

National Climate Change Adaptation Strategy 2035

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Contents

Preface	- 1 -
Chapter I Basic Situation	- 3 -
Section 1 Impacts and Risks.....	- 3 -
Section 2 Current Situation and Achievements	- 4 -
Section 3 Opportunities and Challenges.....	- 7 -
Chapter II General Requirement	- 9 -
Section 1 Guiding Ideology	- 9 -
Section 2 Basic Principles	- 9 -
Section 3 Primary Objectives	- 10 -
Chapter III Strengthen Climate Change Monitoring, Early Warning and Risk Management	- 12 -
Section 1 Improve the Climate Change Observation Network	- 12 -
Section 2 Reinforce Climate Change Monitoring, Prediction and Early Warning.....	- 13 -
Section 3 Strengthen Assessment of Climate Change Impacts and Risks	- 14 -
Section 4 Enhance Comprehensive Disaster Prevention and Reduction.....	- 15 -
Chapter IV Improve the Climate Adaptability of Natural Ecosystems	- 17 -
Section 1 Water Resources	- 17 -
Section 2 Terrestrial Ecosystem	- 19 -
Section 3 Marine and Coastal Zone	- 22 -
Chapter V Improve Climate Adaptability of Economic and Social Systems	- 26 -
Section 1 Agriculture and Food Security	- 26 -
Section 2 Health and Public Sanitation	- 28 -
Section 3 Infrastructure and Major Engineering Projects	- 31 -
Section 4 City and Human Habitat Environments	- 32 -
Section 5 Sensitive Secondary and Tertiary Industries	- 35 -
Chapter VI Construct Regional Structures Adaptive to Climate Change	- 38 -
Section 1 Construct Territorial Space Adaptive to Climate Change	- 38 -
Section 2 Strengthen Regional Action on Climate Change Adaptation	- 38 -
Section 3 Improve Climate Adaptability in Significantly Strategic Regions	- 42 -
Chapter VII Strategy Implementation	- 46 -
Section 1 Strengthen Organization and Implementation.....	- 46 -
Section 2 Strengthen Fiscal and Financial Support.....	- 47 -
Section 3 Strengthen Technology Support	- 47 -
Section 4 Strengthen Capacity Building	- 48 -
Section 5 Deepen International Cooperation.....	- 49 -

The “National Climate Change Adaptation Strategy 2035” in Chinese is the official version.
This is an English translation for reference only.

Preface

Over the past century, global warming has become a significant feature of anthropogenic and natural climate change. The international community is increasingly aware of the threats and challenges presented both for development and for human survival. The global consensus is that positive measures are required to address climate change – mitigation and adaptation being mutually complementary and indispensable strategies.

Mitigation refers to reducing greenhouse gas emissions and increasing carbon sinks through long-term adjustments of energy, industrial and natural ecosystems, so as to stabilize and reduce atmospheric greenhouse emissions. While climate change that has already occurred cannot be eliminated in this way, and potential climate risk will continue to accumulate, even for a certain period of time after peak carbon and carbon neutrality.

Adaptation refers to reducing adverse impacts and potential risks caused by climate change by heightening the risk identification and management of natural ecosystem and socio-economic system, making adjustments, taking full advantage of favorable factors and preventing adverse factors. The impacts and risks of climate change are regionally specific, and it is urgently important to take that into consideration when undertaking adaptation actions to reduce the impacts and risks of climate change.

The PRC has equally emphasized both mitigation and adaptation and implementing a national strategy of actively responding to climate change. In order to comprehensively advance climate adaptability, in 2013 the PRC announced its first “National Climate Change Adaptation Strategy”, which defined the overall requirements, key tasks, regional structures and guarantee measures for climate change adaptation from 2014 to 2020, providing guidance and basis for adaptation work. Since the release of the strategy, hugely successful work has been achieved. However, in the face of long-term and complex climate change, the current analysis and assessment of the impacts and risks continue to be insufficient, calling for further attention and actions.

