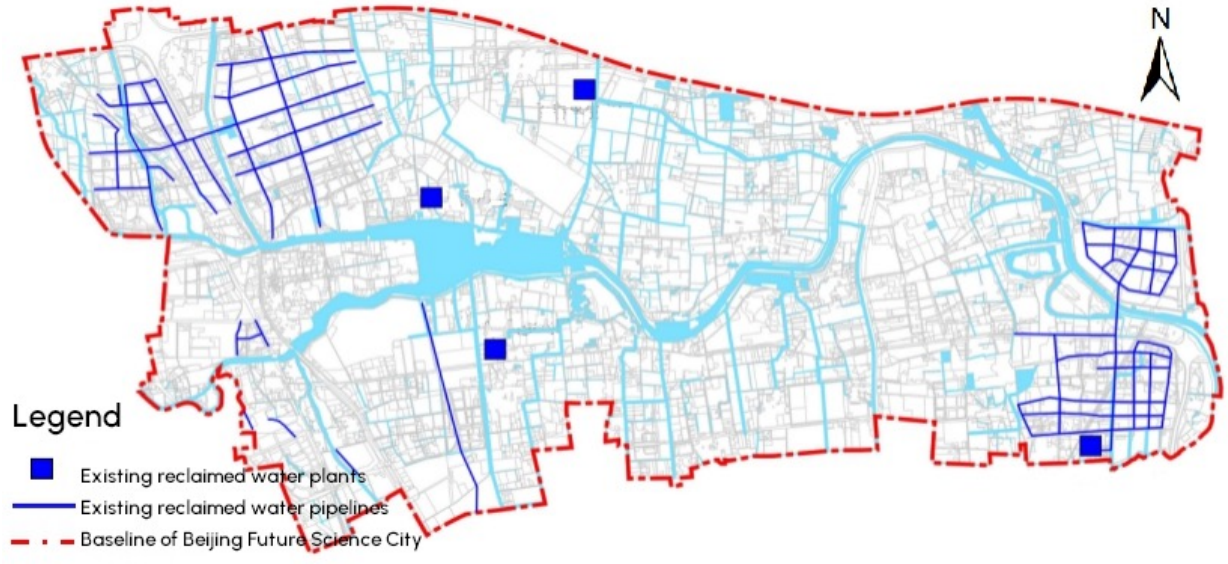


Figure18 Distribution of current reclaimed water plants and reclaimed water pipelines in Beijing Future Science City

Efficient water conservation: improving water use efficiency in all directions

- Promote water-saving appliances: Fully promote the use of water-saving fixtures in residential buildings, public buildings and industrial enterprises, such as water-saving toilets, water-saving faucets and water-saving shower heads. By replacing these fixtures, water waste during use can be reduced, and water efficiency improved.
- Water-saving irrigation: Beijing Future Science City extensively employes water-saving irrigation system, for lawn and ground cover plants, buried sprinkler head are used for irrigation, while trees and shrubs are manually watered using water valves.
- Water-saving society construction: The goal

[5] Future Science City Sponge City Plan

Figure19 Water-saving irrigation

is to build a water-saving society by promoting more refined and scientific regional water management.A water-saving incentive mechanism has been established to reward units and individuals with remarkable water-saving results and encourage the whole society to actively participate in water-saving actions.

- R&D and innovation of water conservation technologies: Beijing Future Science City is actively strengthening R&D and innovation in water resources utilization technologies. It supports universities, scientific research institutions and enterprises in conducting relevant research, focusing on developing efficient reclaimed water treatment technologies, new rainwater harvesting technologies, water-saving equipment and materials to provide technical support for the efficient utilization of water resources.

3.3.3 Recycling and building a waste recycling system

Adhering to the concept of resource recycling, Beijing Future Science City has constructed a well-structured waste recycling system to promote the efficient treatment and resource utilization of the waste, achieving a win-win situation in terms of environmental and economic benefits, and providing solid support for the sustainable development of the city.

Planning guidance and top-level design

From its early development, Beijing Future Science City incorporated waste recycling into the overall planning, and clarified the comprehensive objectives and technical pathways for waste collection, classification, transportation, treatment and resource utilization. Through top-level design, Beijing Future Science City has established a fully closed and automated waste collection system to reduce secondary pollution, while working in accordance with the technical pathways of source reduction, reasonable classification, collection and transportation system, on-site resource utilization and combination of hardware and software.

Construction of an advanced pneumatic waste system for efficient and clean waste collection

Currently, an advanced pneumatic waste collection system has been constructed in the Energy Valley area of Beijing Future Science City. This

system covers a total service area of 5.1 square kilometers, with waste pipelines stretching approximately 15,950 meters. The system offers the following significant advantages:

- Environmentally friendly: realizing fully enclosed waste transportation, effectively improving the regional environment, reducing secondary pollution, avoiding waste transport vehicles from passing through through the residential area, and maintaining a clean and hygienic living environment.
- Efficient and timely cleaning: the number of clean-ups can be adjusted in time according to the amount of waste generated to ensure a clean environment in the area.
- Reducing traffic impact and labor intensity: Reducing the frequency of waste trucks movements within communities, reducing air pollution and noise, and mitigating the impact on residents. Fully automatic operation of the system reduces the labor intensity of waste collection, improves the collection efficiency, and optimizes the labor environment for sanitation workers.
- Strong system adaptability: Features various system configurations to meet different functional requirements. Waste inlets are conveniently located, and the collection process is unaffected by weather, allowing for stable, all-weather operation.

Actively promote the utilization of waste resources

Beijing Future Science City has established a tight cooperative relationship with the Asuwei Circular Economy Park[6] , which is responsible for collecting and treating the waste generated by Beijing Future Science City. The Assuwei Circular Economy Park achieves efficient waste treatment and resource utilization through advanced waste treatment technologies:

- Waste Incineration Power Generation: Asuwei waste incineration power plant handles about 3,000 tons of household waste per day, and through advanced incineration technology, it utilizes the heat energy of waste incineration to generate electricity to be connected to the Beijing power grid, which meets the daily electricity needs of about 14,000 households, achieving waste resource utilization.
- Food waste treatment: Asuwei Integrated Treatment Plant processes 800 tons of household food waste daily. Through composting and maturation, it produces organic nutrient soil. The leachate from the composting process is treated and reused.
- Science education function: the explanation exhibition hall, VR experience area and others within the Beijing Future Science City. Through holographic simulation sand table, interactive games and VR game interaction, visitors can learn about the entire waste treatment process, enhanceing their awareness of waste classification and the environmental protection.

Figure20 Asuwei Circular Economy Park

[12] Asuwei Circular Economy Park Located at the junction of Baishan and Xiaotangshan towns in Changping District, Beijing, the park covers an area of about 135 hectares (2,025 acres), with a total investment of about 3.4 billion RMB. The park is a large-scale comprehensive waste treatment park project in Beijing, mainly serving all of Changping District and the northern part of the East and West Cities, aiming to realize the resourceful and harmless treatment of domestic waste.

Promotion of construction waste resource utilization

Guided by the Full-Chain management concept of "source management, process control and end management", Beijing Future Science City is advancing projects for the circular utilization of construction waste, successfully achieve the goal of converting construction waste into recycled products, mobilizing the green and environmentally-friendly transformation of urban construction waste.

Typical practice: construction of waste resource utilization project

Overview: Located in the Shahe area of Beijing Future Science City, the construction waste resource utilization project has been operated since 2018, it has disposed of nearly 3 million tons of construction waste and renovation waste, with a resource utilization rate of over 95%. The project is equipped with a comprehensive construction waste disposal line with an annual disposal capacity of up to 700,000 tons.

Technology and process: Advanced crushing, screening, sorting and other technologies are used to convert construction waste into recycled products such as recycled aggregate and recycled bricks. Recycled aggregate can be used in road base layer, concrete mixing plant and other projects, and recycled bricks can be used in municipal engineering, landscaping and other projects.

Applications and benefits: The recycled products are widely used in many municipal infrastructure projects in Changping District, such as the construction of beautiful villages, the management of black-smell water bodies and the renovation of Dingsi Road and Anning Road. The implementation of these projects not only reduces the pollution of construction waste to the environment, but also saves a large amount of natural resources, realizing a win-win scenario in terms of economic and environmental benefits.[7]

[7] https://baijiahao.baidu.com/s?id=1823710892693206116&wfr=spider&for=pc

3.4
Smart City Development

This chapter in line with SDG11.3 and SDG11.A. Through the construction of smart city, Beijing Future Science City has improved the efficiency of urban management, optimized public services, promoted social inclusion, realized the refinement and intelligence of urban planning and management through intelligent means, and provided residents with more convenient and efficient living services. In addition, smart city construction has promoted interregional synergistic development and supported the implementation of national and regional development plans through data sharing and the construction of information technology platforms.

3.4.1 Building a model smart city for the future

As the key platform for scientific and technological innovation in Beijing and the first batch of national smart city pilots, Beijing Future Science City has actively explored the path of smart city development since its inception, and is committed to driving innovation to create a model area for smart city construction, enhancing urban management efficiency and residents' quality of life.

Smart city top-level design and planning

In its master plan and sustainable development indicator system, Beijing Future Science City defines key smart city construction goals, which include improving the completeness of information infrastructure and expanding the coverage of intelligent monitoring. Based on these goals, a series of special plans were developed, providing comprehensive guidance for smart city development. These plans focus on the integration of technology and urban governance, aiming to create a smarter, greener and more people-centered urban environment.

Developing smart city pilot zone

In 2018, Beijing Future Science City launched the construction of Smart City Pilot Zone, which is a key initiative for its smart city construction. Currently, the first phase of the pilot zone has successfully implemented four key IT projects, yielding significant results: a Spatio-Temporal Information Smart Support Platform, an Intelligent Energy Monitoring System, a Multi-Modal Smart Transportation Service System, and a Metropolitan Area Network Project.

The Spatio-Temporal Information Smart Support Platform integrates multi-dimensional spatial data from above, on, and below ground within Future Science City. It features data exchange, sharing, and visualization capabilities, providing real-time,

three-dimensional urban information. This platform offers robust support for various smart applications; Leveraging big data and IoT technologies, the Intelligent Energy Monitoring System collects and analyzes energy consumption data from companies located in "Energy Valley." This enables centralized management of energy consumption for individual buildings and complexes, providing data-driven insights for policy decisions; The Multi-Modal Smart Transportation Service System establishes an integrated traffic operation coordination and command system. It includes functions like public safety prevention and control, road network monitoring, and public information services, effectively enhancing traffic operation management and service levels; Finally, the Metropolitan Area Network Project breaks down information silos, significantly improving "Energy Valley's" service management and innovation guidance capabilities.

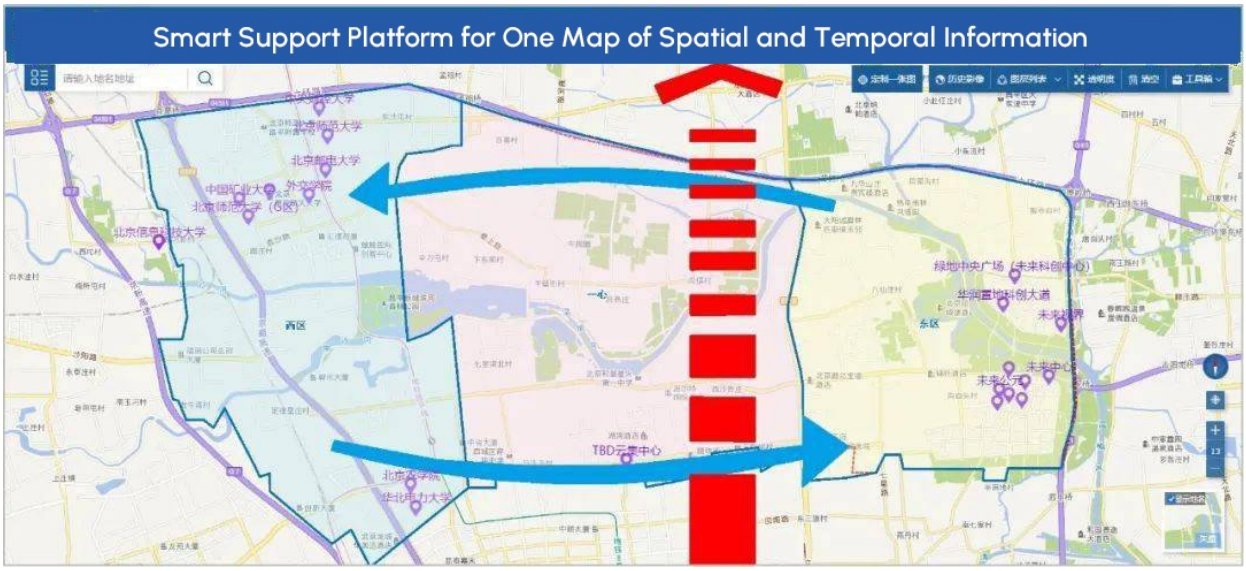


Figure21 Smart Support Platform for One Map of Spatial and Temporal Information

The main characteristics of Beijing Future Science City Smart City Pilot Zone include:[8]

- **System integration and collaborative operation:** the pilot area integrate systems across multiple domains such as metropolitan area networks, smart transportation, energy monitoring, and spatial and temporal information, achieving inter-connectivity of infrastructure and data sharing, forming an organic urban operation and management platform.
- **Data-driven refined governance:** relying on the spatial and temporal information smart support platform, it realizes real-time collection, analysis and processing of urban operation data, providing scientific basis for urban planning, traffic management, energy deployment, etc., and promoting the transformation towards refined urban governance.
- **Innovation-driven and industrial synergy:** Through the construction of smart cities, it provides well-developed infrastructure and application scenarios for scientific and technological innovation, promotes the in-depth integration of industry, academia and research, and boosted the development of smart industries.
- **People-centered service concept:** The smart city construction in the pilot zone consistently revolves around improving the quality of life of residents, reflecting the people-centered service concept and allowing residents to have a sense of brought by the smart city.

[8] Future Science City Smart City Pilot Zone (Phase I) Project Review Report

Regional Development Information System

The system is visually presented through a tree data structure to make it queryable, analyzable and monitorable. 13 functional modules, including economic panorama, enterprise analysis, tax analysis, monitoring and early warning, central enterprise compound, etc., are used to analyze and display the data of various types of enterprises.

Economic operation, a dynamic economic database for Beijing Future Science City has been established, enabling digital monitoring of its economy and exploring and practicing economic analysis work models.

Talent services, a preliminary talent database for Beijing future science city, exploring and realizing talent information application modules.

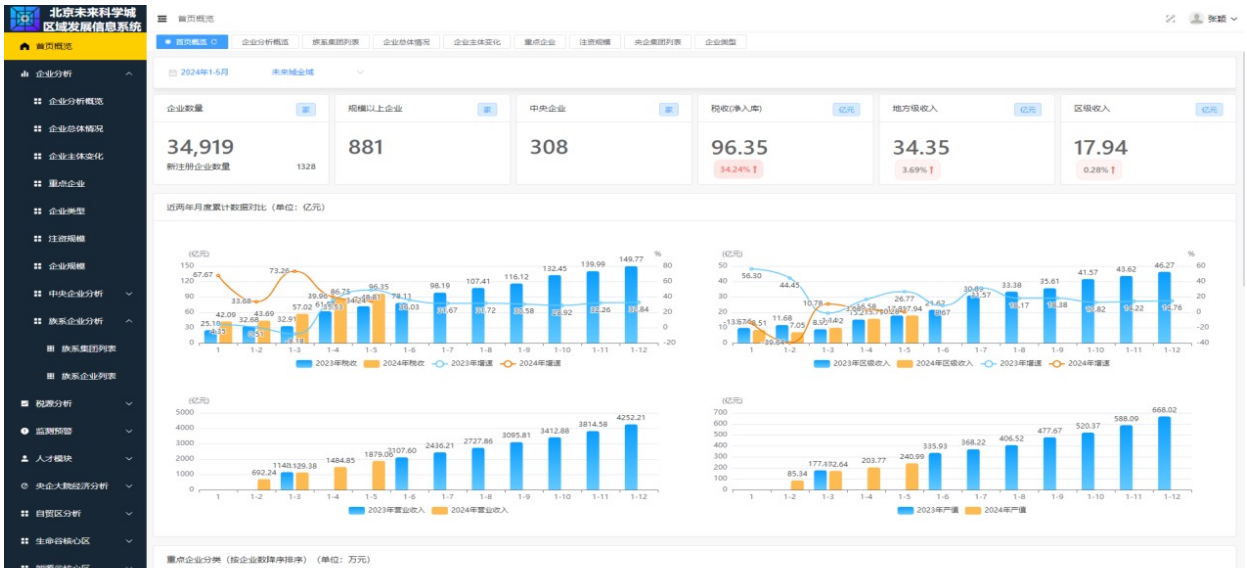


Figure22 Beijing Future Science City Regional Development Information System System Application Interface

Case of smart city management: smart city operation service center of Beijing Future Science City

Project overview

The Smart City Operation Service Center (IOC) of Beijing Future Science City is an important information infrastructure, undertaking important service functions such as digital government affairs, digital and intelligent enterprises, science and technology platforms, and park management. The project is located in the East District of Future Science City, covering a land area of 4,334 square meters with a total construction area of 13,389 square meters and a cabinet scale of 1,200 racks. The IOC was officially put into use in 2023. Currently, in accordance with the overall computing power layout plan of the district, it is collaborating with professional institutions to build an integrated computing network and computing power resource scheduling platform, and construct the core hub for the smart city construction of Future Science City.

Project features

1. Secure and Stable Power Supply Guarantee:

- Dual 10kV Utility Power Access: Total installed capacity of 22,000 kVA.
- 2N UPS Power System: Equipped with a 2N redundant Uninterruptible Power Supply (UPS) system, capable of providing 15 minutes of con
- Backup Power: Eight diesel generators serve as backup power, operating in an N+1 redundancy mode to ensure continuous power supply in the event that both utility power circuits are interrupted.

2. Highly Efficient and Energy-Saving Cooling System:

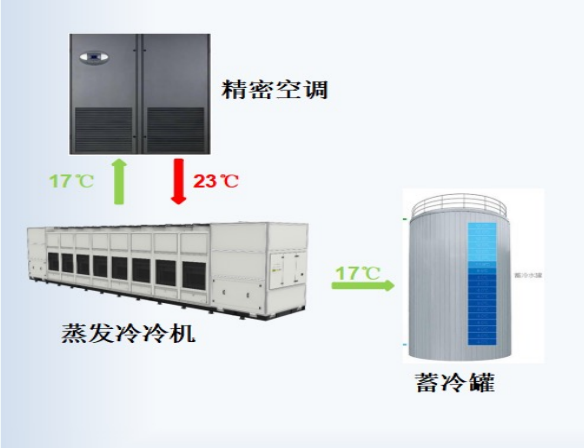
- Advanced Chiller Units: Features six 1,300 kW and two 1,000 kW evaporative cooling chillers with natural cooling (free cooling) capabilities, operating in an N+1 redundancy mode.
- Emergency Cooling: One closed thermal energy storage (TES) tank guarantees 15 minutes of continuous emergency cooling for IT equipment.
- Precision Environmental Control: Supply/Return Air Temperature: 23°C / 35°C; Humidity: Consistently maintained at 55%;
- 24/7 Operation: Year-round, uninterrupted cooling to ensure the stable performance of all IT infrastructure

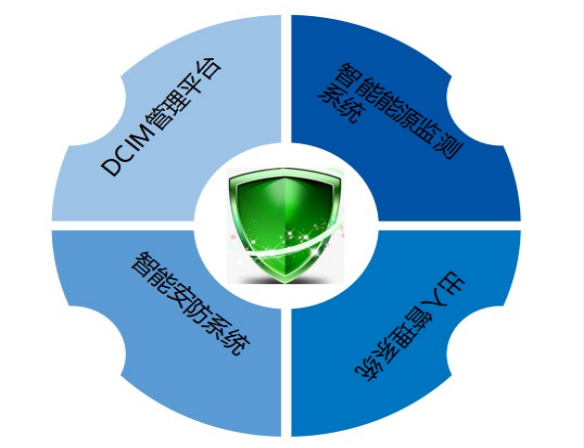
3. High-Speed Interconnected Network Access:

- Multi-Carrier Connectivity: Direct access to the networks of major telecommunications operators, including China Mobile, China Telecom, and China Unicom.
- Redundant Fiber Access: Dual-path fiber optic cables connected to the operators' independent Site A and Site B machine rooms to ensure maximum reliability.
- Abundant Infrastructure: Sufficient external communication conduit resources to support high-capacity network expansion.

4. Intelligent Operations Management Platform:

- Data Center Infrastructure Management (DCIM): Provides comprehensive monitoring of the facility's operating environment.
- Smart Energy Monitoring System: Real-time tracking of power consumption to provide data-driven support for energy saving and consumption reduction.
- Intelligent Security System: 24/7 360-degree surveillance to enhance the reliability and physical security of the machine rooms.
- Access Management System: Implements tiered personnel authorization and rapid facial recognition to strictly control the entry of external personnel.





3.4.2 Digital empowerment, stimulate new vitality of industrial development

Under the global wave of digitization, digital economy has become a key force in promoting high-quality economic development. Beijing Future Science City has keenly captured this trend and actively acted to take digital economy as a key development area, promoting the deep integration of digital technology and the real economy through a series of initiatives, injecting new vitality into industrial development, and cultivating new points for economic growth.

Top-level design, planning and layout of digital economy industry

Beijing Future Science City meticulously constructs a diversified digital economy industrial

layout around core areas such as "Energy Valley", "Life Valley" and Shahe Higher Education Park. Policy documents such as "Changping District Advanced Manufacturing Leapfrog Plan (2022-2025)" and "Beijing Changping District Digital Economy Innovation and Development Three-Year Action Plan (2022-2024)" point out the direction for the development of digital economy, focusing on the cutting-edge fields such as artificial intelligence, big data, cloud computing, industrial internet, intelligent hardware, etc., and making every effort to push forward the in-depth fusion of the digital economy and the real economy.

Creating a digital economy innovation platform and building a digital industry ecosystem

In order to create a favorable ecology for the development of digital economy, Beijing Future Science City actively builds a digital economy innovation platform. The Future Science City Group and the State Grid of China have jointly built a platform for the integration and development of large, medium and small enterprises, constructing an innovation ecology of "leading enterprises + small and medium-sized enterprises + service platform", and promoting resource sharing and collaborative innovation among enterprises. At the same time, Beijing Future Science City also strengthens cooperation with universities and scientific research institutions to build joint laboratories and innovation research institutes, accelerating the process of industrialization and application of digital technology.

In terms of industrial ecological optimization, Beijing Future Science City has attracted many high-quality enterprises and innovation teams in the field of digital economy through policy guidance and market mechanism. Among them, the Robotics Industrial Park project is progressing well and is expected to be completed by the end of 2025. The project centered on robot bodies, focuses on core components, intelligent sensing systems, and technologies to build a characteristic industrial system. It is expected to achieve significant breakthroughs in the industrial internet field, providing strong support for the digital transformation and intelligent upgrading of the manufacturing industry. Future Science City also fosters a strong innovation and entrepreneurship atmosphere and promotes the vigorous development of the digital economy industry by organizing digital economy industrial forums, innovation and entrepreneurship competitions, and other activities.

Significant digital economy industrial agglomeration effect

The digital economy industrial agglomeration effect in Beijing Future Science City is beginning to emerge. A number of leading enterprises, including Xiaomi Smart Industrial Park and Unigroup Digital Economy Technology Park, have successively settled, becoming important engines for regional economic growth. Among them, Xiaomi Group's new-generation Xiaomi smartphone smart factory, with an investment of 2.4 billion yuan, has started operation in Beijing Future Science City. Its highly automated and digitalized production lines operate 24 hours a day without interruption, with a daily output of up to 30,000 smartphones, making it one of the most intelligent and digitalized mobile phone factories in China. At the same time, industrial parks such as the AI Acceleration Center, Sci-tech Innovation Center, and Yunji Center also have their unique features, attracting high-quality enterprises such as Digibird, NIU, RocGene and other companies to move in, forming a good trend of industrial agglomeration and development.

3.5

Civic Engagement and Social Inclusion (CESI)

This chapter in line with SDG11.7 and SDG11.B. Beijing Future Science City's practices in civic participation and social inclusion, including the construction of an all-age friendly community, the provision of barrier-free facilities, and the promotion of gender-equal employment policies, have provided a safe and inclusive public space for different groups, and enhanced the quality of life and sense of well-being of residents. At the same time, through the establishment and optimization of public participation mechanisms, the participation of residents in urban planning and management has been strengthened, and the inclusiveness and adaptability of cities have been enhanced, contributing to the construction of more resilient urban environments

Public participation is a key driver of sustainable urban development. It not only ensures that urban planning and construction fully reflect the actual needs and expectations of residents, but also enhances their sense of belonging and responsibility to the city, thus improving the transparency and efficiency of urban governance. Since its inception,, Beijing Future Science City has been actively exploring public participation mechanisms to ensure the participation of residents, enterprises, social groups and other diversified subjects in urban planning and construction, and has utilized forms such as planning hearings, community forums, and online feedback collection, to promote planning and co-construction, and to lay a solid foundation of public opinion for the realization of the goal of sustainable development.

Building diversified public participation channels

Planning hearings: Beijing Future Science City regularly organizes planning hearings before major planning projects are launched. Through these open and transparent sessions, resident representatives, business leaders, experts and scholars, as well as stakeholders are invited to participate and fully discuss key issues such as planning objectives, functional layout, infrastructure construction and so on.

Community forums and public open days: Beijing Future Science City organizes community forums and public open days from time to time. The community forums provide a platform for residents to express their opinions and suggestions, and residents can have face-to-face exchanges with officials and experts from government departments and the planning team on issues such as the community environment, public ser-

vices, transportation, etc. The public open days enhance the public's understanding of the development of Beijing Future Science City by showcasing the planning achievements, construction progress, and future visions. 2024, Beiqijia Town set up a platform for consultation and deliberation based on the principles of diversification and breadth, and improved the "deliberation unit resource pool" for community consultation and deliberation, and promoted the district's industry committees, property owners, government departments, resident units in the district, government departments and resident units in the precincts to join the resource pool, and promote the participation of relevant parties in proposing solutions to key issues in primary level governance.

Diversified stakeholder participation in in-depth research: on October 30, 2018, Future Science City Group organized a trip to the Sino-Singapore Tianjin Eco-City. Representatives from the District of Housing and Urban-Rural Development, the Municipal Public Utility Project Quality Supervision Station, the District Environmental Protection Bureau, Beiqijia Town Government, Beiqijia Police Station, and the Lutuan Village "Two Committees" participated in a study tour of their pneumatic waste collection and transportation system. This provided valuable guidance and insights for future initiatives.

2025/04 Taoyuan "Benefit" Business Circle Inaugural Meeting

2023/11 Hong Fook Court West Deliberative Consultation Meeting

Figure23 Public Participation

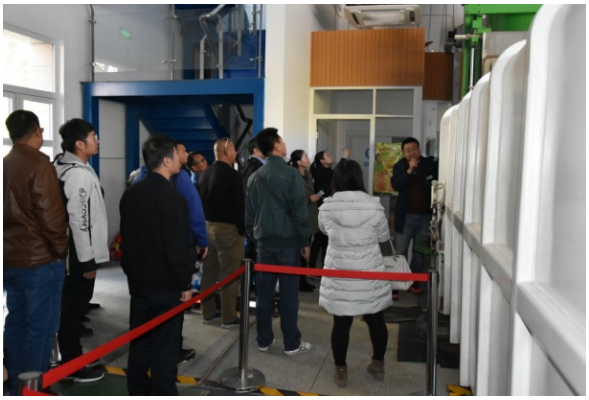


Figure24 Waste Pneumatic SI Station Research

2023/07 Celebrity Residence Property Withdrawal Seminar

2023/07 Peach Orchard Apartments Party Leadership Coordination Meeting for Old and Old Rehabilitation

Figure25 "Seven Short Households" Consultation and Deliberation Platform

Online opinion collection platform: In order to meet the needs of the digital era, Beijing Future Science City has built an online feedback collection platform. Through the official website, social media and mobile apps, residents and enterprises can submit their opinions and suggestions on the plan anytime, anywhere. 2024, Beijing Future Science City Management Committee has organized several public consultations on the "Implementation Plan for Green and Low-Carbon Construction of Buildings in the Future Science City of Beijing," which fully reflects the influence of the participation of the whole population in the construction of Beijing Future Science City.

Figure26 2024 February 26 to March 3, Beijing Future Science City Management Committee on the "Beijing Future Science City building green low-carbon construction implementation plan" (draft) "in the Changping District People's Government's website" government affairs "section" under the "policy documents to solicit opinions The "Policy Document Opinion Solicitation" column on the website of Changping District People's Government under the section of "Public Affairs" is open to the public for opinions.

Innovative public participation mechanisms

Public participation Throughout the Entire Planning Process. Beijing Future Science City integrates public participation throughout the entire process of planning, from the initial demand surveys and mid-stage design proposals to the final implementation evaluations, the public is deeply involved. For example, in the Green Infrastructure Construction Plan, early-stage questionnaires and community interviews were used to thoroughly understand residents' needs for green buildings, "sponge cities," and municipal facilities. During the design phase, resident representatives and experts were invited to jointly review proposals, ensuring the plans were both scientific and practical. In the implementation phase, regular public satisfaction surveys are conducted to promptly adjust and optimize construction content, ensuring the smooth achievement of planning goals.

2021/09 Public Participation Symposium on Planning Environmental Impact Assessment

2024/07 Energy Valley Planning EIA Symposium

Figure27 Public Participation in Planning Discussions

3.5.1 Social inclusion and innovation in community governance

Promoting social inclusion is an important part of the implementation of the Sustainable Development Goals (SDGs), which emphasizes the elimination of discrimination and the promotion of fairness at all levels of social development, ensuring that people of different genders, ages, races, cultural backgrounds and socioeconomic statuses can enjoy equal opportunities for development, participate in social affairs and benefit from them. Beijing Future Science City, as an innovative highland for urban development, has implemented the concepts of gender equality and diversity friendliness from the very beginning of its planning, and is committed to creating an all-age friendly community and innovating the community governance model with the help of intelligent means, so as to provide a practical example for the sustainable development of the city.

In promoting social inclusion, Beijing Future Science City attaches great importance to the issue of gender equality and actively promotes a gender-equal employment policy. By eliminating gender discrimination in the government, enterprises and various organizations, it ensures that women enjoy the same opportunities as men in employment and promotion. **At present, the proportion of female employees in various subordinates and organizations of Beijing Future Science City exceeds 30%. In the case of**

the Beijing Future Science City Development Group, for example, the number of business management and professional and technical personnel is 783, with more than 300 female employees, accounting for a proportion of about 38.3%.

Beijing Future Science City has formulated and implemented a strict anti-gender discrimination policy, requiring all employers to adopt a fair and transparent recruitment mechanism in the recruitment process to ensure that female applicants enjoy the same hiring opportunities as male under the same conditions. At the same time, enterprises and organizations are actively promoted to provide female employees with the same training and career development opportunities as those available to men, and to set up special career development programs for women, providing leadership training, skills enhancement courses, and so on, in order to help female employees enhance their career competitiveness. In addition, enterprises are encouraged to build gender-friendly work environments, provide family rooms in the workplace, flexible work systems, etc., so as to support female employees in striking a balance between work and family, and to enhance the enterprises' sense of social responsibility.

Figure28 Female employees of Beijing Future Science City make a report on the project program

In terms of creating an all-age friendly community, Beijing Future Science City has taken a series of initiatives. Children's play facilities are reasonably located in community parks, squares and other public spaces to provide children with a safe and interesting play environment. For example, the Children's Fun Park in Waterfront Park and the children's play facilities in Future Intelligent Valley, both of which provide excellent recreational conditions for children.

The creation of a comprehensive senior community integrating housing, medical care, rehabilitation and recreation provides a safe, comfortable and convenient living environment for the elderly and enhances their sense of well-being and social participation.

Figure29 children's play equipment in Future Intelligent Valley

Typical practice: Sun City Elderly-Friendly Community of Beijing Future Science City

Project Overview

It spans a total area of 420,000 square meters and is one of China's pioneering integrated eldercare complexes. The community boasts a beautiful environment and convenient transportation, offering diverse eldercare services including home-based care, institutional care, and travel-based eldercare.

Specific measures

- 100% coverage of barrier-free facilities: all public areas in the community are equipped with barrier-free access and elevators.
- Eldercare Service Facilities: The community features a fully equipped eldercare service center, providing services such as day care, rehabilitation nursing, and cultural entertainment. It also includes various types of activity rooms for seniors.
- Health management services: The community collaborates with nearby medical institutions to offer regular health check-ups for seniors. It has also introduced smart health monitoring equipment to continuously track seniors' health data, feeding this information

back to their families and medical staff via a mobile application.

Outcomes

The Sun City Elderly-Friendly Community has significantly enhanced the quality of life and social engagement for seniors, becoming a model for eldercare community development.

- Significantly Improved Quality of Life for Seniors: The comprehensive barrier-free facilities and well-equipped eldercare service amenities have greatly improved seniors' living environment, boosting their convenience and sense of well-being.
- Increased social participation: A rich array of cultural activities and community services has encouraged more seniors to participate in community life, strengthening their sense of social belonging and engagement.
- Enhanced Health Management: Through smart health monitoring systems and regular health check-ups, seniors' health issues are promptly detected and addressed, effectively reducing the incidence of chronic diseases and the risk of complications.

3.5.2 People-centered, promoting equalization and quality of public services

In the field of public services, Beijing Future Science City adheres to the concept of "people-centered", and promotes the equalization and quality of public services through innovative practices such as planning and constructing a well-developed system of service facilities, optimizing the layout of educational resources, constructing a high-quality medical and healthcare system, and building high-quality cultural and sports facilities, thus significantly improving the quality of life of the residents and providing solid support for the sustainable development of the city. This has significantly improved the quality of life of the residents and provided solid support for the sustainable development of the city.

Planning a comprehensive public service facility system

Beijing future Science City has detailed plans for its public service facilities, covering layout, construction standards, and implementation safeguards. The goal is to create a fully functional, high-quality public service system, forming a "two zones, one center" spatial pattern. This involves a coordinated plan for residential, educational, medical, commercial, cultural, and sports supporting service spaces, aiming to achieve a balance between work and life in the area and enhance urban vitality and attractiveness. Based on the strategic positioning of each district and the makeup of its innovative population and enterprises, the plan specifically refines facility configurations. This creates a "city-block-community" three-tier living-oriented service system and a "city-cluster" two-tier production-oriented innovation public service system.

Optimizing education resource development

Beijing Future Science City rationally plans kindergartens and elementary school to ensure that children throughout the region can attend school nearby, reducing the time spent on commuting to school and the risk of transportation. For example, a number of high-quality kindergartens and elementary school have been built in Beijing Future Science City, such as the First Kindergarten of Beijing Future Science City of North Normal University. Additionally, Beijing Future Science City also actively introduces renowned domestic and international educational institutions for collaborative schooling, enhancing educational

quality. For example, by bringing in well-known institutions like Beijing No. 101 High School, they deepen district-based management and group-based schooling reforms through a "hand-in-hand" partnership model, promoting the balanced distribution and sharing of educational resources. As of the end of 2024, Future Science City has built 39 primary and secondary schools (including 10 middle schools and 29 primary schools), and introduced 14 municipal-level prestigious schools, which can guarantee and meet the needs of all age-appropriate children in the district to receive high-quality basic education.

Figure30 Future Science City School of the Second Affiliated Middle School of Normal University of China

Building a quality healthcare service system

Beijing Future Science City is committed to building a comprehensive healthcare service system, providing residents with all-round health protection through measures such as building new hospitals, introducing high-quality medical resources and upgrading the level of primary healthcare services. Beijing Future Science City has planned and constructed a number of high-level general hospitals and specialized hospitals, such as Gao Bo Hospital, the first international research hospital in China. Additionally, Beijing Future Science City also continues to strengthen primary-level healthcare facility construction and services. They're pushing for the establishment of Beijing Future Science City Branch of the Beiqijia Community Health Service Center. This will elevate primary-level healthcare, forming a widely accessible and fully functional primary healthcare service system. This ensures residents can enjoy efficient and considerate medical services right at their doorstep.

Gao Bo Hospital, the first international research hospital in China

Project Overview

Gao Bo Hospital is located in the "Life Valley" in the western part of Beijing Future Science City. Gaobo Hospital was designated a key project in Beijing's "3 100" major initiatives in 2020. It officially began operations in October 2023. The hospital spans approximately 3.2 hectares with a total built-up area of 97,406 square meters and a planned capacity of 500 beds.

Functional positioning and strategic objectives

Gao Bo Hospital is characterized by the combination of "research" and "clinical" functions, highlighting the concept of "small outpatient clinic, big scientific research", and is committed to becoming the diagnosis and treatment of difficult and serious diseases, clinical research, It is committed to becoming a strategic highland for the diagnosis and treatment of difficult and serious diseases, clinical research, and the transformation of the biomedical and device industries.

Construction content and innovative practices

- Functional Layout: The hospital's facilities include a Clinical Application and Transformation Center for Drug Research and Development, a Clinical Expert and Scientist Innovation Research Center, a Clinical Discovery Industry Transformation Platform, and a Complex and Critical Disease Diagnosis and Treatment Center.
- Technological innovation: The hospital is equipped with advanced medical equipment and research facilities to support cutting-edge clinical research.
- Cooperation Model: Gao Bo Hospital actively explores the cooperation mode with universities, scientific research institutions and enterprises, and promotes the deep integration of industry, academia and research.

Project effectiveness

- Enhancement of medical services: The completion and operation of Gao Bo Hospital has significantly enhanced the level of medical services in Beijing Future Science City and the surrounding areas.
- Promoting scientific research and innovation: As a public service platform for clinical research in Beijing, the hospital can undertake 400-600 clinical trial projects annually, promote the accelerated marketing of more than 100 new drugs, and build an innovative medical ecosystem of "clinical discovery-basic scientific research-industrial transformation-clinical application".
- Promote industrial development: The operation of Gao Bo Hospital has driven the development of the biomedical industry and attracted more innovative companies and research teams to Beijing Future Science City.

Creating high quality cultural and sports facilities

Beijing Future Science City places high importance on the construction of public cultural and sports facilities to meet the growing spiritual, cultural, and fitness needs of its residents. Regarding cultural facilities, Beijing Future Science City is promoting the construction of the Science and Technology Cultural Exchange Center, a high-end experiential cultural complex integrating performances, exhibitions, and technological exchanges. Additionally, plans include various facilities such as libraries and theaters to further enrich residents' cultural lives. In terms of sports facilities, Future Science City has completed its first large-scale outdoor stadium, covering approximately 70,000 m² and equipped with a standard 400-meter track, an 11-a-side artificial turf football pitch, and a 5-a-side pitch.

The Zhuxinzhuang Sports Center is currently under construction and is planned as a block-level national fitness center with a total construction area of 15,006 m². The center features a three-section functional layout with tiered internal circulation. Its facilities include an 8-lane standard swimming pool and training pool, 12 badminton courts, 1 basketball court, a comprehensive sports hall of about 4,500 m², and several outdoor and rooftop sports areas.

At the same time, Future Science City has planned a Sports Center project that includes a comprehensive gymnasium, a swimming arena, a national fitness hall, a children's sports center, an ice hockey rink, and a sports technology center. Once completed, it will significantly improve the regional sports service level and provide residents with more diverse exercise options.