The period from the present to 2035 will be critical for China in terms of realising socialist modernization and building a beautiful China. The “Outline of the 14th Five-Year Plan (2021–2025) for National Economic and Social Development and the Long-Range Objectives Through the Year 2035” clearly puts forward the need for enhanced observation and assessment of the impact of global warming on vulnerable areas in China, as well as higher climate adaptability of urban and rural construction, agricultural production and infrastructure. The “Opinions of the Central Committee of the Communist Party of China

(CPC) and the State Council on Further Fighting the Tough Battle of Pollution Prevention and Control” considered that it was important to formulate the National Climate Change Adaptation Strategy 2035 and vigorously promote pilot work for climate change adaptation.

In order to implement the decisions of the CPC Central Committee and the State Council with the aim of strengthening national climate change adaptation actions and measures, while improving the ability to prevent and withstand climate risks, this strategy clarifies the guiding ideology, basic principles, and primary objectives for national climate change adaptation on the basis of in-depth assessment of the risks and impacts of climate change, the effectiveness of adaptation, and the challenges and opportunities therein. Based on the exposure and vulnerability of varying regions to the adverse effects and risks of climate change, this strategy further clarifies the key sectors and regional structures while guaranteeing measures for climate change adaptation. It is a strategy that will stay in place until 2035, while should be adjusted and revised in response to situational changes during implementation as needed.

Chapter I Basic Situation

Section 1 Impacts and Risks

Global warming is intensifying. Since the mid-20th century, the global average temperature has increased by 0.15°C every 10 years. It is expected that global warming will continue, and the adverse impacts and risks of climate change will keep intensifying. Similarly, the PRC's temperature has also risen significantly. From 1951 to 2020, the average temperature increased by 0.26°C every 10 years—higher than the global average for the same period.

Climate change has generated a serious adverse impact on China's natural ecosystem, and it continues to seep into the economic and social system. Floods and droughts are intensifying, glaciers are retreating, the permafrost is thawing, glacial lakes are expanding, and water-resources security risks have grown significantly; The vegetation belt has shifted northward in a biological invasion that has worsened, and the terrestrial ecosystem is becoming increasingly unstable. Meanwhile, as sea levels rise above global averages, the frequency and intensity of extreme marine events are escalating, which pose a severe threat to marine and coastal ecosystems. Climate change has also caused changes in farming practices and crop layouts, as risks associated with meteorological hazards and pests and diseases have intensified. Health risks associated with extreme weather and climate events such as high temperature and heat waves are increasing, as are vector-borne diseases, probably leading to a variety of allergic and chronic diseases. Changes to the generation of energy, transportation and other major infrastructure projects tend to reduce safety, stability, reliability and durability. The operation of urban lifeline systems, the quality of living environment, and the safety of people's lives and property have been critically threatened in some cases. Climate change has also transformed resource utilization modes, environmental capacity, and consumption demand, which could further affect the networks and operational safety of sensitive secondary and tertiary industry industrial chains, and even lead to systemic financial and economic risks.

In the PRC, where varieties of climate are complex, climate change and its adverse effects exhibit obvious regional differences. The warming degree of Northeast China is greater than the national average level. Though the increase of accumulated temperature is conducive to agricultural production, it also increases flood risks in summer, reduces wetland areas and heightens the vulnerability of permafrost. North China, where significant warming and drying is underway, faces prominent imbalances in supply and demand of water resources and serious urban heat-island effects. In East China, the intensity of