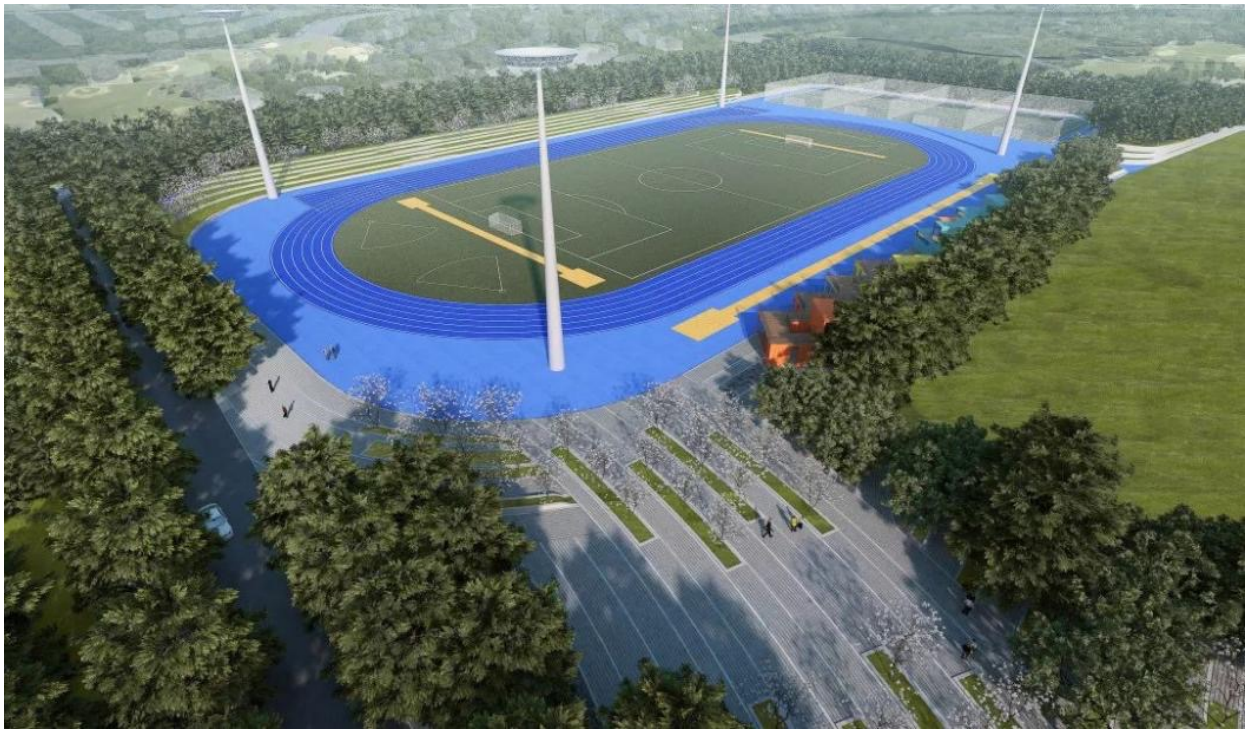


Figure31 Beijing Future Science City Stadium View

3.6

Synergistic Development of Ecological and Cultural

The chapter in line with SDG 11.4 and SDG 11.6. The practice of Beijing Future Science City's initiatives in protecting historical and cultural heritage and fostering coordinated cultural and ecological development highlight its commitment to preserving both cultural and natural legacies. Through ecological restoration and landscape design, it has organically combined historical sites with the natural environment, enhancing the cultural connotation and ecological quality of the city. Furthermore, measures such as atmospheric, water, and soil environment remediation, alongside biodiversity protection, have significantly enhanced the urban ecological environment. These efforts have reduced the city's negative impact on nature and boosted its capacity for sustainable development.

3.6.1 Blue sky and clear water, strengthening integrated environmental management and biodiversity protection

Through a series of systematic and innovative practical initiatives in strengthening comprehensive environmental management and biodiversity protection, Beijing Future Science City has realized significant improvement of the ecological environment, laid a solid foundation for sustainable development, and at the same time provided valuable experience for the ecological and environmental management of global cities.

Atmospheric environmental management: developing the blue sky and white clouds

Volatile organic compounds (VOCs) management. It promotes source substitution of products with low VOCs content, carries out sampling inspections of VOCs-containing products such as paints, adhesives and cleaning agents, and encourages industrial coating enterprises to use raw and auxiliary materials with low (no) VOCs content. Meanwhile, quality supervision of products such as automotive oils and NOx reducing agents has been strengthened.

Emission reduction of nitrogen oxides. Optimizing the structure of vehicles, accelerating the replacement of fuel vehicles with purely electric vehicles or hydrogen fuel cell vehicles, and strengthening the regulation of emissions from motor vehicles and non-road mobile machinery.

Dust control. Leveraging Changping District's online ecological environment monitoring net-

work, a comprehensive "monitoring - supervision - assessment - analysis - decision - support" management system has been established to strengthen dust control measures, implement the "Three Responsibilities at the Doorstep " system, (a policy where entities are responsible for cleanliness, order, and greenery in front of their premises) and enhance inspections and cleaning for construction site exits and muck transport vehicles.[9]

Water environment management: developing clear water and clear streams

Ecological restoration to improve the quality of water environment. Beijing Future Science City attaches great importance to the restoration and protection of its aquatic ecosystems. It's actively undertaking ecological remediation of waterways like the Wenyu River and Nansha River to restore their natural forms and ecological functions. Through methods such as eco-friendly revetments and the construction of wetland ecosystems, the city is increasing the proportion of ecological shorelines along these rivers, creating vital ecological buffer zones. These efforts effectively purify river water quality and enhance the water body's self-purification capacity. For example, Wenyu River Park, by developing ecological wetlands and embankments, has not only improved river water quality but also created a popular recreational destination for local residents.

Figure32 Park Riverwalk

[9] Work Plan and Measures for Ecological Civilization Construction and Ecological Environmental Protection in Changping District in 2024

Smart monitoring and governance. An automatic water quality monitoring network is applied to monitor the water quality of national and municipal assessment sections in real-time, allowing us to stay informed of water quality changes and enhance the early warning and supervision capabilities. "Pipe Cleaning Actions" is launched to clear rainwater culverts and combined sewer pipes, while intensifying efforts to rectify misconnections and illegal junctions to ensure the dynamic zeroing of rainwater and sewage mixing.

Establishment of a comprehensive rainwater management system. Ensure that flood control and drainage facilities meet the planning requirements, thereby maintaining the natural flow and purification capacity of water bodies and guaranteeing the sustainability of the regional water environment.

Soil environmental management: developing a clean home

Construction land risk management. Beijing Future Science City is enhancing its construction land risk management mechanisms to ensure 100% safe utilization of key construction sites. For land plots whose usage is changed to residential, public administration and public service land, soil contamination surveys are strictly conducted in accordance with relevant standards and regulations, and risk control and remediation measures are implemented to ensure the safe utilization of the land and safeguard public health.

Solid waste management. The development of a "zero-waste city" pilot program is being advanced, and solid waste collection, transportation, and disposal capabilities are being enhanced. At Beijing Future Science City, publicity and guidance for waste classification are being strengthened, and residents' awareness and participation in waste sorting are being increased. Concurrently, the waste collection system is being optimized, and modern waste treatment facilities are being constructed. This allows for the classified treatment and resource utilization of domestic waste, construction waste, and other types of refuse. Furthermore, the classified management of new pollutants and full-process risk prevention and control are also being strengthened at Beijing Future Science City, effectively reducing the pollution of soil and the environment by solid waste.

Biodiversity conservation: building an ecological home

Optimize urban spatial pattern. Beijing future science city has built a spatial pattern of "one axis converging with one belt, one zephyr embracing two gardens, and two rings stringing pearls" with the keynote of "co-prosperity of city and green, and symbiosis of time and space". Through scientific and reasonable spatial planning, the natural ecology and urban space are deeply integrated, providing a good spatial basis for biodiversity protection. At the same time, the high standard of Beijing future science city waterfront park and the future of the Wenyu River Zhigu Park and other ecological space for wildlife to provide a habitat and living space.[10]

[10] Master Urban Design Theme for Spatial Implementation of Integrated Planning for Future Science City

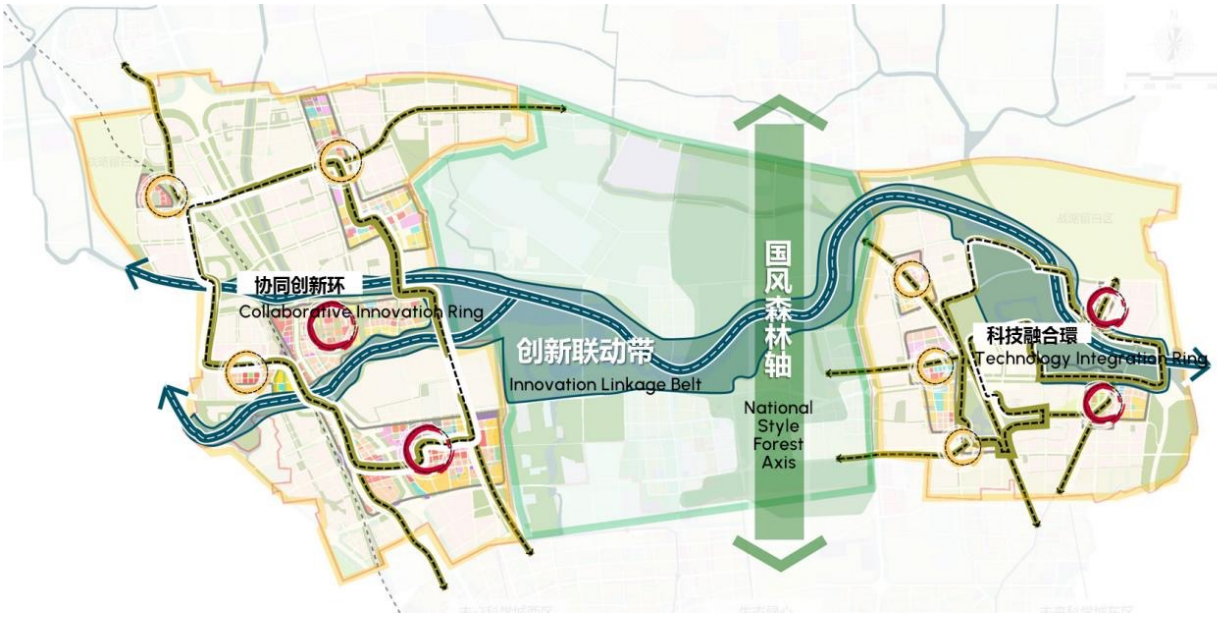


Figure33 General spatial structure

Constructing an uninterrupted ecological network. Based on ecological construction, Beijing Future Science City has built a spatial pattern of "one center, two Zones, and a green ring" to enhance the connectivity and stability of the ecosystem through the construction of ecological corridors, biological corridors, and parks and green spaces. The high standard ecological recreation park has built a green oxygen bar with a total area of 2.9 square kilometers, which is divided into three large areas, namely Shahe, Beiqijia and Dongxiaokou. The design of the Shahe area focuses on biodiversity, such as the Insect Valley and Bird Watching Station, linking with the Shahe Wetland Park to form a complete ecological network[11].

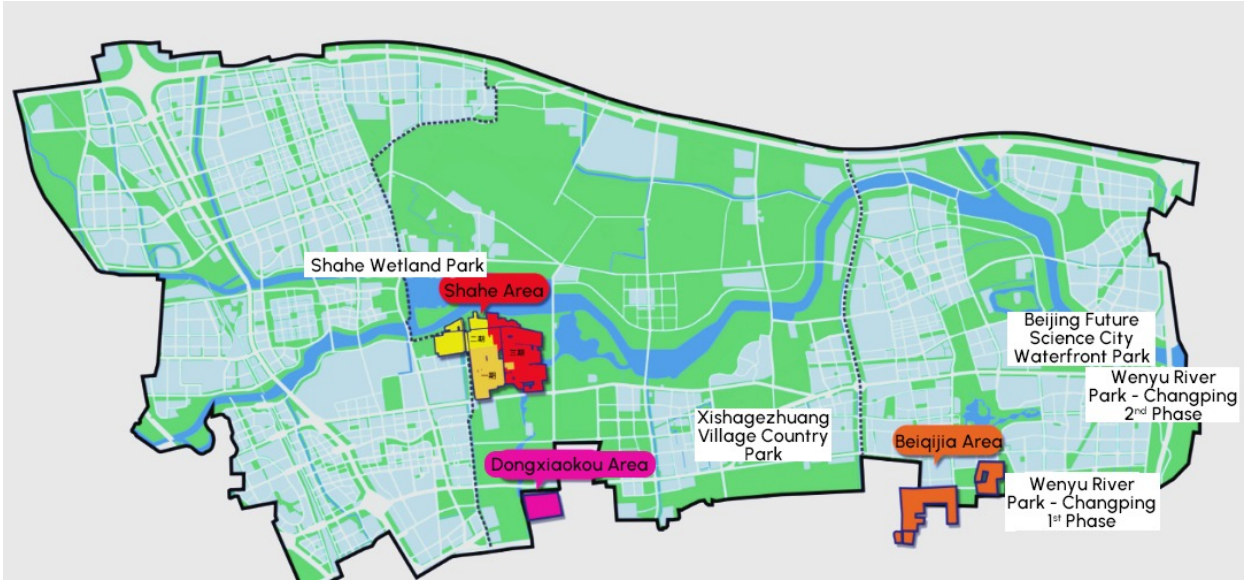


Figure34 Ecospatial Layout

[11] https://finance.sina.cn/2024-11-25/detail-incxhcvq8261721.d.html?cref=cj

Through ecological restoration and landscape design, Beijing Future Science City has linked the scattered ecological spaces into an organic whole, creating iconic ecological nodes such as the Wenyu River Future Zhigu Park and Beijing Future Science City's Waterfront Park.

- Wenyu River Future Intelligent Valley Park: As an important ecological section of Beijing Future Science City, the park introduces intelligent technological facilities, such as an intelligent runway and a 5G corridor, creates multiple habitats such as forests, scrub meadows, and wetlands, making it a model area for "science and technology + ecology". It is a model area for "technology + ecology".
- Wenyu River Park Changping Phase II and its natural belt cover an area of 1.94 square kilometers with a total investment of 325 million yuan. Continuing the theme of "carbon neutrality," the project explores the application of green, low-carbon technologies and the promotion of green lifestyles. This second phase is equipped with an "AI + Robotics" human-machine collaborative management platform. By leveraging a specialized park-industry large model, an AI agent configuration platform, and over 700 sensing devices, it achieves multi-dimensional smart operations.
- Beijing Future Science City Waterfront Park: Centered around the ancient course of the Wenyu River, the park preserves native poplar forests and integrates advanced ecological technologies to minimize environmental impact. A 600-meter wetland boardwalk is featured within the park, connecting ecological spaces and achieving a seamless fusion of natural landscapes with technological elements.

Figure35 Smart System of Wenyu River Park Changping Phase

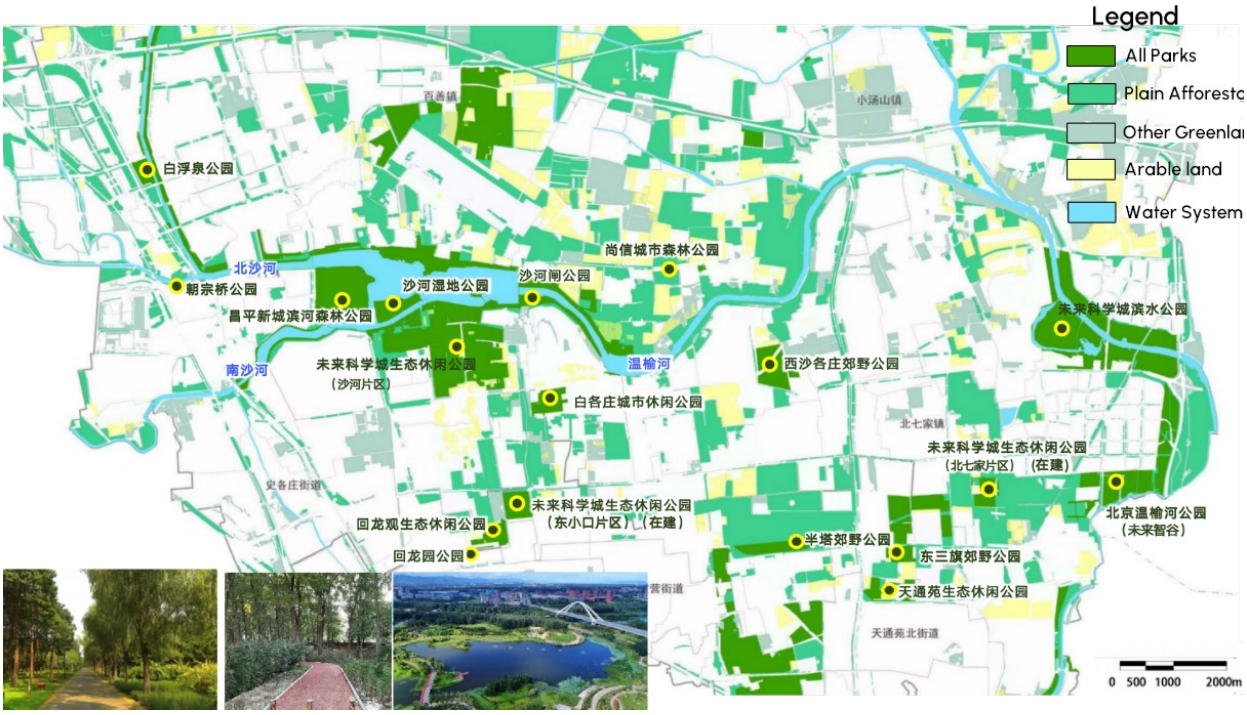


Figure36 Ecological Network Map of Beijing Future Science City

In addition, Changping District has planned and constructed a 42-kilometer greenway network, the main of which is located in the Beijing Future Science City, connecting important functional areas such as Shahe Higher Education Park and Life Science Park, forming an ecological slow-travel system covering the whole area. The greenway not only provides residents with a place for leisure and fitness, but also promotes ecological connectivity and enhances biodiversity in the area. A number of ecological stations and viewing platforms have been set up along the greenway, combining with the surrounding natural landscape to create a multifunctional space integrating leisure, science popularization and sports.

Figure37 42 kilometers of greenway network

Graded ecological conservation zones. Beijing Future Science City has implemented the "Biodiversity Conservation Special Plan" , delineating three levels of ecological conservation zones, creating three-dimensional ecosystems, and protecting important habitats for wildlife. Through baseline surveys and assessments of biodiversity, a comprehensive understanding of existing biodiversity is being established. This information then informs efforts to strengthen control over invasive alien species and protect wild plant and animal resources. For instance, within Beijing Future Science City's ecological conservation zones, measures such as establishing ecological buffer zones and restricting human activities are providing safe habitats and breeding environments for wildlife like birds and insects.

Figure38 Birds in the region

3.6.2 Integrating green spaces for a garden city

Against the backdrop of accelerating global urbanization, garden city construction has become a key pathway for achieving sustainable urban development. Garden cities not only enhance residents' quality of life and health by increasing urban greenery and optimizing the ecological environment, but also play a vital role in promoting biodiversity conservation, mitigating the urban heat island effect, and reducing environmental pollution.

The "Beijing Garden City Special Plan (2023–2035)" issued by the Beijing Municipality explicitly designates fifteen "Capital Garden Essence Areas," with Beijing Future Science City being one of them. Actively responding to the overall garden city planning goals of Beijing and Changping District, Future Science City is integrating the ecological green core of the northern extension of the Central Axis with the ecological landscape construction along the Wenyu River. It is encouraging enterprises and universities within the park to "open their walls and share the greenery," shaping a blue-green interwoven ecological spatial pattern that embodies "mountain-water charm, pastoral style, national spirit, and futuristic flair." The goal is to create a fully functional and vibrant "Science+" garden city that highlights North China’s characteristics, the capital’s style, and the charm of the ancient city.

Building a high-quality park system

Relying on the spatial layout of the ecological green core and the northern extension of the Central Axis, a series of high-quality parks and green spaces have been developed. As the core of the ecological green core, the Wenyu River

Park has been transformed through ecological restoration and landscape enhancement into a comprehensive park integrating ecological conservation, leisure, and cultural exhibition. This initiative improves the ecological well-being of urban residents and creates a "15-minute park life circle." Currently, Future Science City has five parks under construction, including four ecological leisure parks and one country park, covering a total area of 6,585 mu (about 439 hectares). Additionally, two more parks are planned, with a total area of 3,033 mu (about 202 hectares).

Figure39 Layout of major parks in Future Science City

Figure40 Wenyu River Future Smart Valley Park

Figure41 Aerial view of Waterfront Park

Promoting garden-style neighborhoods

Garden-style neighborhoods are being actively promoted to create a functional and vibrant "Science+" garden city. Currently, construction is being advanced for two urban parks (a sports and leisure-themed park and a science and innovation-themed park), one corner space, and six garden street corners, with the aim of enhancing the ecological quality and landscape value of urban public spaces. Concurrently, four scenic streets (Puqing Temple Road, Yingcai North 1st Street, Yingcai North 2nd Street, and Tugou Road) are being upgraded through measures such as connecting tree pits, beautifying fences, and improving road greening, to create streetscapes with garden characteristics.

Enhancing urban health and livability

Beijing Future Science City actively promotes the construction of small and micro green spaces and pocket gardens, constructing small and micro green spaces and pocket parks around residential and commercial areas to provide residents with convenient leisure space and enhance the accessibility of urban green spaces; improving the urban microclimate and reducing the heat island effect by planting street trees and constructing green shaded walkways to provide residents with a comfortable travel environment; promoting indoor greening in public buildings and commercial facilities to enhance the ecological quality and aesthetic value of urban spaces. ecological quality and aesthetic value of urban space.

Building a garden scenarios

A distinctive garden city brand has been created through the construction of diverse scenarios such as garden model neighborhoods, garden settlements, garden streets, garden business districts, garden offices, garden factories, garden stations and garden villages. For example, vertical greening and rooftop gardens have been promoted in the construction of residential areas to enhance the ecological quality of the living environment, and garden-style commercial plazas and pedestrian streets have been built in conjunction with the construction of commercial districts to enhance the attractiveness and vitality of the commercial districts.

3.6.3 The inheritance protection and the utilization of historical and cultural heritage

As the foundation of urban development, historical and cultural heritage carries rich cultural memories and social values, and is an important source of the city's cultural identity and sense of belonging. Beijing Future Science City has realized the integration of modern technology and historical context by strategically planning and innovatively practicing the inheritance, protection, and utilization of its historical and cultural heritage.

Systematization and protection of historical and cultural resources: The area boasts numerous historical and cultural heritages, such as Gonghua City, Chaozong Bridge, and Puqing Temple Cultural Ruins, all of which bear witness to Beijing's historical evolution and serve as important carriers of regional culture. In the urban planning and construction, Beijing Future Science City has systematically sorted out these historical relics, delineated the protection scope and formulated detailed protection plans. For example, Gonghuacheng ensures the integrity of its core relics, such as city walls and gates, and through ecological restoration and landscape design, it integrates with the surrounding environment and becomes a window to showcase the city's culture; for Chaozong Bridge as an important historical bridge in the Beijing area, it focuses on the continuation of its transportation function while preserving its historical appearance.

Continuing of historical lineage and integrating of modern functions: Beijing Future Science City is deeply unearthing rich historical and cultural resources like Gonghua City and Chaozong Bridge, a cleverly integrating them into modern urban development. Take Gonghua City as an example: its historical layout and traditional architectural structure are being preserved. The Gonghua city is functionally and culturally divided into distinct areas such as the Historical Cityscape Zone, Ecological Recreation Zone, and Technology Innovation Zone. Each zone has clear landscape control standards and unique development guidelines, ensuring a harmonious blend of modern and traditional architecture. This approach retains historical charm while meeting modern urban functional demands.

Activating historical and cultural heritage: Actively exploring the path of adaptive use of historical and cultural heritage, and organically combining cultural protection with urban development. Taking Chaozong Bridge as an example, through the construction of a cultural park and the setting up of a cultural display area, it has been turned into a public space integrating cultural display, leisure and entertainment. On the basis of protecting and displaying the historical relics of Chaozong Bridge, the Chaozong Bridge Park combines modern landscape design with cultural display functions, so that the historical relics can be integrated into the lives of the residents, and also provides a platform for tourists to learn about the history and culture of Beijing.

Gonghua City: It was built in 1537, the 16th year of Jiajing of the Ming Dynasty, and was the place where the Ming emperors and kings stopped for their northern expeditions and visits to the tombs and tours. Gonghua City is a square city with a length and width of about 1 kilometer, covering an area of about 1 square kilometer.

Chaozong Bridge: a historical stone bridge of the Ming Dynasty, built in the 12th year of Zhengtong of the Ming Dynasty (1447), is one of the oldest existing large stone arch bridges in Beijing.

Puqing Temple: Buddhist temple, built in the Qing Dynasty, located in the southeast of the State Grid Smart Grid Research Institute, covering an area of about 2,000 square meters, is a district-level cultural relics protection unit in Changping District.

By protecting and displaying the historical relics of Chaozong Bridge and combining modern landscape design with cultural display functions, it creates a cultural park integrating historical preservation, cultural inheritance, recreation and ecological restoration.

The spatial and temporal continuation of Beijing's central axis culture: Beijing Future Science City takes the Wenyu River ecological corridor as the "natural central axis", connects Gonghuacheng, Chaozongqiao and other historical nodes, and builds a cultural axis of "history-ecology-technology". The plan designates the core area of the Gonghua City ruins as a "cultural anchor point." Its north-south axis subtly echoes Beijing's traditional central axis: the reconstructed city gate design intricately blends with the grid layout of the modern science and technology innovation district. Building heights gradually rise outwards from the ruins, creating a rhythmic skyline where "low eaves reflect ancient structures, and tall buildings gaze upon new skies."

Integration of cultural heritage and modern technology: Concurrently, a multi-layered cultural heritage system is being established. Through school education and community activities, promotional education is strengthened to cultivate residents' cultural identity and protective awareness. Cultural events and academic seminars are also held to attract experts, scholars, and various sectors of society to participate in cultural heritage protection research.

Synergistic development of culture and ecology: focusing on the synergistic development of culture and ecology, while protecting the historical and cultural heritage, through ecological restoration and landscape design, the historical relics are organically combined with the surrounding natural environment to create an ecological and cultural park. For example, on the basis of the protection of the historical sites, the Wenyu River old canal, the construction of wetland parks, ecological trails and other facilities, so as to make it a comprehensive space integrating ecological protection, cultural display, leisure and recreation, to enhance the level of protection of historical and cultural heritage, and to provide a high-quality living environment for urban residents.

In its rapid development, Beijing Future Science City has fostered a unique "new culture" that merges an innovative spirit, diverse inclusivity, and green development concepts. This has become a vital component of Beijing Future Science City's cultural soft power.

Innovation culture and scientific and technological spirit: The innovation culture of Beijing Future Science City is reflected in the pursuit of cutting-edge science and technology and the promotion of the spirit of innovation. It brings together numerous top research institutions, enterprises, and innovative talents, creating a strong innovative atmosphere. From national laboratories to new research institutions, and from technology transfer platforms to innovation and entrepreneurship incubators, Beijing Future Science City provides vast space and rich resources for researchers and entrepreneurs. This unwavering pursuit of innovation not only drives technological progress but also shapes a cultural spirit of courage in exploration and daring to break through. Innovation is not just a technological breakthrough but also a transformation of thinking, becoming the core essence of Beijing Future Science City's culture.

Green culture and ecological awareness: The new culture of Beijing Future Science City also includes the practice of green development concepts and respect for the ecological environment. It features not only a blue-green interwoven ecological pattern but also innovative practices such as green buildings, sponge cities and renewable energy utilization. This emphasis on ecology is not only reflected in urban construction, but also integrated into residents' daily lives. Green culture has become a way of life, with residents actively participating in environmental protection activities and advocating for low-carbon living, forming a cultural concept of harmonious coexistence between human beings and nature.

3.7 Green Transportation

This chapter in line with SDG11.2 and SDG11.3. Beijing Future Science City's practice of building an efficient, convenient, comfortable, safe, green and environmentally friendly integrated transportation system demonstrates its achievements in providing a sustainable transportation system. Through measures such as optimizing the public transportation network and building a slow-travel friendly city, it has improved the convenience and safety of residents' travel while reducing the impact of traffic on the environment. In addition, the construction of green transportation systems had enhanced the inclusiveness and sustainability of cities through public participation and integrated planning, providing residents with a more livable environment.

3.7.1 Pedestrian-friendly: building a comprehensive walking and non-motorized vehicle lane network

slow-travel transportation systems are an important part of sustainable urban development. Beijing Future Science City attaches great importance on constructing a slow-travel friendly city and creating an efficient, safe and comfortable slow-travel transportation network, which offers residents and employees green, low-carbon travel options.

Beijing Future Science City's slow-travel planning network strengthens the connection between various regions through two parts: the slow-travel greenway network and the urban arterial road. First, through the Wenyu River waterfront road through Beijing Future Science City "two Zones and a center" space pattern, through the northern axis extension line cultural greenway to strengthen the north-south link, to create "an axis and a vein" green slow walking liaison channel; Second, through the Beijing-Tibet Expressway auxiliary road, back to the east of the Chang Road, Litang Road, Beijing Future Science City Road and other urban arterial roads to strengthen the north-south connection, and Dingsi Road to strengthen the east-west connection.

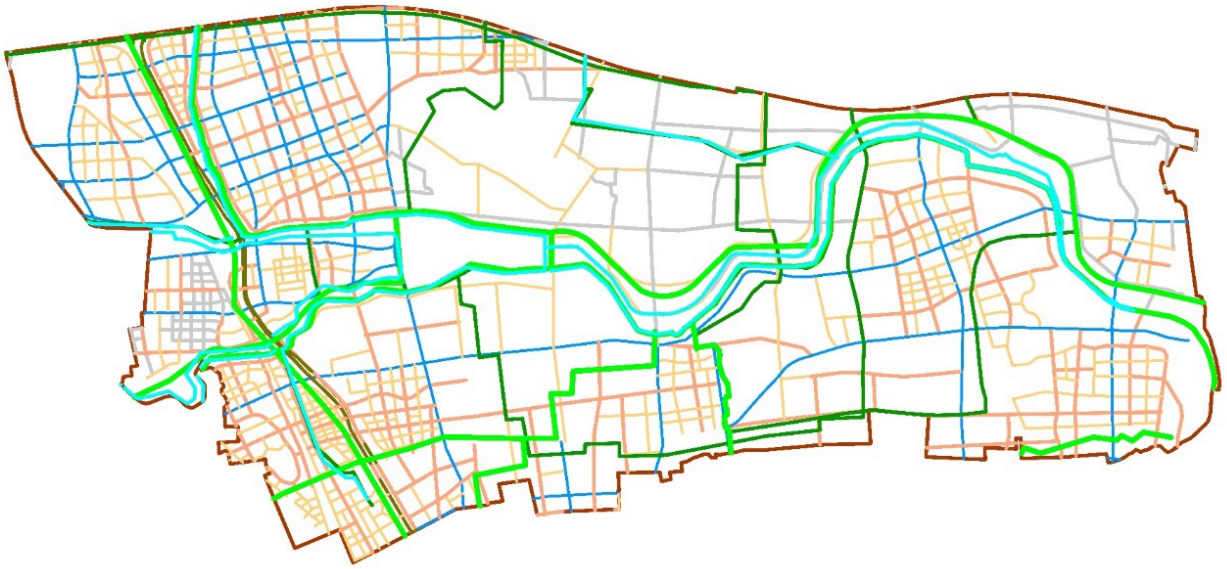


Figure42 Future Science City Slow Travel Planning Grid Map

Strengthen the top-level design, build an integrated slow-travel network: In the construction of slow-travel system, Beijing Future Science City insists on the top-level design, integrates the slow-travel transportation into the overall urban transportation system, and deeply integrates with the urban road network, greenway network and waterfront slow-travel network. Relying on the Wenyu River, and other natural water systems, to create a waterfront slow walking corridor, linked with wetland trestles, boulevard trails and other landscape nodes, to form a "blue and green" leisure cycling network. 2020, Shahe Higher Education Park to start the construction of the slow walking system, optimize the urban traffic network, enhance the traffic micro-circulation, the first phase of the second phase has been completed and put into use, connecting the 42 kilometers of greenway in Changping, connecting the landscape of parks. The first and second phases have been put into use, connecting 42 kilometers of greenway in Changping and linking park landscapes.[12]

Practicing the concept of all-age friendliness and empowering intelligent slow-travel transportation: Focusing on the all-age friendly design of the slow-travel system, the project meets the travel needs of people of all ages by optimizing the slope of the sidewalks, widening the non-motorized lanes to more than 3 meters, and installing additional children's trolley parking areas and resting seats for the elderly. Additionally, a variety of intelligent transportation technologies have been introduced to enhance safety and comfort. For example, Shahe Higher Education Park has set new electronic police, intelligent pedestrian crossing systems, adaptive traffic signals and other equipment to optimize traffic management, improve the efficiency of non-motorized vehicles and pedestrians, and reduce traffic accidents.

Promoting green travel and ecological development of the slow-travel system: The slow-travel system of Beijing Future Science City is closely integrated with the ecological space, and permeable paving, sunken green space, rain gardens and other facilities are constructed to improve the infiltration and retention capacity

[12] https://www.sohu.com/a/679050044_121034620

Figure43 Sandy River High School Green Ride

of rainwater and reduce surface runoff. Continuous walking and cycling paths are set up in parks, squares and other public spaces to connect various ecological nodes and form a green slow-travel network integrating leisure, fitness and commuting. Additionally, intelligent facilities, such as smart parking systems and shared bicycle stations, are reasonably distributed to enhance the convenience and attractiveness of slow-travel transportation. The slow walking trail in the waterfront park of Beijing Future Science City not only improves the traveling experience of residents, but also becomes a model of sponge city construction.

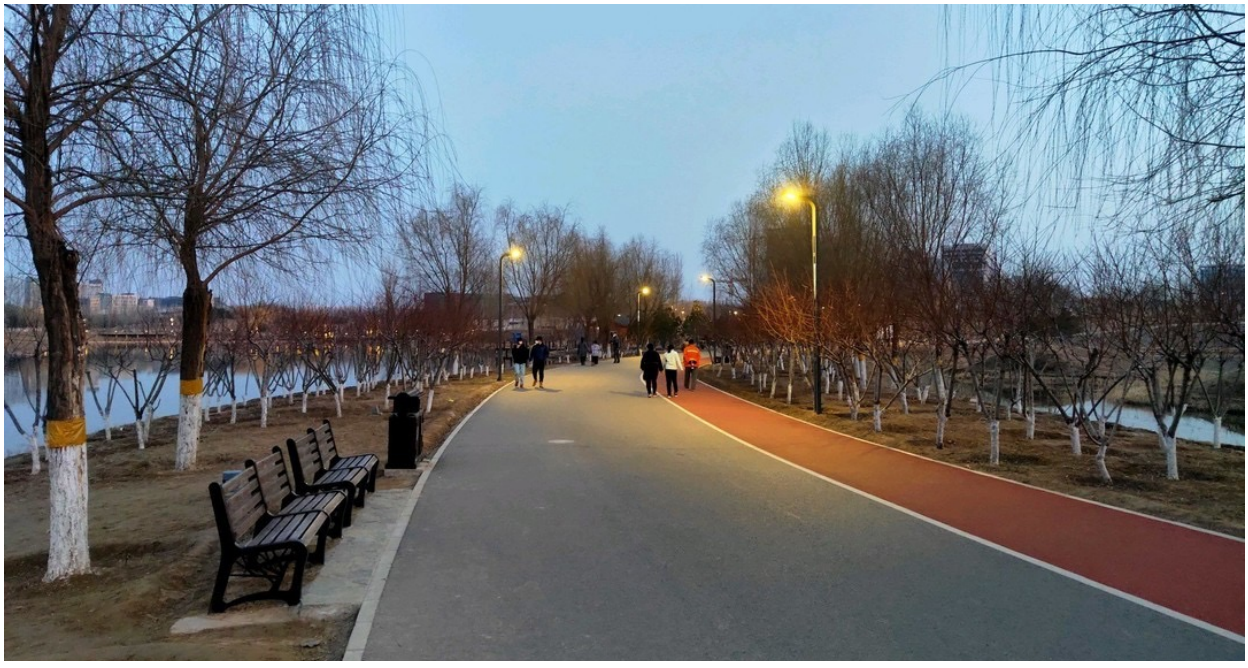


Figure44 Future Science City Waterfront Park Jogging Trail

3.7.1 Internal and external connectivity: optimizing a "bus + rail" public transportation system

An efficient and green public transportation system is the key to achieving urban inclusiveness, efficient resource utilization and environmental sustainability. By optimizing the formation of a public transportation system with the subway as the backbone, conventional buses as the main force, and electric shuttles as a supplement, Beijing Future Science City not only improves regional transportation convenience, but also provides strong support for achieving green travel and reducing carbon emissions, contributing to Beijing's development as an international science and technology innovation center.

Create convenient rail transportation: The rail transportation construction of Beijing Future Science City is steadily advancing, forming a backbone network of "two vertical and two rings". The southern extension of the Changping Line, has been initiated in 2023, connects Beijing future science city with Zhongguancun Science City; Metro Line 17 connects the Energy Valley, Wangjing, the CBD, and Yizhuang New City, and the North Station of Beijing Future Science City has been equipped with a three-story transportation hub to realize "zero-distance interchange"; Line 13, which is split into Line 13A and Line 13B after the expansion and upgrading project, strengthens Huilongguan, Tiantongyuan, and Science City. Line 17 connects Energy Valley, Wangjing, CBD and Yizhuang New City, and the North Station of Future Science City is equipped with an underground transportation hub, realizing "zero-distance transfer"; Line 13 expansion and upgrading project splits Line 13A and Line 13B to strengthen the connection between Huilongguan, Tiantongyuan and Science City; Line 19, Phase II, extends to the Life Valley Station in the north, and the extension of the branch line to the Qinghe Station to form a northwest fast track connecting with the Beijing-Zhangzhou high-speed railway and Changping Line. These rail transit lines enhance the traffic accessibility of the future Science City and provide an important guarantee for green travel.

At present, the south end and north end of Line 17 have been opened successively, realizing segmented operation. After the completion of the middle section, Line 17 will realize the whole line through the operation, connecting Changping District, Chaoyang District, Dongcheng District and Tongzhou District, by then, it will take only 66 minutes from the Jiahui Lake Station to the North Station of Future Science City.

Figure45 Future Science City Public Transportation (Line 17)

Continuously optimizing the ground bus system and improving the efficiency of public travel services: In the process of building a green and efficient transportation system, Beijing Future Science City is relentlessly optimizing the ground bus system, improving the efficiency of public travel services in all aspects, and providing better and more convenient travel choices for the residents of the region.