typhoons and the frequency of urban rainstorms, waterlogging, and high-temperature heatwave events have been increasing. Moreover, the continued rise of sea levels threatens coastal cities. Central China is troubled by frequent drought and flood disasters, as well as shrinking lakes and wetlands, raising the risks of ecological degradation, and decreasing biodiversity. In South China, extreme weather and climate events such as heatwaves, rainstorms and floods, typhoons and storm surges occur frequently, and are exacerbated by salt tides and seawater intrusions. In Northwest China, the accelerated melting of glaciers increases the risks and frequency of meltwater floods, while rendering water resources and ecosystems more vulnerable. Southwest China is facing intensifying droughts in the winter and spring, increasing pressure to undertake soil and water conservation, manage stony desertification, and protect biodiversity. The climate of the Qinghai-Tibet Plateau shows a warming and humidifying trend, with glaciers and permafrost melting and shrinking, lakes expanding, and river runoff increasing significantly, leading to increased risk of extreme events such as ice and snow avalanches. In addition, climate problems in major strategic locations such as the Beijing–Tianjin–Hebei region, the Yangtze Economic Belt, the Guangdong–Hong Kong–Macao Greater Bay Area, the Yangtze River Delta, and the Yellow River Basin are intertwined with problems such as over-population, resource shortages and environment degradation, which are obviously subject to ripple and amplification effects by climate change.

Global warming is projected to continue, making extreme weather and climate events more frequent and intense, as climate change impacts and risks expand in breadth and scale. With the deepening of domestic and global economic integration, climate change will pose more and more risks to the PRC's economic and social development, as well as the security of its people. As a major non-traditional security factor, the long-term adverse effects and abrupt extreme events brought about by climate change have become a significant risk in the process of realizing socialist modernization and building a beautiful China.

Section 2 Current Situation and Achievements

A preliminary policy system for climate change adaptation has been established. In 2013, the PRC issued the National Climate Change Adaptation Strategy, which provided strategic guidance for all departments and local governments to advance climate change adaptation and promote its active implementation in key sectors and regions. “China's National Plan on Climate Change (2014–2020)”, which was issued in 2014, proposed the principle of simultaneously promoting climate change mitigation and adaptation to further

boost strengthened actions in key sectors and regions. In 2016, action plans for climate change adaptation in cities, forestry and other sectors were successively released. Relevant policy documents on meteorology, agriculture, water conservancy, oceanography, infrastructure, urban and rural construction, and ecological environment protection were also incorporated in both conceptual and practical terms. Relevant departments have issued climate feasibility demonstration specifications and technical guidelines in consideration of climate change factors when revising technical standards and specifications in such sectors as water conservancy, construction, and roads and waterways.

Climate monitoring and early warning systems have been continuously improved. A comprehensive meteorological observation system comprising on-the-ground automatic meteorological stations, radars, and meteorological satellites has been built. A long-time monitor database of disasters involving regional droughts, rainstorms, high temperatures, sand and dust storms, typhoons, extreme snowfalls, low/freezing temperatures, and other meteorological disasters has been established. The construction of a risk survey database is underway. The work of designating areas that are subject to meteorological disasters and risks has been completed. Monitoring networks in forests, waterways, the ocean, the environment in general, and health, and other sectors, are undergoing continuous improvement. China's offshore and South China Sea observation, island and nearshore hydrometeorological monitoring for the Yellow Sea and Bohai Sea observation networks have been established. A geological-disaster monitoring, early-warning and prediction system has been established and measurement and prevention systems at village, township, and county levels has been improved countrywide. Meteorological early warning of geological disasters has been carried out, preliminarily covering all medium- and high-risk areas that are prone to geological disasters.

Climate adaptability in key areas has been effectively improved. Water-resources regulation, storage and allocation projects in basin areas—for example, the South–North Water Diversion Project—have been implemented to optimize water-resources allocation and perfect the ability to regulate and control water resources. We have continued to drive the backbones of engineering projects for river governance and improved flood control and disaster reduction systems. We have actively promoted green agriculture and smart climate agriculture to improve farmland infrastructure, significantly enhancing the ability of farmlands to prevent, resist and mitigate disasters. Major projects for protection and restoration of important ecosystems are underway, basically curbing ecological deterioration, improving the overall stability of the natural ecosystem, and building a preliminary framework for a national ecological security barrier. By the end of 2020, 53.3

million hectares of high-standard farmland was established with an effective utilization coefficient of farmland irrigation water reaching 0.565, and forest coverage rate reaching 23.04%. The comprehensive vegetation coverage of grassland has reached 56.1%, and the wetland protection rate has reached 52%.