Route planning, Beijing future science city continuously adjusts bus routes and coverage based on regional development needs and residents' travel patterns. For newly developed communities and industrial parks—areas with high travel demand, customized bus lines are promptly launched to fill service gaps. It also strengthens connections with rail transit stations by increasing the density of bus routes around subway stations, reducing transfer times, and achieving seamless integration between buses and subways, thus forming a multi-layered public transportation network. For example, around Beijing Future Science City stations on Metro Line 17, multiple bus routes have been optimized and adjusted. By scientifically setting stop locations and operating schedules, passengers can quickly transfer from the subway to a bus and reach their destinations directly.

In terms of station layout, Beijing Future Science City follows the principle of "scientific and reasonable, convenient and beneficial to the people" to optimize and upgrade the bus stops. On one hand, existing bus stops are inspected and rectified, adjusting stops that are too close or too far apart to ensure compliance with spacing standards and improve bus operating efficiency. On the other hand, in conjunction with urban development and residents' travel needs, a batch of standardized bus stops are being newly built or renovated. These new stops are equipped with shelters, seating, and electronic display boards that show real-time information such as bus locations and estimated arrival times, allowing passengers to plan their travel effectively. Furthermore, in high-traffic areas like commercial districts, schools, and hospitals, pull-in bus bays are being implemented to minimize the impact of buses entering stops on other vehicle flow, thereby enhancing road capacity.

Regarding to service innovation, Beijing Future Science City is actively exploring diversified modes of public transportation services. Launched the "community micro-bus", running in the community and surrounding areas to meet the residents' short-distance travel needs; initiated the "commuter line", customized point-to-point direct bus routes for the travel patterns of industrial park office workers to improve commuting efficiency; "Bus + Tourism" services are also being developed, with special tourist lines operating to nearby scenic spots during peak seasons to facilitate travel for both residents and tourists. Concurrently, supervision and management of bus service quality are being strengthened through passenger satisfaction surveys and service quality assessments to promptly identify and resolve issues and continuously enhance the level of bus services.

CHAPTER FOUR

INNOVATIVE CASE STUDIES

4.1 Application of Innovative Technologies (AIT)

4.1.1 Energy innovation technology applications

With energy transformation as the key goal, Beijing Future Science City has vigorously developed innovative technologies, built a green and intelligent energy system, and made remarkable breakthroughs across multiple energy technology fields.

Natural gas "cooling, heating and power" co-generation system: In 2014, Energy Valley completed the "natural gas cooling, heating and power" cogeneration system, which uses natural gas as the primary energy source, generates electricity through gas turbine generator sets, and at the same time recycles waste heat for cooling, heating and domestic hot water supply, realizing the cascading utilization of energy. This system not only meets the electricity, cooling and heating needs of public buildings in the Energy Valley area, but also significantly improves overall energy efficiency. Compared with traditional coal-fired power generation, it can annually reduce standard coal consumption by 200,000 tons, carbon dioxide emissions by 60,000 tons, nitrogen dioxide emissions by 260,000 tons, and save 115,000 tons of condensate, which effectively reduces energy consumption and environmental pollution, and ensures the safety and reliability of energy supply.

Hydrogen energy development and application: Beijing Future Science City has achieved friutful results in hydrogen energy. The first domestic alkaline water electrolysis system with a hydrogen production capacity of 1300Nm³/h, developed by Huaneng Group's Clean Energy Technology Research Institute, with its equipment volume reduced by one-third compared to conventional devices, reaching international leading level. Additionally, the fast hydrogen refueling machine technology independently developed by Beijing Low Carbon Clean Energy Research Institute of the National Energy Group has multiple safety protection functions, enabling logistics trucks to be fully refueled within 3-5 minutes and buses in as fast as 5 minutes. This technology reduces refueling energy consumption by 25% and achieves a high hydrogen refueling full rate of 95%-100%. The application of these technologies promotes the extensive development of hydrogen energy in transportation, energy storage and other fields, and helps Beijing Future Science City’s transition to low-carbon energy.

Innovative application of solar photovoltaic: Beijing Future Science City has actively explored innovative applications of solar photovoltaic and constructed a number of representative projects. For example, the integrated wind-solar-storage multi-energy complementary intelligent building integration demonstration project (Guodian R&D Building of Beijing Future Science City) has a 2.58MW rooftop photovoltaic system, a 1.5MW wind turbine generator set, and a 500kW×2h battery storage system, making it one of the

largest integrated wind-solar-storage buildings in the world. The "All-Photovoltaic Wall Building" designed and constructed by the Green Energy and Building Research Center of National Energy Group is made of thin-film photovoltaic modules, with an estimated annual power generation capacity of 75,000 kWh. It realizes self-sufficiency in building energy consumption, and provides an innovative example for the application of photovoltaic energy in construction sector.

Carbon capture, utilization and storage (CCUS) technology development and application: The CCUS laboratory established by the New Energy Institute of National Energy Group focuses on the complete technological process of carbon dioxide capture, utilization and storage. Based on the research outcomes of this laboratory, the largest thermal power CCUS technology demonstration project in Asia was built in Taizhou, Jiangsu Province, achieving a carbon dioxide capture rate of over 90%, a carbon dioxide concentration greater than 99%, regenerative energy consumption of 2.4GJ/tCO2, and a cost below 250 yuan/ton. The application of this technology is of great significance for reducing carbon emissions and realizing the sustainable use of energy, and provides a feasible technical solution for the global response to climate change.

4.1.2 Innovative technology applications for medicine and health

As the core area of the pharmaceutical and health industry in Beijing Future Science City, "Life Valley" gathers top research teams, making breakthroughs in several cutting-edge fields and contributing to the development of the global medical and health industry.

Gene editing and cell therapy technology: research teams in Life Valley uses gene editing technologies such as CRISPR-Cas9 to conduct research on incurable genetic diseases and malignant tumors like leukemia. In leukemia treatment research, gene editing of patients' immune cells enables them to accurately recognize and attack cancer cells, showing promising results in the preclinical research stage. This advancement offers new therapeutic hope for leukemia patients and promoting the clinical application of gene editing technology.

Synthetic biology technology: Enterprises in Life Valley are utilizing microbial cells to convert inexpensive raw materials such as sugar into high-value pharmaceutical products by designing new intracellular metabolic pathways. In the production of insulin, the synthetic biology-based "cell factory" not only reduces production costs, but also reduces the environmental impact of traditional chemical synthesis methods, improves the production efficiency of insulin and the accessibility of drugs for diabetic patients around the globe. This innovation provides new approaches for the sustainable development of the pharmaceutical industry.

Innovative application of synthetic technology for bio-active substances: BLOOMAGE BIOTECH has successfully developed a "cell factory" for the production of bioactive substances by virtue of synthetic biology technology, realizing the green chemical production of important bioactive substances such as L-alanine, which has a wide range of applications in the fields of pharmaceuticals and cosmetics. The "cell factory" production method ensures stable and uniform product quality, promoting the development of related industries.

Innovations in the field of medical devices: Enterprises in Beijing Future Science City have developed intelligent surgical robots integrating multidisciplinary technologies such as artificial

intelligence, mechanical engineering, image processing. These robots assist doctors in performing precise and minimally invasive surgical operations. In complex cardiac surgeries, the robots' high-precision mechanical arm is capable of completing fine operations in a narrow space, reducing surgical trauma and complications, improving the success rate of surgeries and patients' recovery results, and upgrading the quality and level of medical services.

4.2

International Collaboration and Lessons Learned

4.2.1 International standardization cooperation on sustainable development of Sino-French Business Zones

In 2014, marking the 50th anniversary of the establishment of diplomatic relations between China and France, the standardization agencies of the both countries signed the "Sino-French Cooperation Agreement on Jointly Developing International Standards and Promoting Mutual Adoption of the Standards of Both Sides", which specifies that international standard-setting work will be carried out in the field of sustainable urban development and other areas. In this context, in September 2015, with the support of the Standardization Administration of China (SAC), the China National Institute of Standardization (CNIS) and the French Association for Standardization (AFNOR), Beijing Future Science City signed a letter of intent on cooperation with the city of Vélizzi in Paris, France. Focusing on the field of sustainable urban development, it establishes the joint objective to promote the development of international standards for the sustainable development of business districts, laying a solid foundation for subsequent cooperation.

A Sino-French Business District Standardization Working Group was established, formulating detailed work plans and communication mechanism. Under this framework, 9 joint meetings were held. Beijing Future Science City and the

Figure46 2024 September 8, 2024 Standard Innovation Low Carbon Park Sustainability Initiative launched in Beijing

City of Vélizzi carried out the standard test to verify the scientific robustness and feasibility of the draft standard respectively. **In this process, Beijing Future Science City incorporated its own experience in green ecological demonstration zones, smart city and sponge city construction into the draft, which provided important support for the improvement of the standard.** In January 2019, China and France jointly initiated a proposal for an international standard on the sustainable development of business districts to the International Organization for Standardization (ISO), which was approved. In 2022, the ISO37108 "Sustainable Development of Cities and Communities" was adopted. Local Implementation Guidelines for ISO37101 for Sustainable Business Districts" was officially released. The standard integrates the advanced experience of China and France as well as many other countries around the world, providing scientific guidance for the sustainable development of business districts around the world.

At the 2024 Global Energy Transition Conference, Beijing Future Science City—alongside Chengdu Science City, the Qingdao Area of the Shandong Free Trade Zone, the Nansha Area of the Guangdong Free Trade Zone in Guangzhou, and the Jinbridge Area of the Shanghai Free Trade Zone—collectively released the "Standard Innovation for Low-Carbon Parks Sustainable Development Initiative." Following the release, initiative members will further deepen cooperation with international partners such as the French Standardization Association (AFNOR) and Marseille. Building upon this initiative, they will actively promote the establishment of the International Sustainable Development Alliance for Business Districts, contributing to the standardization of global sustainable development.

Effectiveness of cooperation

(1) Successfully developed and published the world's first international standard on sustainable development of business districts. It fills a global gap in this domain and providing scientific guidance for the sustainable development practices in business districts around the world.

(2) Increased international influence. Through the formulation of international standards for sustainable urban development, Beijing Future Science City has significantly increased its impact in the field of sustainable development.

(3) Advanced the construction of China's urban sustainable development standard system. On the basis of ISO37108, Beijing Future Science City has participated in the development of relevant Chinese national standards and promoted the improvement of the standard system for sustainable urban development.

(4) Promoted Sino-French exchanges and cooperation. At present, the Sino-French working group has held nine bilateral working group meetings and three international standardization (sustainable development of business districts) forums.

(5) Developed a model for international standardization cooperation. The partnership has explored a sustainable and replicable model of international standardization cooperation, providing valuable experience for future collaborations with other countries.

The Sino-French standardization cooperation on sustainable development of business districts has become a model for international standardization cooperation between Chinese and French cities. Through the cooperation, Beijing Future Science City has not only achieved significant progress in international standardization but also provided valuable experience for sustainable development of global cities.

← TC ← ISO/TC 268

ISO 37108:2022

Sustainable cities and communities

Business districts

Guidance for practical local implementation of ISO 37101

Status : **Published**

Figure47 ISO37108 release

International Standardization (Sustainable Development of Business Districts) Forum (2016)

Representatives of AFNOR and Vélizy visited Beijing Future Science City

Technical visit of Future Science City representatives to Vélizyi Innovation Park

International Standardization (Sustainable Development of Business Districts) Forum (2018)

Technical Visit in May 2025

The ninth EGM of A Sino-French Business District Standardization Working Group

4.2.2 International energy exchange and cooperation-global energy transition conferencees

The Global Energy Transition Conference, as a high-level event with great influence in the domestic and international energy sectors, has been successfully held for six consecutive years in the Energy Valley of Beijing Future Science City in Changping District. The conference plays a crucial role in promoting the development of advanced energy industry in Beijing Future Science City and promoting international exchanges and cooperation in the global energy field.

The Conference features a rich and diverse program, typically covering an opening ceremony, plenary sessions, several thematic sessions, a closing session aligned with Energy Week, exhibitions, and a series of related Energy Week activities. In 2024, for example, during the plenary session, leading experts and scholars in various fields delivered keynote speeches on the critical topics such as energy development and security, green and low-carbon transition and emissions reduction, low-carbon and digital technology, and international energy cooperation. The Conference attracted more than 1,000 domestic and international experts and enterprise representatives in the energy field to attend the conference in person, with online global viewership surpassing 10 million participants.

The Global Energy Transition Conference 2024 is an event with the theme "Transitioning to a Green Future". It opened on 7 September 2024 in Future Science City and consisted of an opening and plenary session, nine thematic sessions, a conference wrap-up and opening ceremony of Beijing Future City Energy Week, an exhibition and a number of Energy Week events.

Figure48 The Global Energy Transition Conference 2024

The Conference achieved remarkable results in international exchange and cooperation. Numerous international organizations and enterprises actively participated in the conference, including the World Bank, the Organization for Economic Cooperation and Development (OECD), the International Energy Agency (IEA), the Shanghai Cooperation Organization (SCO), and the TRATON Group. Representatives from these organizations delivered keynote speeches at the conference, significantly enhancing its international profile. The thematic sessions increasingly incorporated global perspectives, covering carbon neutrality, international cooperation and exchange, global economic green development trend and other cutting-edge topics. Over 10 business matchmaking events were held during the Energy Week series, where representatives from renowned investment institutions such as China International Capital Corporation (CICC), Hillhouse, and Sequoia Capital, as well as partner institutions from the parent funds participated in the project roadshow, which promoted synergistic innovation among diversified stakeholders.

The conference has had a profound impact on accelerating the development of advanced energy industry and promoting global international energy exchanges and cooperation. The continuous organization of the Conference has expanded its platform function—attracting a number of industry-leading enterprises to establish a presence in the Energy Valley, enabling renowned scholars and experts to contribute their voices, and encouraging investment from technology-focused financial institutions, accelerating the building of the Energy Valley with international influence. It played a vital role in promoting international cooperation in the field of global energy to facilitate the process of global energy transformation.

4.2.3 Cooperation with UN-Habitat on capacity enhancement for sustainable development

In September 2024, Beijing Future Science City signed a cooperation agreement with UN-Habitat, initiating a comprehensive and deep-level collaboration. The partnership aims to jointly promote the process of sustainable development of global cities, enhance the influence of Beijing Future Science City in international sustainable development, and at the same time contribute Chinese wisdom and solutions to cities worldwide.

Technical guidance and capacity-building support for sustainable development

UN-Habitat has fully leveraged its expertise in sustainable urban urban development to provide Beijing Future Science City with all-round technical guidance ranging from the formulation of sustainable development policies to the evaluation of the implementation of plans. At the same time, UN-Habitat has also formulated a capacity building support program for the relevant personnel of Beijing Future Science City. Through international seminars, field trips and diverse training formats, the initiative has enhanced the professional skills and practical capabilities of managers, technicians, and community workers of Beijing Future Science City, providing a strong human resource foundation for sustainable urban development.

Collaboration in the preparation of reports and replication of successful experiences

Beijing Future Science City and UN-Habitat have worked together to produce this report, which comprehensively and systematically summarizes the innovative initiatives, remarkable achievements and valuable experiences of Beijing Future Science City in sustainable development practices. The report not only elaborates on the achievements of Beijing Future Science City's

sustainable development practices, but also provide in-depth analysis of its contributions to the United Nations Sustainable Development Goals (SDGs), especially SDG11 (Sustainable Cities and Communities), which offers replicable and adaptable models for cities and regions worldwide. With the strong support and assistance of UN-Habitat, Beijing Future Science City will widely promote successful experiences globally through participation in international conferences, forums, exhibitions, and other initiative.

Innovation and demonstration of international cooperation models

The cooperation between Beijing Future Science City and UN-Habitat has explored and established an innovative mode of international cooperation, providing a model for Beijing Future Science City to carry out similar cooperation with other international organizations, cities and scientific research institutions. Through close cooperation with UN-Habitat, Beijing Future Science City has not only elevated its international visibility and influence, but also successfully builds an efficient platform for global knowledge exchange and joint initiatives, bringing in international resources and leading ideas. This partnership fully embodies the principle of complementary advantages and mutual benefit. With its practical achievements in science and technology innovation and urban construction, Beijing Future Science City has provided UN-Habitat with robust case studies for research and advocacy efforts. In turn, UN-Habitat has leveraged its global network and technical expertise to provide a broader vision and stronger support for Beijing Future Science City's sustainability efforts. Together, both sides are advancing global urban sustainable development and contributing wisdom and strength to building a more inclusive, resilient, and sustainable urban futures.

4.2.4 Lessons learned from international cooperation

In its long-term international collaboration practice, Beijing Future Science City has developed a systematic and replicable cooperation model across multiple fields, providing an effective framework for other regions to undertake similar initiatives.

First, the deep cooperation mode led by standardization. Taking the Sino-French international standardization cooperation on sustainable development of business districts as an example, Beijing Future Science City has established a full-cycle cooperation chain of "agreement signing - mechanism building - joint standard research - results promotion". After signing the Letter of Intent on cooperation with the City of Vélizy in 2015, the Sino-French working group was promptly formed. The group held regular meetings to review draft standards, incorporating Beijing Future Science City's practical experiences in green ecological demonstration zones, smart city construction, and other areas. In 2022, these efforts led to the successful release of ISO37108, the world's first international standard for sustainable development of business districts, and promoted its application by organizing international forums. Other regions can adopt this model of cooperation with standardization as a link, and through the establishment of a long-term communication mechanism, transform the results of local practices into international standards, and strengthen their voice in global industrial rule-making.

The second is the synergistic international cooperation in energy industry chain. In the field of energy, Beijing Future Science City relies on platforms such as the Global Energy Transformation Conference to build up a whole-chain cooperation system of "technology R&D - industrial

landing - capital docking". By involving international organizations like the World Bank, International Energy Agency, and attracting investment from multinational enterprises such as TRATON Group, it has promoted collaborations between local enterprises such as Sany Renewable Energy, Mingyang Smart Energy and global institutions to carry out joint technological research and development in hydrogen energy development, solar photovoltaic and other areas. For example, a 1300 Nm^3/h alkaline hydrogen water electrolyzer, jointly developed by Huaneng Group's Clean Energy Technology Research Institute and international partners, achieves a globally leading hourly hydrogen output. This kind of cooperation model, centering on the industrial chain and integrating technology, capital and market resources, provides a blueprint for other regions to promote industrial upgrading.

Thirdly, international cooperation among universities and colleges linked with industry, academia and research. Beijing Future Science City promotes the establishment of diversified cooperation mechanisms between universities in the Higher Education Park and top international institutions. On the one hand, universities like Beihang University and Beijing University of Posts and Telecommunications (BUPT) engage in joint reserch and exchange programs with MIT, Stanford University, etc., and establishes a special fund to encourage teachers to visit each other. On the other hand, it partnerships with overseas science parks facilitate cross-border entrepreneurial project docking sessions and the cross-border transformation of scientific research achievements. For example, the communication technologies developed through university-enterprise collaborations have quickly commercialized and applied. This international cooperation model of industry-university-research linkage effectively promotes the cross-border flow of innovation factors by integrating education, scientific research and industrial resources.

Fourthly, the regular exchange mechanism driven by platformization. Through the establishment of brand events such as the Global Energy Transition Forum, Life Science International Forum and the Medical Device Administration Conference (permanent venue), Beijing Future Science City has formed a regular exchange platform of "regular meetings, themed events and achievement showcases". These platforms not only attract the participation of international organizations, multinational enterprises and top scholars, but also set up enterprise docking and project roadshows to promote the efficient docking of technology, talent and capital. At the 2024 Global Energy Transition Conference, partners included the World Bank, the Organization for Economic Cooperation and Development (OECD), the International Energy Agency (IEA), the Shanghai Cooperation Organization (SCO), and TRATON Group, reinforcing the internationalization levels of the conference. High-quality projects emerging from the International Innovation and Entrepreneurship Competition can directly obtain policy support for park entry. Other regions may adopt this multi-level, regularized international exchange platform model, tailored to their industrial strengths, to continuously attract global innovation resources.