Solid progress has been made in climate change adaptation pilot and demonstration programs. After the “Notice on Carrying out Pilot Work for the Construction of Climate Adaptive Cities” was issued, 28 cities (districts and counties) were selected nationwide to undertake the pilot work of building climate adaptive cities to explore modes of constructing and managing urban climate change adaptation according to actual situations, significantly improving urban climate change adaptation and disaster prevention and relief. Thirty cities were selected to carry out sponge city pilots, forming the basis of experience that can be replicated and rolled out, as systematic and citywide promotion of sponge city construction demonstration work got underway. The project was implemented in 1,116 areas that are very prone to waterlogging—in 60 cities with serious waterlogging disasters. The PRC is also engaged in building national water-saving cities, ecological garden cities and ecological civilization construction demonstration areas to achieve greater synergy with adaptation work.

Awareness of the need for climate change adaptation continues to make headway. Climate change impact analysis and risk assessment were promoted in key cities, and awareness of the need for climate change adaptation was enhanced. The PRC has been carrying out training, advocacy, and educational activities via multiple channels and in various fields via opportunities such as World Meteorological Day, International Day for Disaster Risk Reduction, National Disaster Prevention and Reduction Day, World Water Day, China Water Week, Tree Planting Day, World Day to Combat Desertification and Drought, and International Day for Biodiversity and World Environment Day. We have actively launched the program “United Nations Decade on Biodiversity, China in Action” and systematically publicized biodiversity protection and climate change adaptation based on nature reserves, zoos, botanical gardens and forest parks. Comprehensive disaster prevention and reduction publicity and educational activities have taken place in schools and communities, thus boosting engagement of society as a whole.

International cooperation on climate change adaptation keeps deepening. The PRC is an active and constructive participant in the negotiations on the performance of the United Nations Framework Convention on Climate Change and the preparation for all the assessment reports of the Intergovernmental Panel on Climate Change (IPCC) to promote equal attention to mitigation and adaptation by the international community, and to strengthen global adaptation actions. Together with other nations, we jointly inaugurated

the Global Commission on Adaptation to promote large-scale climate adaptation actions and partnerships, and strengthen international cooperation on adaptation. In this process, we have told the PRC's climate change adaptation stories through publicizing and promoting our experience. As a major responsible country, China has also made vigorous efforts to promote South–South cooperation in climate change adaptation—for example, providing microsattellites and meteorological mobile stations to other developing countries such as Ethiopia, Bolivia, and Uruguay to improve their climate adaptability.

Section 3 Opportunities and Challenges

From an international perspective, the world is undergoing profound changes unseen in a century. Global climate governance has become an important area to pool the strength of all countries and promote the building of a community with a shared future for humankind. It has become a global consensus to actively prevent and resist climate risks and improve climate adaptability. Frequent extreme weather and climate events and disasters such as extreme high temperature, drought, heavy rainfall and forest fires in recent years have aroused worldwide concerns and further highlighted the importance and urgency of climate change adaptation.

From the domestic perspective, since the 18th CPC National Congress, under the leadership of the CPC Central Committee with Comrade Xi Jinping at its core, China has been firmly implementing the national strategy of actively responding to climate change and fully promoting green and low-carbon development as an important participant, contributor, and trailblazer in the construction of global ecological civilization. PRC President Xi Jinping in September 2020 made a statement at the general debate of the 75th session of the United Nations General Assembly that China aimed to have CO₂ emissions peak before 2030 and achieve carbon neutrality before 2060. This major strategic decision was made based on our sense of responsibility to build a community with a shared future for humankind and our own need to secure sustainable development. The CPC Central Committee and the State Council released the “Working Guidance for Carbon Dioxide Peaking and Carbon Neutrality in Full and Faithful Implementation of the New Development Philosophy” and “Action Plan for Carbon Peak Before 2030” and moved forward to put in place a “1+N” policy framework. As a result, society as a whole is ready to solidly promote carbon peak and carbon neutrality and actively respond to climate change.