4.3
Mechanisms For Innovation

In the practice of promoting sustainable development, Beijing Future Science City attaches great importance to mechanism innovation to ensure efficient implementation and long-term promotion of sustainable development goals. These innovative mechanisms cover a wide range of areas such as green ecological index management, university-city integration, whole-process project management, internationalized talent services and enterprise services, which provide a solid institutional guarantee for the high-quality development of Beijing Future Science City and also provide valuable reference for the sustainable development of other cities.

Innovation in Green Ecology Indicator Management and Implementation Mechanisms. Future Science City has achieved closed-loop management throughout the entire process—from planning to construction—by establishing a green ecology indicator system. Within the core area of the "Energy Valley," Future Science City ensures the implementation of green ecological planning by signing green construction commitment letters with resident central enterprises, adding "6+4" green ecological indicators to land supply planning conditions, and conducting technical reviews and indicator evaluations during the project construction phase.

Furthermore, Future Science City has developed a green and low-carbon indicator system comprising 5 categories, 10 items, and 17 indicators covering green, low-carbon, smart, livable, and scenario-based dimensions. It has also continuously optimized and established a "1+1+2" evaluation and review model. Specifically, this model implements a commitment system during the scheme design phase, a "commitment + filing" system during the construction drawing design phase, and a formal evaluation and review system during the preliminary design and final approval stages. Meanwhile, through an integrated information management platform, the entire green ecology evaluation process is managed digitally, enhancing management efficiency and ensuring the full implementation of green ecological indicators.

Innovation in the mechanism of school-city integration mode. Beijing Future Science City promotes the deep integration of universities and the city through the mechanism of school-city integration. Shahe Higher Education Park is home to a number of colleges and universities, and through the establishment of college and university alliances, it promotes the sharing of teaching resources and scientific research platforms, and encourages collaborative innovation between academic institutions and enterprises. For example, the Future Education High Precision Innovation Center of Beijing Normal University has partnered with Changping District to promote the deep integration and optimal allocation of educational resources across levels. In addition, under the "one school, one policy" initiative, Beijing Future Science City has signed strategic cooperation agreements with universities to jointly develop model bases for school-city integration and support local transformation of research outcomes.

In June 2025, at the third meeting of the Beijing Shahe Higher Education Park University Alliance Council, the joint construction of the Beijing Future University Science Park was officially launched. The park marks a critical step for Changping District in implementing major municipal strategic deployments and deepening university-city integration. Leveraging the high concentration of universities in the Shahe Higher Education Park, the project adopts "one university in multiple locations" and "multiple universities within one park" models. It is a collaborative effort involving 10 Changping-based institutions, including Beijing Normal University, Beijing University of Posts and Telecommunications, and North China Electric Power University. The initiative aims to create a contiguous cluster for university-linked technology industries and a source of origin for cutting-edge technological innovation.

Figure49 Beijing Future University Science Park

Innovation of internationalized talent service mechanism. Relying on the "1+1+N" innovative policy framework of Changping District, Beijing Future Science City has continuously optimized the housing security system for foreign and internationalized talents. It has Integrated and upgraded the talent policy of "Changju Project", introducing collaborative talent attraction mechanisms, encouraging flexible evaluation systems through the collaboration of diversified subjects, promoting the mechanism of independent identification of talent assessment, and focusing on the encouragement and support of the emerging platforms for attracting and gathering talents. A pioneering model—"linkage mechanism + online platform + practice base"—has been established for key industrial clusters to align with enterprise demand and provide brand-building, international talent exchanges, and empowerment services. At the same time, Beijing Future Science City is piloting a flexible recruitment model by appointing professors from universities and research institutes as "Vice President of Science and Technology" in enterprises. The "Changju Future - Global

Alumni Talent Meeting Room" was inaugurated as the first alumni talent attraction base in the city, gathering innovative projects in the field of energy science and technology.

Financial service mechanism innovation. In 2023, Changping District issued "Several Measures on Financial Promotion for Innovative Development of Beijing Future Science City", establishing a "1+2+n" framework system. "1" refers to aligning with the construction of "Zhongguancun Science and Innovation Financial Reform Pilot Zone", actively integrating into the capital's new financial development pattern, and striving for the creation of a science and innovation financial demonstration zone; "2" means that by 2025, Changping District will have achieved the goal of gathering 100 science and innovation financial institutions and 100 listed enterprises; and "N" refers to the refinement and improvement of 12 support measures.[13] In December 2025, Changping District upgraded and issued the Version 2.0 implementation rules of the measure, increasing support in areas such as ecological optimization, product and service innovation, and the expansion of financing channels. These rules cover various entities, including licensed financial institutions and technology enterprises. Through diverse initiatives such as financial rewards and rent subsidies, the measures provide full-lifecycle financial security for technological innovation within Future Science City.

Innovation in financial cooperation model. On March 22, 2025, Beijing Future Science City Science and Innovation Finance Conference was held in Beijing, with more than 300 representatives from government departments, academic institutions, financial institutions, and tech enterprises and the investment community attending the conference to discuss the path of financial assistance for scientific and technological innovation, and to promote the integration of new-quality productivity and financial capital. Parallel roadshow sessions were divided into three major sectors: pharmaceutical health and synthetic biology, advanced manufacturing and AI innovation, and advanced energy and green low-carbon technologies, with 20 tech enterprises showcasing breakthrough technologies. Changping District Economic and Information Bureau and Beijing Future Science City Administrative Committee introduced the industrial policies, and the Beijing Municipal Fund Manager and Changping District Government Guiding Fund and other investment institutions docked with the enterprises on the spot and reached a number of cooperation intentions. [14]

Innovation of intellectual property protection mechanism. The Beijing Municipal Intellectual Property Office and the Beiing Future Science City Management Committee jointly established the Future Science City Intellectual Property Service Center, creating a comprehensive public service system for intellectual property. The center integrates municipal-level IP service resources to deliver high-quality, convenient, and specialized support for innovation entities. At the same time, the Beijing Intellectual Property Court set up the Changping Future Science City Intellectual Property Circuit Court to carry out circuit trials for civil and administrative intellectual property cases of exemplary significance in the region, to understand the needs of market players, to carry out litigation services and publicize the law, etc., and to guide the enterprises to establish an intellectual property management system and a risk prevention mechanism.

[13] Several Measures on Finance to Promote the Innovative Development of Future Science City Changping Releases Several Financial Policies on Science and Innovation and Strives to Realize 100 Listed and Quoted Enterprises by 2025| Changping_Sina Finance_Sina.com

[14] 2025 Future Science City Science and Innovation Finance Conference was held to gather financial "living water" and create a new quality future!

CHAPTER FIVE

ACHIEVEMENTS AND IMPACT

5.1
Ecological Improvements[15]

Beijing Future Science City has made remarkable achievements in improving its ecological environment. Through a combination of innovative practices and systematic planning, it has developed into a modern urban area characterized by the harmonious integration of blue and green spaces and a high standard of ecological livability, laying a solid foundation for sustainable development.

Significant improvement in air quality: Over the past decade, Beijing Future Science City has implemented rigorous environmental governance measures and actively promoted green, low-carbon development. These efforts have resulted in a significant leap in atmospheric environmental quality over the past ten years, with the reduction of PM2.5 level ranking among the highest in Beijing. In 2024, the annual average concentration of PM2.5 in Beijing Future Science City dropped to 27.1 μg/m3, the best level on record for the area. That year, the City achieved 296 days of air quality compliance, representing 83.1% of the year. Compared to 2013, the four major pollutants PM2.5, PM10, NO2, and SO2 decreased by 65.8%, 45.7%, 53.1%, and 88.4% respectively in 2024, and the air quality has realized fundamental improvement.

Figure50 PM2.5 Concentration Changes in Beijing Future Science City Over the Past Decade (Micrograms per Cubic Meter)

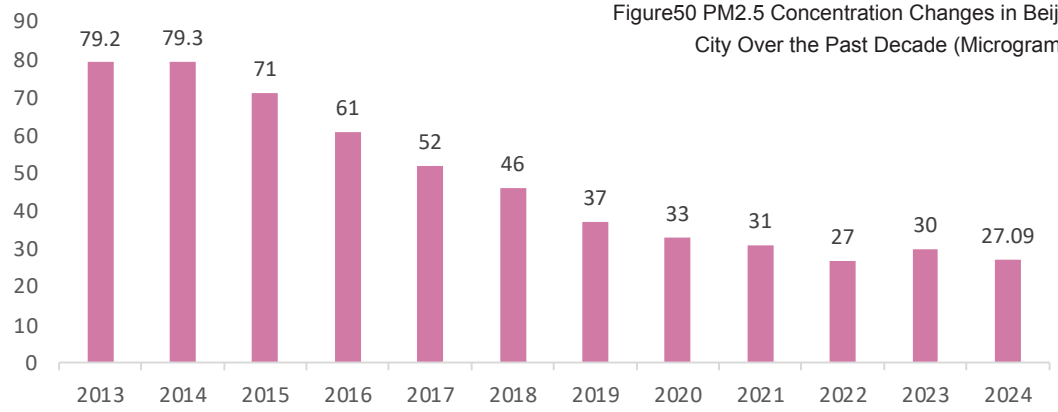
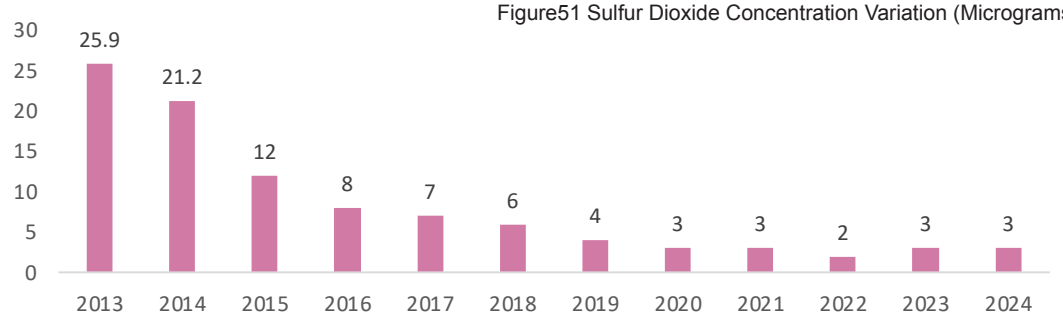


Figure51 Sulfur Dioxide Concentration Variation (Micrograms per Cubic Meter)



[15] Ecological and environmental quality continues to improve the construction of a beautiful China to promote comprehensively -- New China 75 years of economic and social development achievements of the series of reports of the fourteenth_Departmental News_China.gov.cn (www.gov.cn)

Green space has increased significantly

Beijing Future Science City is dotted with parks, green spaces, wetlands, and greenways, achieving an urban greening rate of 56% and a blue-green space ratio of over 40%. The area has completed a massive waterfront ecological park, and "Future Wisdom Valley"—the first carbon-neutral themed park in China—has officially opened, serving as a significant landmark for urban ecological construction. Furthermore, through ecological restoration and landscape design, Future Science City has interconnected scattered ecological spaces into an organic whole, creating iconic ecological nodes such as the Wenyu River Future Wisdom Valley Park. These efforts provide residents with abundant leisure spaces and an excellent ecological environment.

Figure52 A corner of Waterfront Forest Park of Beijing Future Science City

Continuous Improvement of Water Environment Quality

Future Science City has significantly enhanced the regional water environment quality through measures such as smart monitoring and governance, as well as water ecological restoration and construction. By restoring the Wenyu River channel, a comprehensive wetland system has been formed—primarily consisting of riverine wetlands, surface-flow wetlands in waterfront parks, and subsurface-flow constructed wetlands. This system protects the natural environment of the water bodies, wetlands, and riverbanks along the Wenyu River axis, successfully achieving the planning goal of "zero net loss of natural wetlands." According to the historical monthly water environment reports released by the Beijing Municipal Ecology and Environment Bureau, the water quality of the Wenyu River has demonstrated a trend of continuous improvement.

In recent years, the water quality of the Wenyu River has improved substantially. The annual average water quality reached Grade III in both 2023 and 2024. Furthermore, from January to September 2025, the average water quality remained at Grade III, which is one grade better than the designated water environment functional zoning requirement.

Figure53 Water quality of the Wenyu River continues to improve

Significant increase in biodiversity richness

Through the construction of ecological corridors, wildlife passages and parks and green spaces, the connectivity and resilience of the ecosystem have been enhanced, providing favorable habitats for wildlife. In recent years, there has been a significant increase in the diversity and abundance of birds species observed in the region, including several rare species, such as the great bustard, indicating that the ecological environment of Beijing Future Science City has been significantly improved and biodiversity has been effectively protected. These outcomes not only improve the ecological quality of the area but also provide important support for the sustainable development of the City.

Figure54 Great bustard, heron and other rare species appear in Wenyu River Park

5.2 Economic and Social Benefits

Beijing Future Science City has made remarkable achievements in generating both economic and social benefits, injecting a strong impetus to the development of the region and bringing extensive benefits to the society through its efforts in scientific and technological innovation, industrial upgrading, infrastructure improvement and talent gathering.

Economic growth and industrial agglomeration

Beijing Future Science City has evolved into a powerful engine for regional economic growth, deeply integrating into the "Three Science Cities and One Hi-Tech Zone" development framework of the Beijing International Innovation Center. It has established three 100-billion-yuan level industrial clusters: Pharmaceutical & Health, Advanced Energy, and Advanced Manufacturing. As of 2024, the area has gathered 881 enterprises above designated size, generating a total operating income of 430.1 billion yuan. Specifically, the total revenue of the Pharmaceutical & Health industry reached 104 billion yuan; the Advanced Energy industry achieved 253.237 billion yuan; and enterprises above designated size in the Advanced Manufacturing sector recorded 164.69 billion yuan in revenue.[16] These industrial clusters complement and develop synergistically, significantly enhancing the overall regional economic strength and serving as the core driving force for the sustained economic growth of Beijing Future Science City.

As of March 2025, a total of 38,048 enterprises had been registered in Beijing Future Science City, with 148,184 employees covered by social insurance. According to the Beijing Future Science City Development Monthly Report (January-April 2025), the above-designated-size enterprises in Beijing Future Science City have realized a cumulative business revenue of 109.824 billion RMB from January to March 2025. During the same period, 2,293 new enterprises were registered, representing a year-on-year growth of 118.59%.

Scientific and technological innovation and transformation of results

In 2024, Beijing Future Science City ranked among the top three of China's top 100 Science and Technology cities. A robust system of national strategic scientific and technological forces has been established in the area, including one national laboratory, 17 national key laboratories, 75 national-level scientific research platforms, and 175 provincial and ministerial scientific research platforms. In addition, the City has attracted 315 central state-owned enterprises and their branches, stationed 9 universities or branch campuses such as Beihang University and Beijing University of Posts and Telecommunications—of which eight are ministry-affiliated institutions and one is administered by the municipality, and gathered 58,000 innovative talents.

On this basis, the transformation of scientific and technological innovation achievements in Beijing Future Science City has been effective. Lever-

[16] https://www.ncsti.gov.cn/kjdt/scyq/wlkxc/wldt/202503/t20250307_197555.html

As of December 2024, Energy Valley has attracted more than 900 advanced energy companies, forming a full-cycle innovation chain covering scientific research and development, technical services, and outcomes transformation.

Figure55 Energy Valley

Figure56 National Institute for New Energy Technologies

aging platforms such as Tsinghua National Key Research Base, Peking University Innovation Center for Industry-Education-Research, and the Future University Science Park, the City has promoted a large number of enterprises founded by scientists and commercialization of university research outcomes. To date, more than 400 international and national standards, with more than 16,000 valid patents, these results not only highlight the Beijing Future Science City's scientific and technological innovation capacity, but also through technology transfer, industrial application and other means, the regional economic development of the injection of new kinetic energy, accelerating the conversion of scientific achievements into productive forces.[17]

Social welfare and public service enhancement

In terms of educational resources, we have successfully introduced high-quality educational brands such as Beijing Normal University and Beihang University, establishing a well-structured and high-quality education system. The system provides residents with diverse range of premium educational options, spanning from pre-school to higher education.

The healthcare service system has been continuously improved, with a number of high-level medical institutions newly built or introduced into the region, covering both general hospitals and specialized hospitals. At the same time, the construction of primary healthcare institutions has been promoted simultaneously, effectively improving the quality of primary medical services and building a comprehensive and functional medical service network, enabling residents to access convenient and efficient healthcare.

The housing security system has been steadily optimized, and the supply of various types of housing has met the housing needs of residents across various income levels, promoting a better jobs-housing balance. The construction of smart cities has achieved remarkable results, with innovative applications in smart transportation, smart energy, and smart buildings, which have made urban management more refined and intelligent, providing residents with more convenient and efficient services, and significantly improving quality of life and overall well-being.

Figure57 Beijing Future Science City Future Huiyuan Shared Ownership Housing

[17] https://www.ncsti.gov.cn/kjdt/scyq/wlkxc/wldt/202503/t20250307_197555.html

Talent pooling and employment opportunities

With its favorable environment for innovation and entrepreneurship, comprehensive supporting facilities and promising development prospects, Beijing Future Science City has attracted a large number of outstanding talents from both domestic and international sources, expanding its pool of innovative professionals to 58,000, establishing itself as a major talent hub in Beijing.

Driven by the rapid growth of its industrial sectors, Beijing Future Science City has created a wide range of employment opportunities in fields such as medicine and healthcare, advanced energy, and advanced manufacturing, offering broad space for the career development of workers at various skill levels. Beijing Future Science City focuses on in-depth cooperation with universities, providing abundant practice and employment opportunities for college students by building internship bases and organizing innovation and entrepreneurship competitions to support the growth of young talents. In addition, targeted and diversified vocational training programs has been carried out for the demolished aborigines, helping them enhance their employability and realize stable employment, thus promoting social harmony and stability.

According to the Beijing Future Science City Development Monthly Report (January-April 2025), the number of individuals covered by social security in the City has reached 147,905, marking a year-on-year increase of 6.88%.

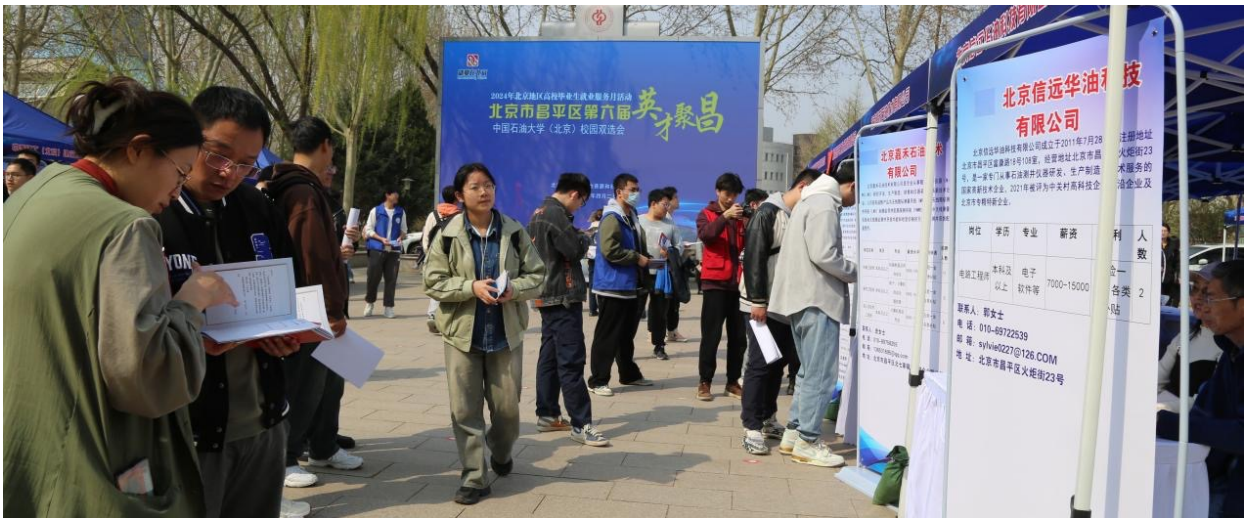


Figure58 Beijing Future Science City Enterprises Participate in the Campus Recruitment Activity of "Talent Gathering"

Inclusive growth for local original residents

Beijing Future Science City has expanded from the initial 10 square kilometers of construction to a total area of 170.6 square kilometers, undergoing years of coordinated planning and development. During this process, local original residents have played an important role and shared in the benefits of development. The development of Beijing Future Science City has generated substantial employment opportunities, enabling original residents to find jobs locally without the need to travel long distances. With the development of industries such as the "Energy Valley" and "Life Valley" and the stationing of related enterprises, the original residents can leverage their existing skills to secure suitable positions within the parks and increase their income. Additionally, the broader development of the City may also stim-

ulate local commerce, creating opportunities in sectors such as food services, retail, and other community-based business, thereby generating further economic gains for original residents.

Regional synergy and spillover effects

While developing rapidly, Beijing Future Science City has actively leveraged its strategic position to drive regional synergy. As a pivotal node in the "Three Cities and One Zone" initiative, it has strengthened the interaction and cooperation with Zhongguancun Science City and Huairou Science City, facilitating the sharing and flow of scientific innovation resources, and enhancing the overall innovation capacity of the region.

During the construction of the "Two Zones", Beijing Future Science City has pioneered a new model of "linkage mechanism + online platform + practice base" to ensure precise policy implementation and support rapid enterprises development. The industrial spillover effect of Beijing Future Science City has significantly contributed to drive the economic development of the neighboring areas, promoted balanced growth among regions, and played a vital role in shaping a new pattern of coordinated regional development.

5.3

Social Recognition and International Impact (SRI)

Since its construction, Beijing Future Science City has garnered wide social recognition and international influence by virtue of its outstanding achievements in scientific and technological innovation, green and low-carbon development, smart city construction, and international cooperation and exchange. The City has not only received a number of prestigious domestic honors, but has also demonstrated its important position as a model of sustainable development and scientific innovation on the international stage.

Domestic recognition

Beijing Future Science City has received a number of honors and recognitions in China, which not only demonstrate its leading position in scientific and technological innovation, green and low-carbon development, and smart city construction, while also providing valuable models for other cities. Selected recognitions include:

- 2013: Recognized as one of the first national smart cities pilot projects, marking its pioneering demonstration in smart city development.
- 2014: Awarded the Beijing Green Ecological Demonstration Zone, highlighting its achievements in ecological and green development.
- 2016: recognized by the Ministry of Housing and Urban-Rural Development as a Low-Energy Green Building Demonstration Area, reflecting its innovative practices in green architecture.
- 2023: Awarded the "2023 China Industry-University-Research Cooperation Innovation Demonstration Base", the only industrial park in Beijing to receive this honor, demonstrating its innovative capability in industry-university-research cooperation.
- 2024: Awarded the "Outstanding Pilot Unit for Climate-Friendly Areas in Beijing (2024)", recognizing its success in climate action and green transformation.
- 2025: Recognized as a 2025 National Standardization Pilot Project – Future Science City Carbon Emission Standardization Pilot.
- 2025: Beijing Shahe Higher Education Park was honored as the "2025 Most Investment-Worthy Park

International influence

The achievements of Beijing Future Science City in the field of international standardization and sustainable development are particularly outstanding and have significantly increased the global visibility and influence. Selected international milestones include:

- 2018: Designed as a pilot city for ISO37101, an international standard on sustainable urban development, marking its exploration of international standard-setting.
- 2022: Led the release of the first international/national standard for business districts (ISO37108), which is the first international standard on sustainable development of business districts, enhancing the influence of Beijing Future Science City in global sustainable governance.
- 2023: Became the first industrial park in China to pass a third-party compliance assessment for ISO 37108, further consolidating its

leadership in the implementation of international standards for sustainable development.

- 2024: Recognized by ISO/TC268 as an international standard model city, marking a new level of international influence for Beijing Future Science City in the field of sustainable urban development.
- 2024: Future Science City's zero-carbon city construction case was included in the draft of ISO/TR 37115, "Sustainable Cities and Communities — Practical cases of paths to zero carbon city."
- 2024: Received recognition from UN-Habitat to co-compile the report Beijing Future Science City Sustainable Development Practice: Innovations and Achievements for global promotion.
- 2025: At the Annual Meeting of the ISO Technical Committee on Sustainable Cities and Communities (ISO/TC 268) and the International Smart Sustainable City Club (ISSCC), Beijing Future Science City was honored with the title of "Global Sustainable Development Demonstration City."

International cooperation and exchange

Beijing Future Science City has actively carried out international cooperation strengthening partnerships with global research institutions and enterprises through high-level international conferences and academic exchange activities. Beijing Future Science City successfully hosted the Global Energy Transition Forum, which attracted experts, scholars and enterprise representatives from all over the world and enhanced its influence in the international energy field. The City has also actively engaged in various types of international cooperation by introducing overseas projects and establishing international innovation platforms. For example, during the 2023 China International Fair for Trade in Services (CIFTIS), Beijing Future Science City introduced high-quality Israeli project resources, cutting-edge global innovative technologies and overseas high-level scientific talents, providing scientific and technological empowerment for building a globally oriented innovation hub.

International media and academic attention

The innovative practices and sustainable development achievements of Beijing Future Science City have received extensive attention from international media and academia. A number of internationally renowned media outlets have reported on its progress in green buildings, intelligent transportation, and low-carbon development, showcasing its image as a global model for sustainable development. Meanwhile, a number of research outcomes of Beijing Future Science City have been published in international academic conferences, further enhancing its visibility and credibility in global academia.

On September 17, 2022, People's Daily published a full-page report on Beijing Future Science City, introducing its positioning as the main platform of Beijing's International Science and Technology Innovation Center and its achievements in advanced energy industries, green and low-carbon development, and the design of urban environment that is pleasant to live and work in.

On April 12, 2024, 100 journalists from 91 countries, including the United Arab Emirates, Brazil, Russia, Hungary, and India, visited Beijing Future Science City to gain firsthand insight into its construction background, master plan, as well as the research and development direction, introduction of talents, and operation mechanism of the resident central enterprises.

In 2024, the Beijing Low Carbon Clean Energy Research Institute of the National Energy Group published its research results on the breakthrough of the key technology of direct conversion of syngas into linear alpha-olefins in the flagship journal Nature, demonstrating the capability of Beijing Future Science City in original innovation.

CHAPTER SIX

CONCLUSIONS, FUTURE OUTLOOK, AND LESSONS LEARNED

6.1 Conclusions

Beijing Future Science City's achievements in sustainability are embodied in the following key dimensions:

- **Scientific and technological innovation leads industrial upgrading:** Beijing Future Science City has formed a world-leading scientific and technological innovation highland by focusing on cutting-edge fields, bringing together top scientific research institutions and innovative enterprises, and promoting breakthroughs in key core technologies and the transformation of achievements. The three hundred-billion-dollar industry clusters it has successfully built have provided a strong impetus for regional economic growth and significantly contributed to the United Nations Sustainable Development Goals (SDG9) of building resilient infrastructure and promoting sustainable industrialization and innovation.
- **Green and low-carbon development for ecological environment improvement:** upholding the concept of "ecological priority", building a blue-green ecological network, vigorously promoting green buildings and the use of renewable energy. These initiatives have significantly improved the quality of the ecological environment and effectively reduced the negative environmental impact of the city. These measures have provided strong support for the realization of SDG7 (Affordable and Clean Energy) and SDG11.6 (Reduce the adverse per capita environmental impact of cities).
- **Smart city construction has enhanced the effectiveness of urban management:** A comprehensive smart infrastructure system has been established accorss sectors such as smart transportation, smart energy and smart buildings, promoting deep integration of the digital and the real economies. This has markedly improved the precision and interlligence of urban governance. These results align with SDG11.3 (Enhance inclusive and sustainable urbanization) and SDG9 (Industry, Innovation and Infrastructure) on strengthening inclusive and sustainable city construction and promoting innovation.
- **Social inclusion and equitable public services improving people's well-being:** Emphasizing inclusiveness and equity of public services, Beijing Future Science City has created age-friendly communities that meets the needs of residents of different age groups, which equipped with child-friendly spaces, senior-oriented facilities and a gender-equal public services. It has also improved education, healthcare, and culture amenities, and established a 15-minute community service circle to enhance residents' quality of life. Meanwhile, public service facilities including education, medical care and culture have been improved, and a 15-minute community service circle has been established to enhance the quality of life of residents. A favorable environment for innovation and entrepreneurship and perfect supporting facilities has attracted a large number of domestic and international talent, while industrial development has created a large number of employment opportunities and promoted a jobs-housing balance. These efforts aligned to SDG11.7 (Accessible and green public

spaces) and SDG10 (Reduced inequalities).

- **Cultural and Natural Heritage Protection and Inheritance Enhancement of the City's Cultural Heritage:** During development and construction, Beijing Future Science City integrates cultural heritage protection by preserving historic landmarks, building cultural parks, and organizing public cultural activities, which enhanced the City's cultural soft power. At the same time, the city has actively explored the integrated development of culture and ecology. Through ecological restoration and landscape design, it actively explores the synergistic development of culture and ecology, resulting in the creation of eco-cultural spaces such as the Wenyu River Park Future Intelligence Valley through ecological restoration and landscape design. These efforts have not only enhanced the cultural connotation of the City, but also provided residents with abundant recreational spaces, promoting the harmonious coexistence of human and nature, in alignment with SDG11.4 (Strengthen efforts to protect and safeguard the world's cultural and natural heritage).
- **International Cooperation and Exchange Expansion to Enhance International Influence:** Beijing Future Science City has actively pursued international cooperation through leading or participating in international sustainable development standards (ISO37108, ISO37115), hosting international conferences (e.g., the Global Energy Transition Forum), introducing overseas projects and building an internationalized innovation platform. These efforts have strengthened its cooperation with other international cities and institutions, and enhanced its global visibility and influence. Such initiatives have not only promoted the high-quality development of Beijing Future Science City, but also provided valuable reference and models for sustainable urban development worldwide, aligning with SDG17 (Partnerships for the goals).

6.2

Future Outlook and Future Development Pathways (FDP)

Looking into the future, Beijing Future Science City will actively align with global visions for sustainable urban development, such as the New Urban Agenda, closely committed to its strategic positioning. It will continue to make efforts in a number of key areas, so as to create a model of excellence in global sustainable urban development.

By 2035, a globally leading hub for technological innovation will be established. Beijing Future Science City will focus on strategic sectors such as advanced energy, medicine and healthcare, and advanced manufacturing, strengthening basic research and applied basic research, breaking through core technologies, and generating globally leading innovation outcomes. By building national laboratories, new types of R&D institutions and other high-level innovation platforms, the City aims to attract the world's top scientific talents and innovation resources, creating a globally influential hub for scientific and technological innovation.

By 2035, a livable, eco-friendly, and green city will be fully realized. In line with the global trend of green and low-carbon development, Beijing Future Science City will unswervingly pursue a green and low-carbon pathway. By promoting renewable energy, constructing a low-carbon energy system, and implementing green building standards, Beijing Future Science City will reduce carbon emissions and improve the energy efficiency. It will further deepen the green ecological index system, promote innovative practices in green architecture, renewable energy application and other fields, and create a model for low-carbon smart city construction. By 2035, Beijing Future Science City will be fully built into a livable, eco-friendly and green city, with the proportion of blue and green space reaching 50%, and the proportion of renewable energy utilization in new areas reaching 10%.

By 2035, it will become a globally influential hub for open and collaborative innovation. Beijing Future Science City will give full play to its role as the connection point of Beijing's "Three science cities and one demonstration area" framework, strengthening synergies with Zhongguancun Science City, Huairou Science City, and Beijing Economic-Technological Development Area. It will promote the in-depth integration of the innovation, industrial, capital, and policy chain. At the same time, Beijing Future Science City will actively link global innovation resources, strengthen cooperation with world-renowned innovation hubs, and attract multinational enterprises and international R&D institutions, and create an open, collaborative innovation hub.

By 2035, it will evolve into a smart and efficient city, realizing the intelligence and refinement of urban operation and management. Beijing Future Science City will comprehensively promote the smart city development by applying next-generation technologies such as cloud computing, big data, the Internet of Things (IoT), and artificial intelligence. Through the deployment of smart energy management system, intelligent

transportation networks, and intelligent public service platform, the City will improve the efficiency of urban operation and the quality of urban services.

By 2035, it will become a model city of cultural and natural heritage protection and inheritance. Emphasizing the importance of cultural and ecological continuity, Beijing Future Science City will protect historical and cultural sites, construct cultural parks, and host diverse cultural events to promote traditional culture and enhance the city's cultural soft power. At the same time, Beijing Future Science City will strengthen ecological restoration and environmental protection by building large areas of contiguous blue-green ecological spaces and ecological recreational parks, and improving the quality of the urban ecological environment.

By 2035, it will be established as a global hub for international cooperation and exchange. Beijing Future Science City will actively expand international partnerships and strengthen cooperation and exchange with globally renowned cities and scientific research institutions. Through hosting international conferences, carrying out international cooperation projects, and establishing international science and technology cooperation bases, Beijing Future Science City will enhance its glocal visibility and influence. It will attract a number of world-class scientific research institutions, research-intensive universities and innovative enterprises.

By 2035, it will be a leading platform for the international standardization of sustainable urban development. Beijing Future Science City will continue to strengthen its participation in the formulation of international standardization for sustainable urban development, and is committed to becoming an important participant and promoter in the field. Based on the international standard for sustainable development of business districts (ISO37108), Beijing Future Science City will focus on the cutting-edge areas of urban sustainable development such as smart cities and zero-carbon parks to propose actionable and forward-thinking international standards. Through in-depth research and summarization of its practices in smart city construction and low carbon development, it will put forward forward-looking and operable draft standards, and contribute "Beijing Future Science City Wisdom" to the improvement of global standardization system. At the same time, Beijing Future Science City will actively participate in the pilot demonstration of international standards, proactively aligning with and applying the latest international standards for sustainable urban development. By integrating the international advanced concepts and methodologies into its own construction practice, the City aims to explore more replicable and promotable practice cases, provide model references for sustainable development worldwide, and promote the continuous optimization and advancement of the global standard system of sustainable urban development.

Beijing Future Science City will also deepen cooperation with UN-Habitat to become a global model for international collaboration on sustainable urban development. Beijing Future Science City will further deepen its cooperation with UN-Habitat, and leverage the global influence of the United Nations to continuously enhance its international visibility and influence in the field of sustainable development. The two sides will jointly carry out capacity-building projects for sustainable urban development, sharing Beijing Future Science City's practical experience in areas such as green and low-carbon development, intelligent transportation, and social inclusion through international training sessions, seminars and field trips, thereby providing reference cases of sustainable development for cities around the world. Simultaneously, Beijing Future Science City will actively participate in the global initiatives and actions of UN-Habitat, leveraging its unique strengths to contribute more wisdom and solutions to the sustainable development of global cities. Through close cooperation with

UN-Habitat, Beijing Future Science City will become a model for international cooperation in sustainable urban development, leading global cities to move forward on the path toward sustainable development and making greater contributions to the achievement of the United Nations Sustainable Development Goals.

In order to achieve the above ambitious goals, Beijing Future Science City has planned a series of practical development pathways and strategies, including:

- Continuously increasing investment in scientific research, optimizing the innovation environment, and improving incentive mechanisms to attract and cultivate a large number of high-end talents. It will strengthen close cooperation with leading domestic and international research institutions, universities and enterprises to build an open and collaborative innovation ecosystem. By actively implementing the related industrial action plans, the City will promote the vigorous development of energy and pharmaceutical and healthcare industries, accelerating the technological transformation and industrial upgrading.
- Fully leveraging the leadership of central state-owned enterprises, supporting them to form collaborative innovation consortia, and strengthening cooperation with universities in applied basic research, technological innovation, commercializing scientific and technological achievements, and building joint laboratories and collaborative innovation platforms. The effectiveness of platforms integrating large, medium, and small enterprises will be enhanced to facilitate close cooperation along the industrial chain, accelerate the concentration of high-quality enterprises, and create a complete and competitive industrial chain.
- Accelerating the construction of zero-carbon buildings and communities, vigorously promoting advanced technologies such as building-integrated photovoltaic, and realizing the goal of carbon neutrality in the construction sector. Public transportation networks will be optimized, and the adoption of electric vehicles and intelligent transport systems will be promoted to reduce carbon emissions. Effort will be made to strengthen ecological environmental protection and restoration through ecological restoration projects for rivers, wetlands and forests, improving green infrastructure, and comprehensively enhancing regional ecological quality.
- Optimizing the construction of the smart city. Beijing Future Science City will promote data sharing and openness, break down information silos to ensure the interconnection of urban data. By utilizing big data and artificial intelligence technologies, Beijing Future Science City will develop diverse smart service applications to enhance intelligent public services, and significantly improve the quality of life of residents. Beijing Future Science City will continue to improve the smart city infrastructure and advance the development of key areas such as smart transportation, smart energy, smart buildings, smart industries and smart communities.
- Continuously improving community participation mechanisms. Beijing Future Science City will encourage residents to participate in urban planning and community governance on all fronts and enhance their sense of belonging and responsibility. Efforts will also be made to continuously optimize the layout of public service facilities such as education, healthcare and culture, actively introduce quality resources, and build more high-quality community hospitals, schools and cultural centers. These actions aim to improve the quality of life of residents and build a more equitable and inclusive social environment.
- By regularly hosting cultural exhibitions and traditional festival activities, we will strengthen cultural preservation and innovation, promote excellent traditional culture, and enhance residents' sense of cultural identity, thereby boosting the city's cultural soft pow-

er.

- Actively participation in international standardization. Beijing Future Science City will actively participate in the formulation and promotion of international standards across multiple fields to enhance its influence in the field of international standardization. The City will strengthen cooperation with internationally renowned scientific research institutions and enterprises, engage in joint research and project cooperation, and improve international scientific and technological cooperation. For example, the City will deepen cooperation with France, Germany and other countries in fields such as new energy and bio-medicine, jointly tackling key technological problems and share scientific research results.
- Strengthening regional synergy. Beijing Future Science City will continue to enhance collaborative efforts with surrounding regions. It will formulate regional synergistic development plans, provide policy and financial support, and establish regional joint innovation platforms and industrial alliances to facilitate the sharing and synergy of scientific research resources, accelerating the commercialization of scientific and technological achievements. The City will also build regional industrial clusters, strengthen cooperation between upstream and downstream enterprises in the industrial chain, improve industrial support capabilities, and promote the synergistic development of regional industries to realize common prosperity.
- Resilience planning to address climate change. In the face of the challenges posed by climate change, Beijing Future Science City will develop resilience plans to address climate risks. It will advance the implementation of the planning and indicator system to ensure the coordinated advancement urban development, infrastructure construction and ecological environment improvement. Through the development of core objectives for resilience planning, the City will integrate systematic strategies across urban construction, energy, social services and ecological services, thereby enhancing the ability of cities and communities to respond to extreme weather and climate change.
- Active participation in international standards development and pilot programs. Beijing Future Science City will establish a professional team to establish a regular communication mechanism with the International Organization for Standardization (ISO) and relevant international organizations to deeply engage in the development of international standards in cutting-edge fields such as smart cities and zero-carbon parks. At the same time, Beijing Future Science City will actively carry out the pilot application of international standards for sustainable urban development and explore the best pathways and methods for the implementation of the standards on the ground.
- Deepening and expanding cooperation with UN-Habitat. Beijing Future Science City will establish a permanent cooperation mechanism with UN-Habitat and continuously explore the expansion of cooperation. It will actively respond to UN-Habitat's global initiatives and actions, combining its strengths to formulate detailed implementation programmes and action strategies.