The 19th CPC National Congress made it clear that climate change is a non-traditional security threat facing mankind. Putting forward new requirements for the next stage of climate change adaptation, “Outline of the 14th Five-Year Plan (2021–2025) for National

Economic and Social Development and the Long-Range Objectives Through the Year 2035” clarified the need to intensify the observation and assessment of the impacts of global warming on vulnerable areas in the PRC, and to enhance the capacity of urban and rural construction, agricultural production, and infrastructure, to adapt to climate change. New infrastructure and new technologies brought about by economic transformation, and scientific and technological innovation and progress have enriched the means of climate change adaptation and provided favorable conditions for strengthening climate change adaptation.

Climate change adaptation in the PRC is and will have to confront many challenges. First, analysis and assessment of the impacts and risks of climate change are insufficient, and the complexity, breadth and profundity of the direct and indirect threats of climate change to natural ecological systems, as well as economic and social systems, require further attention. Second, the governance of climate change adaptation needs improvement. Adaptation work has not yet been fully incorporated into local and departmental priorities; nor has a working system of climate-system observation—impact risk assessment—adaptation actions—action-effect assessments—been formed. Third, the existing adaptation measures are not enough to support the goal of high-quality development required for building a beautiful China. Climate adaptability in key sectors and regions calls for improvement. Fourth, a lot of basic work for adaptation has yet to be undertaken. Both the basic theoretical and technological research, and development of climate change adaptation are relatively weak—marked by insufficient knowledge and experience. Society should further promote awareness of climate change and the ability to adapt to it.

Chapter II General Requirement

Section 1 Guiding Ideology

Under the guidance of Xi Jinping Thought on Socialism with Chinese Characteristics for the New Era, we should fully implement the guiding principles from the 19th CPC National Congress and the second through fifth plenary sessions of the 19th CPC Central Committee, and thoroughly apply Xi Jinping Thought on Ecological Civilization. Following the plans and decisions of the Party Central Committee and the State Council, we should promote the five-sphere integrated plan and the four-pronged comprehensive strategy, and adhere to a people-centered philosophy of development. We should fully, accurately, and comprehensively implement the new development philosophy, coordinate development and security, and implement the national strategy of actively responding to climate change. Paying equal attention to mitigation and adaptation, we should grasp the opportunity of solidly peaking carbon emissions and achieving carbon neutrality, while incorporating climate change adaptation into economic and social development. Efforts are required to promote modernization of the governance system and governance capabilities for climate change adaptation, the economic and social resilience for climate adaptability, and the formation of regional structure for climate adaptability, so as to effectively respond to the adverse impacts and risks of climate change and reduce losses caused by extreme weather and climate events and disasters. In this way, we will make active contributions to the great rejuvenation of the Chinese nation by enhancing ecological civilization, building a beautiful China, and achieving high-quality economic development.

Section 2 Basic Principles

Active adaptation by putting prevention first. We should fully understand the importance and urgency of strengthening climate change adaptation actions and make active investment and adaptation actions that seek advantages and avoid disadvantages to the greatest extent by making use of favorable factors and preventing unfavorable factors. Following the principle of putting prevention first, we must step up preparedness for the worst-case scenario and improve the climate resilience of natural ecosystems and economic and social systems in order to prevent and resolve the adverse effects and risks of climate change.

Scientific adaptation by following the laws of nature. We should scientifically assess the impacts and risks of climate change, and actively take reasonable and effective adaptation measures based on economic and social development and the capacity of

resources and the environment. Organically combining nature-based solutions with climate change adaptation, we should effectively give play to ecosystem functions and enhance comprehensive climate adaptability by strengthening ecosystem protection, restoration, and sustainable management.

Systematic adaptation by highlighting priorities. We will organically combine climate change adaptation with relevant deployments such as ecological civilizational construction, the Beautiful China Initiative, and high-quality economic development, gradually engaging the entirety of society in all sectors and all regions in active adaptation actions. While taking climate adaptation actions, we should put priority on climate-sensitive and -vulnerable areas, as well as key regions in order to improve climate change adaptation in key sectors and major strategic regions.