6.3
Lessons For Global Cities

The practices and achievements of Beijing Future Science City in terms of sustainable development have provided global cities with various experiences and inspirations for promoting sustainable development:

I. Strengthening top-level design to support sustainable urban development through indicator systems, planning and standards leadership

Beijing Future Science City has provided solid support for the sustainable development of the city through the construction of a sound top-level design system, including a system of sustainable development indicators, scientific planning and high standards of leadership. Its experience shows that top-level design is the key to realizing sustainable urban development. Other cities can learn from the practices of the future science city, specifically:

a. **Construct a multidimensional sustainable development indicator system.** It covers economic, social, environmental and other dimensions to ensure the scientificity and feasibility of the indicators; it regularly evaluates and optimizes the indicator system, taking into account new needs and trends to maintain the forward-looking and leading nature of the indicators; and it incorporates the indicators into the entire process of urban planning and management, monitoring and evaluating them in real time through information-based means to ensure that they are implemented on the ground.
b. **Develop a scientific and rational planning system.** Integrate multiple regulations to achieve synergistic development; reserve space for development and provide flexibility for future development and upgrading. Planning should emphasize public participation so that it reflects public needs.
c. **Strengthening the construction and implementation of standards.** Actively participate in the formulation of various types of standards to enhance the city's influence in the field of standardization. Actively benchmarking the use of advanced standards and establishing an assessment mechanism to ensure the effective implementation of standards.
d. **Strengthening planning implementation management.** Real-time monitoring of the implementation of the plan through informatization means, timely adjustment and optimization; guaranteeing the implementation of the plan through the provision of multi-dimensional support, such as financial funds, financial innovation and land policies; and strengthening cross-sectoral coordination and regional cooperation in order to promote the implementation of projects.

II. Promoting sustainable development through the integration of the two-way model of "industry-city-people" and "city-people-production"

Beijing Future Science City breaks through the traditional one-way development logic and innovatively combines the two modes of "city of production and people" and "city of people and production" to form a closed loop of two-way-driven development. In the dimension of "production, city and people", Science City takes advanced

energy, medicine and health industry clusters as its foundation, and builds industrial ecology through the specialized layout of "Energy Valley" and "Life Valley", which drives the whole process of R&D, pilot plant, production and so on. The whole chain of resources, including R&D, pilot test and production, will be concentrated, and then the city functions will be improved with the engine of industrial development.

In the dimension of "city, people and production", Science City takes the quality of the city as the core attraction, through the ecological base with 50% of blue and green space, intelligent transportation and low-carbon buildings form a livable environment, and global research talents and indigenous people are attracted to participate in the construction of the city by building nests and attracting phoenixes. The integration of the two-way model is not a simple superposition, but through the policy of mixed land development, the mechanism of the three-party council and other institutional innovations, so that industrial parks and living communities in the space of mutual penetration, functionally support each other, and ultimately realize the chemical reaction of "production, city, people" and "city, people, production". Finally, the chemical reaction of "production, city, people" and "city, people, production" will be realized.

Other cities can learn from Future Science City's approach, specifically:

a. **Precise industrial focus:** Cities can accurately position their leading industries according to their own resource endowment, industrial foundation and development advantages, avoid dispersed industrial layout, and concentrate on building competitive industrial clusters.
b. **Constructing a scientific spatial structure:** in the planning for the integration of industry and city, it is necessary to pay attention to the science and rationality of the spatial structure, based on functional zoning, and organically linking different functional areas through transportation, green corridors and other elements, so as to improve the efficiency of space use and the vitality of urban operation.
c. **Strengthening regional functional mix:** urban planning and construction should avoid excessive separation of industrial areas and living areas, appropriately increase the degree of functional mix, and support certain residential, commercial, leisure and other facilities in industrial parks, so as to reduce the commuting distance between work and residence, and improve the convenience of residents' life and the overall vitality of the city.
d. **Improvement of public service support:** Emphasis is placed on the construction of public service facilities, and the layout and scale of public service facilities such as education, medical care, culture and sports are rationally planned in accordance with the needs of the residents and the needs of urban development, so as to ensure that the residents are able to enjoy high-quality and convenient public services.
e. **Building a diversified housing supply system.** Construction of guaranteed housing, such as shared ownership housing and public rental housing, to meet the housing needs of different income groups; construction of high-quality talent apartments to provide a comfortable living environment for scientific research talent
f. **Enhancement of transportation accessibility:** It is necessary to optimize the transportation network, strengthen the transportation links within the city and with the surrounding areas, improve the coverage and convenience of public transportation, provide residents and enterprises with good transportation and travel conditions, and promote the efficient flow of people, goods and information between the production and the city.

III. Financing sustainable urban development and construction with innovative financial services

Beijing Future Science City has provided strong financial support for urban development and construction through innovative financial models, promoting the integration of industry and urban development. Its experience shows that financial innovation is an important support for sustainable urban development. Other cities can learn from the practices of the Future Science City, specifically:

a. **Playing the role of government guidance funds:** Promoting development and construction can give full play to the leverage of government guidance funds, and guide social capital to participate in urban development and construction-related projects through the establishment of special funds. For example, Future Science City gives full play to the role of government guidance funds at the urban and municipal levels to guide social capital to participate in projects related to urban development and construction, and attracts more funds to key areas and key projects through the establishment of various special funds, such as the Chain Master Fund. Prioritize the revitalization of stock assets.
b. **Deep binding of industrial finance.** Focusing on local characteristic industries (e.g. agriculture, culture and tourism), we can design a combination of "industry fund + supply chain finance + special debt" tools, for example, culture and tourism cities can issue "culture and tourism consumption ABS", relying on scenic spot ticket revenue financing.
c. **Innovative development and construction models.** Diversified development and construction modes can be explored, social capital can be introduced to participate in urban construction, and land utilization and development mechanisms can be innovated to improve the efficiency and quality of development and construction. For example, the Future Science City Group has cooperated with China Shipping Real Estate to promote project construction and regional development through innovative land grant models and optimized development processes.

   Pioneered the "Dual Coordination & Dual Investment" development model for collective industrial land (Life Valley International Bioengineering Innovation Center), actively exploring and cultivating a new type of rural collective economy. This provides a new and effective path for developing new quality productive forces tailored to local conditions. Additionally, it pioneered the "Construction Starts Immediately Upon Land Acquisition" model (Xiaomi Smart Factory Phase II), characterized by parallel approval processes and tolerance-based processing (allowing for minor missing documents).
d. **Policy innovation breaks through limitations.** Seek policy support and utilize policies to attract financial support. For example, Beijing's Changping District has formulated **Several Measures on Finance to Promote the Innovative Development of Future Science City.**

IV. Adhere to the concept of ecological priority and promote green and low-carbon development

The Future Science City of Beijing upholds the concept of "ecological priority", builds an ecological pattern of blue and green, and vigorously promotes the use of green buildings and renewable energy, which has significantly improved the quality of the ecological environment. Its experience shows that ecological prioritization is the foundation for sustainable urban development. Other cities can learn from the practices of the future Science City, including:

a. **Focusing on low-carbon development in key areas:** Focusing on key areas such as energy, transportation and construction, it

will formulate low-carbon development strategies, promote the construction of green buildings, increase the proportion of green buildings, and strengthen the green and low-carbon control of the entire life cycle of buildings. It will actively develop and utilize renewable energy, promote the efficient use of water resources and the recycling of waste, and reduce carbon emissions and negative environmental impacts in the city.

b. **Constructing a green production and lifestyle:** through publicity, education, policy guidance and other means, advocating green travel, energy conservation, garbage classification and other green lifestyles, raising residents' awareness of and participation in environmental protection, and forming a favorable atmosphere for the whole society to participate in green and low-carbon development. Strengthen the research, development and application of energy-saving and emission reduction technologies, improve the efficiency of resource utilization, and reduce pollutant emissions in the production process.
c. **Strengthening ecological environmental protection and restoration:** formulating scientific ecological protection plans, strengthening the protection and restoration of ecosystems such as rivers and wetlands, and enhancing the stability and service functions of ecosystems. Through ecological restoration projects, the quality of the urban ecological environment will be improved, the area of urban green space will be increased and urban biodiversity will be enhanced.

V. Taking smart city construction as a hand to improve the level of urban management refinement

Beijing Future Science City has significantly improved the level of refinement and intelligence in urban management by building a smart infrastructure system covering a wide range of fields, including smart transportation, smart energy and intelligent buildings. Its experience shows that smart city construction is an important means of improving urban governance capacity. Other cities can learn from the practice of Future Science City, specifically:

a. **Strengthening the top-level design and planning of smart cities:** formulating a scientific and reasonable development plan for smart cities, clarifying development goals and key areas, and coordinating the informatization construction of various departments to avoid duplication of construction and waste of resources. At the same time, focus on data security and privacy protection, and establish a sound data management and security guarantee mechanism.
b. **Accelerating the construction of smart cities and comprehensively promoting digital transformation:** utilizing new-generation information technologies such as cloud computing, big data, Internet of Things and artificial intelligence to improve the level of refinement and intelligence in urban management. Enhance the efficiency of urban operation and service quality through the construction of intelligent energy management systems, intelligent transportation systems, and intelligent public service platforms. Accelerate the digital transformation of traditional industries, promote the deep integration of the digital economy with the real economy, and cultivate new economic growth points.
c. **Enhancing the intelligent level of public services:** Developing diversified intelligent service applications to enhance the intelligent level of public services and significantly improve the quality of life of residents. For example, telemedicine and online appointment booking services are realized through the smart medical system, online education resources are provided through the smart education platform, and the public transportation travel experience is optimized through the smart transportation system.

VI. Promoting social inclusion and equalization of public services to enhance residents' quality of life

Beijing Future Science City Focuses on social inclusion and equalization of public services by constructing age-friendly communities that meet the needs of residents across different age groups. The communities provide child-friendly spaces, age-friendly facilities and a gender-equal public service system. Its experience shows that social inclusion and equalization of public services are key to improving residents' quality of life. Other cities can learn from the practices of the Beijing Future Science City, in particular:

a. **Focusing on social inclusion and building all-age-friendly communities:** Urban planning and construction should emphasize social inclusion and actively build age-friendly communities to safeguard the equal rights for all groups. Through proper planning of community spaces and the installation of amenities such as children's play areas, senior activity centers, barrier-free facilities, the City can meet the needs of residents of different ages, thereby enhancing the inclusiveness and livability of the community.
b. **Continuously improve public service facilities:** Ongoing efforts to improve the planning and construction of public service facilities, optimizing the distribution of resources in education, healthcare, and culture, building a convenient community service circle, which improve residents' quality of life. By innovating community governance models and realizing refined management with the help of intelligent means, the City can encourage public participation in community affairs, and enhancing residents' sense of belonging and responsibility.
c. **Promoting the equalization of public services:** Beijing Future Science City can promote the equalization of public services through policy guidance and optimization of resource allocation, and narrowing the gap in public services between urban and rural areas and different regions. The City will increase investment in sectors like education, medical care, culture and other public services, improving the supply capacity and quality of public services, and ensuring residents have access to equitable, high-quality public services.

VII. Promoting culture and tourism integration to enhance the soft power of urban culture

During its development and construction, Beijing Future Science City has focused on the protection and inheritance of historical and cultural heritage, and has enhanced the city's cultural soft power by promoting outstanding traditional culture through protecting historical relics, building cultural parks and the organization of cultural activities. The experience shows that the integrated development of culture and tourism is an important way to enhance the city's cultural soft power. Other cities can learn from the practices of Beijing Future Science City, which includes:

a. **In-depth into historical and cultural resources:** Cities should dig deep into their own historical and cultural resources, develop scientific protection plans, and strengthen the protection and repair of historical sites. By building cultural parks, museums and memorial halls, the City can historical and cultural charms should be demonstrated, and the residents' sense of cultural identity and belonging should be enhanced.
b. **Promoting the adaptive use of historical and cultural heritage:** Beijing Future Science City has been combining cultural preservation with urban development and ecological construction to create urban spaces with cultural characteristics and enhance the cultural soft power of cities. For example, cultural inheritance and innovation will be strengthened through the organization of cultural exhibitions and traditional festival

activities to promote outstanding traditional culture.

c. **Promote the integrated development of culture and tourism:** develop attractive cultural heritage tourism products and create unique cultural tourism brands. Through the development of the cultural tourism industry, drive the synergistic development of related industries, and enhance the economic vitality and cultural influence of the city.

VIII. Strengthening international cooperation and exchanges to enhance international influence

Beijing Future Science City has actively engaged in international cooperation and enhanced its international visibility and influence by leading or participating in the formulation of international sustainable development standards, organizing international conferences, introducing overseas projects and building internationalized innovation platforms. Its experience shows that international cooperation and exchange is an important way to enhance the international influence of a city. Other cities can learn from the Future Science City's practices, specifically:

a. **International cooperation in the light of its own reality:** Cities should actively carry out international cooperation in the light of their own reality and establish long-term and stable cooperative relations with international organizations and other cities. Through organizing international activities, they should strengthen exchanges and cooperation with international scientific research institutions and enterprises, and introduce high-quality projects and resources from overseas.
b. **Participation in the development and promotion of international standards:** actively participate in the development and promotion of international standards in multiple fields to enhance its influence in the field of international standardization. Through the development and implementation of international standards, it will promote sustainable urban development and enhance the city's international competitiveness.
c. **Strengthening international scientific and technological cooperation and exchanges:** Strengthening cooperation with internationally renowned scientific research institutions and enterprises, carrying out joint research and project cooperation, and upgrading international scientific and technological cooperation.

IX. Strengthening synergies with neighboring regions and promoting coordinated regional development

By strengthening synergies and linkages with the surrounding regions, Beijing Future Science City has realized resource sharing and complementary advantages and promoted overall regional development. Its experience shows that regional synergistic development is an important way to enhance the overall competitiveness of the region and realize common prosperity. Other cities can learn from the practices of the Future Science City, specifically:

a. **Establishment of regional synergistic mechanisms:** formulate regional synergistic development plans, establish joint innovation platforms and industrial alliances, promote the sharing and synergy of scientific research resources, and accelerate the transformation of scientific and technological achievements.
b. **Constructing regional industrial clusters:** Strengthening the cooperation between upstream and downstream enterprises in the industrial chain, enhancing the supporting capacity of industries, forming competitive industrial clusters, and promoting the synergistic development of regional industries.
c. **Strengthening regional transport integration:** optimizing regional transport networks, strengthening transport links within cities and with neighbouring areas, improving the coverage and convenience of public transport,

and facilitating the movement of people and economic exchanges between regions.

d. **Promoting the common and shared use of public services:** through policy guidance and optimization of resource allocation, promoting the common and shared use of public services such as education, medical care and culture in the region, and narrowing the gap in public services between regions.

Appendix : Data and Statistics

Development indicators			Annual indicator data	
			FY2022	FY2023
autonomous and innovative	Innovative resources	national laboratory	Changping National Laboratory into orbit, Huairou National Laboratory Future Science City Energy Valley project is rapidly advancing.	The core area of the Changping Laboratory and supporting projects were topped out, and six new reorganized national key laboratories were approved.
		Research universities (institutes)	10	10
		Number of state-level innovation platforms (nos.)	46	46
		Number of leaders (persons)	1487	1700
		Proportion of foreign talents (%)	0.85	in deficit (of commodity)
		Number of R&D personnel per 10,000 employees (persons)	2170	1557
		Number of National High-tech Enterprises in the whole area of Changping (number)	1906	1944
		Area of state-level incubation platforms (10,000 square meters)	32.1	32.1
		Total venture capital investment (billions of dollars)	141.2	-
		R&D investment in main business revenue of regulated enterprises (%)	-	3.7
	Innovative development	International patent (PCT) applications (pieces)	More than 500 pieces	725
		Number of 10 billion enterprises (leading enterprises) in the whole region of Changping (number)	13	13
		Number of international standards created (items)	More than 260 items	More than 260 items
		Changping region-wide 100-billion industry clusters (number)	2	2

Beijing Future Science City 2035 Development Indicator System[18]

Development indicators			Annual indicator data	
			FY2022	FY2023
City Charms	livable and workable	Density of road network in centrally built-up areas (km/km2)	5.28	5.28
		Coverage of 15-minute community service circles (%)	100%	100%
		Proportion of green trips (%)	-	By the end of 2023 the coverage of public transportation stops in the region has increased significantly, Line 17 has been completed and opened to traffic, shared bikes have been placed in use, and the percentage of green trips continues to increase, so it is expected that the 2025 goal can be accomplished.
		Density of pedestrian and bicycle paths in concentrated construction areas (km/km2)	Over 10.6	Over 10.6
		Area of public sports land per capita (square meters)	-	0.4
		Floor space of public cultural facilities per capita (square meters)	-	0.18
		Number of community general practitioners per 10,000 urban and rural residents (number)	3.1	4.2
		Proportion of guaranteed housing supply (%)	38%	38%
		Level of smart facilities (%)	-	-
		High-speed broadband level (%)	Gigabit to the home and full 5G coverage has been realized.	Gigabit to the home and full 5G coverage has been realized.
	ecological environment	Share of blue-green space (%)	43.2%	43.2%
		Total annual runoff control rate (%) for new areas	80%	80%
		Renewable energy utilization rate in new construction areas (%)	5%	in deficit (of commodity)
		Proportion of green buildings in new civil buildings (proportion of two-star or higher/three-star)	92.4/56.1	92.4/56.1
industrial development	advanced energy	Industry revenue (billions of dollars)	2368.9	2306.6
		Industrial output (billions of dollars)	465.6	838.7
	medicine and health	Industry revenue (billions of dollars)	799.3	910
		Industrial output (billions of dollars)	304	370

[18] Data from the 2023 Phase Assessment Report of the Future Science City Plan (2017-2035)

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Correspondence between Future City's sustainable development practices and SDG11 goals

SDG11 Target Sustainable Cities and Communities (Building inclusive, safe, disaster-resilient and sustainable cities and human settlements.)		Corresponding to the sustainable development practices of Futuro City
serial number	subgoal	
11.1	By 2030, ensure access to adequate, safe and affordable **housing and basic services** for all and upgrade slums.	3.2
11.2	By 2030, provide safe, affordable, accessible and sustainable **transport systems** for all and improve road safety, in particular by expanding public transport, paying special attention to the needs of persons in vulnerable situations, women, children, persons with disabilities and older persons.	3.8
11.3	By 2030, strengthen inclusive and **sustainable cities** and capacities for participatory, integrated and sustainable human settlements planning and management in all countries.	3.1/3.4
11.4	Further efforts to protect and safeguard the world's **cultural and natural heritage**.	3.7
11.5	By 2030, substantially reduce the number of deaths and the number of people affected by disasters, including floods, as well as the direct economic losses related to global gross domestic product (GDP) resulting from such disasters, with a focus on protecting the poor and vulnerable.	3.2
11.6	By 2030, reduce per capita negative **environmental impacts** of cities, including special attention to air quality, and urban waste management.	3.3/3.6
11.7	By 2030, provide universal access to safe, inclusive, accessible and green **public spaces for all**, especially women, children, older persons and persons with disabilities.	3.5
11.A	Support positive economic, social and environmental linkages between urban, peri-urban and rural areas by strengthening national and regional **development planning**.	3.1
11.B	By 2020, significantly increase the number of integrated policies and plans adopted and implemented to build inclusive, resource-efficient, climate change mitigating and adaptive, disaster-resilient cities and human settlements, and establish and implement comprehensive disaster risk management at all levels in line with the Sendai Framework for Disaster Risk Reduction 2015-2030.	3.3
11.C	(c) Supporting LDCs in building sustainable, disaster-resilient **buildings** made of locally available materials, including through financial and technical assistance.	3.2

Beijing Future Science City Sustainable Development Practices: Innovations and Achievements

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