Collaborative adaptation by coordinated and cooperative governance. We should continue to make concerted progress in adaptation and mitigation, giving priority to actions and initiatives with the co-benefits of mitigation and adaptation. Both overall and local factors in the short, medium and long term should be taken into account from domestic and foreign perspectives. Enhanced coordination, resource sharing, information exchange, mutual learning, and multi-agent participation are required to form a joint force for climate change adaptation.

Section 3 Primary Objectives

By 2025, the policy system and institutional mechanisms for climate change adaptation will be basically formed; the monitoring and early-warning capacity of climate-change, extreme-weather, and climate-related extreme events will continue to be enhanced, and the assessment of adverse impacts and risks of climate change will be effectively improved. Significant progress will be made in the modernization of climate-related disaster prevention, as well as control systems and prevention capacity. Climate adaptation actions will be effectively carried out in key sectors and regions. The regional structure for climate adaptability will be established. Remarkable progress will be made in the pilot projects for climate-adaptive cities. Advanced technologies in climate change adaptation will be widely applied. A sound atmosphere for the whole society to consciously participate in climate change adaptation will have a preliminary basis.

By 2030, the policy system and institutional mechanisms for climate change adaptation will be generally well-established. Systems for climate-change observation and prediction, impact assessment, and risk management will be basically formed. The ability to prevent major climate-related risks and disasters will be significantly improved, and climate

adaptation activities in all sectors and regions will be carried out comprehensively. The climate vulnerability of natural ecosystems and economic and social systems will be significantly reduced. Moreover, climate change adaptation will be widely popularized as a concept throughout society, and adaptation technological systems and standards will be constructed preliminary constructed. Phased results will be achieved in the building of a climate-adaptive society.

By 2035, the climate change monitoring and early warning capacity will reach an international advanced level, the climate risk management and prevention system will be basically mature, major climate-related disaster risks will be effectively prevented and controlled, and the climate change adaptation technology systems and standard systems will be well-established. The construction of a climate-adaptive society with greater climate adaptability will be basically completed.

Chapter III Strengthen Climate Change Monitoring, Early Warning and Risk Management

We will strengthen the establishment of climate-change observation networks, enhance monitoring, prediction and early warning, and impact-risk assessment, promote climate risk management and improve comprehensive disaster prevention and reduction capabilities.

Section 1 Improve the Climate Change Observation Network

Improve the atmospheric observation network. A dynamic assessment mechanism for the needs of the climate observation system should be established, and a long-term, stable, and continuous observation system of the basic atmospheric climate variables should be developed in order to achieve three-dimensional observation capacity of the atmosphere. We need to upgrade the observation equipment such as satellites, radars and observational technology that integrates aerospace, the sky, and the earth observation, so as to promote autonomous and intelligent observation. Moreover, we should enhance the relative quality management system for higher observation accuracy and data quality. Comprehensive observation capacity of the climate system on the Qinghai–Tibet Plateau also requires improvement.

Build a network to observe the multiple spheres and their interactions. An inter-ministerial mechanism is required to coordinate resources, layout and efforts for an intensive, coordinated, and efficient multi-sphere observation system. We need to build a network to observe the multi-sphere interactions on the surface of the Qinghai–Tibet Plateau, continuously monitoring the glaciers, permafrost, snow, lakes and local ecosystems, constructing a better observation system that tracks climate and environmental changes in the PRC’s alpine area. A comprehensive marine and meteorological observation system and corresponding support system that integrates land, marine, sky, and aerospace resources is required for the real-time monitoring of marine and climate factors in key marine areas worldwide. Improvement is required in observation of ecosystems, emissions from human activities, changes in underlying surfaces, and changes in important artificial ecosystems. By 2025, we will achieve full coverage of major climate variables in all climate regions in the PRC. By 2035, a national climate observation network integrating “aerospace, sky and earth” resources with high spatiotemporal resolution and complete observation elements will be built, improving the monitoring rate of global weather and climate events.

Special Column 1 Climate and Climate Change Observation Network

A standardized and perfectly structured observation-station network should be built with reasonable layout, complete functions, and scientific processes that operate stably and reliably. It should cover reference radiation observation, atmospheric background observation, ozone three-dimensional observation, greenhouse-gas and carbon monitoring, and observation of the Qinghai–Tibet Plateau cryosphere and ecosystem. Construction and protection of a meteorological exploration environment will be promoted. By 2025, we will be more capable of observing the impacts of global warming on vulnerable areas across the country, basic climate variables, and greenhouse gases, making full coverage of all climate regions and key climate variables possible. By 2035, we will improve the ability of monitoring global climate change and its impact. Moreover, we will continuously optimize and adjust the structure, layout, and functions of national weather and climate observation networks based on dynamic assessments of the needs of climate observation systems.

Section 2 Reinforce Climate Change Monitoring, Prediction and Early Warning

Improve the ability of climate system monitoring and analysis. Relying on multi-sphere and multi-source observation data and basic data products, we will improve the quantitative monitoring index system, standardize regional climate-change monitoring technology and methods, and carry out whole-process monitoring of changes in climate systems that have already occurred along with major weather and climate events. We will strengthen the monitoring of the impact of global warming on typical vulnerable areas in the PRC, carry out dynamic monitoring of hydrology and water resources, vegetation cover and desertification in arid and semi-arid areas in Northwest China, key ecological areas in the Yellow River Basin and the Yangtze River Basin, enhance the monitoring of climate and environmental effects of human social and economic activities, and reinforce the monitoring of the impacts of meteorological disasters and climate change on ecological security for better ecological protection and restoration.

Improve prediction accuracy. We will deepen research into the mechanisms of multi-sphere and multi-time interactions and their impacts on the climate; research and develop weather and climate-integrated numerical prediction systems, and carry out refined grid prediction. We will also improve the simulation and prediction of global ozone, aerosol, and vegetation ecological processes, while aiming to better predict the East Asian monsoon, El

Niño–Southern Oscillation and Madden–Julian Oscillation, and to predict major weather events one month in advance and global climate anomalies one year in advance. We also aim to build an inter-decadal climate prediction system in pursuit of greater prediction of the climate for the next 10 to 30 years. By 2035, a complete working system of weather and climate prediction featuring seamless full coverage and intelligent and digital functions will be in place.

Strengthen the warning of extreme weather events. We will carry out attribution analysis of major extreme weather and climate events, and develop prediction and early-warning technologies for extreme weather and climate events and compound disasters; build an early warning platform for climate change risks, construct a monitoring, forecasting and early warning system for various types of meteorological disasters, and strive for more accurate, detailed, and advanced early warning for extreme weather and climate events, small- and medium-sized river floods, mountain floods, geological disasters, and forest and grassland fires. We will try to achieve early warnings of local strong weather one hour ahead and severe weather one week in advance, improving the release of early-warning information in the interests of risk prevention. Our goal is that the accuracy and refinement of forecasting and prediction will reach advanced international levels by 2035.

Section 3 Strengthen Assessment of Climate Change Impacts and Risks

Improve the technical level and basic ability of assessment. We will strive to promote the construction of climate-change data center systems and establish a big-data sharing platform covering multiple spheres and human activities, which will hopefully realize the data connection between climate change and its socio-economic impacts. Products will be produced to analyze key climate variables such as global temperatures and precipitation over more than a century. Moreover, regional multi-sphere, long-term climate data sets based on ground observation and satellite remote sensing will be developed and made available to the public. We will also carry out quantitative analysis of climate-change impacts and risk attribution, establishing index and technical systems for evaluating climate change and its impact and risks as well as assessing the climate bearing capacity. Moreover, technical standards should be put in place to evaluate the effects of climate change adaptation.

Strengthen assessment of climate change impacts and risks in sensitive sectors and key regions. We will promote quantitative and dynamic assessment of climate change impacts and risks in key sectors and climate-sensitive industries. Add greenhouse-gas emission controls and address climate-change requirements into the environmental impact

assessment, carry out general investigation, zoning, monitoring and detailed assessment of climate resources such as solar energy and wind energy, and reinforce climate-feasibility demonstrations for the planning and construction of major projects. We will also augment the ability to assess climate change impacts and risks in key vulnerable areas such as the Qinghai–Tibet Plateau and major strategic regions, and improve assessments of climate-change risks in cities and urban agglomerations. By 2035, a relatively sound climate-change impact and risk assessment system on all levels will be established with coverage of all vulnerable areas in the PRC.

Section 4 Enhance Comprehensive Disaster Prevention and Reduction

Promote the concept of disaster risk management. We will enhance research into how global climate change influences the occurrence, development, and impacts of natural disasters, and better understand the new characteristics and evolutionary trends of natural disasters caused by climate change. With disaster risk management and comprehensive disaster reduction in mind, we will put prevention first and combine prevention, mitigation, and relief together. By treating disaster mitigation as a daily routine and disaster relief as an emergency response, we will strive for a transformation from post-disaster relief to pre-disaster prevention, from addressing single disasters to comprehensive disaster reduction, and from reducing loss to lowering risks to fully improve comprehensive disaster prevention and climate change adaptation.

Strengthen prevention and resolving of major risks. We will enhance the construction of a comprehensive monitoring, early-warning, and assessment system for climate-induced-disaster risks, strengthen the consultation, research, and judgment of comprehensive-disaster-risk situations, and improve comprehensive monitoring, assessment, and early-warning capacity of multi-disaster and disaster-chain risks. Regular checks of potential disasters and dangers should be effectively integrated with periodic investigations into overall risks, and dynamic risk assessment should be undertaken. Moreover, natural-disaster risk zoning and comprehensive prevention and control zoning should be upgraded for greater integration with relevant plans. Meanwhile, we need to promote the improvement of risk-management systems in key industries, strengthen the impact and risk assessments associated with climate change in terms of safety for major projects, and formulate and implement risk-control measures.

Enhance comprehensive governance of natural disasters. The deployment of disaster prevention and mitigation should be adjusted in response to the impacts of climate change, with specific emphasis on strengthening the comprehensive management of areas

with increased climate disasters and areas where disaster risks may significantly change in form. We will try to improve the basic conditions for urban and rural disaster prevention; raise the disaster prevention capacity and standards of important urban buildings, infrastructure systems, and primary-level units, strengthen the comprehensive control of disasters in cities, and gradually advance plans to improve disaster resistance in rural areas, including the relocation of residents in high-risk areas. Moreover, we will endeavor to optimize the spatial layout of major infrastructure projects and strictly restrict construction in high-risk areas. At the same time, the application of intelligent prevention and control technology will be actively promoted for increased resistance to damage and quicker recovery under extreme conditions.

Reinforce the emergency mechanisms and response forces. We will improve the emergency response mechanism, and constantly optimize the “flat organization and command” mode of disaster emergency response and rescue as well as the integrated operational mode of disaster prevention, rescue, and relief. Efforts will be made to build a more standard, specialized, and professional national fire-rescue team that is ready to deal with all kinds of disasters and carry out major response tasks. In addition, we should increase the allocation of advanced and applicable equipment; promote the application of new technologies; and raise the comprehensive rescue capacity under extreme weather and climate events. Every variety of professional rescue force affiliated to relevant national departments, local governments, and enterprises should be fully used, while orderly participation of social emergency forces in disaster prevention, mitigation and emergency response should also be promoted.

Chapter IV Improve the Climate Adaptability of Natural Ecosystems

We should coordinate to promote the integrated protection and systematic management of mountains, rivers, forests, farmlands, lakes, grasslands, and deserts, fully following the principle of “determining city development, land planning, population, and industries according to the carrying capacity of water resources.” Climate adaptability needs to be coordinated for both land and sea, implementing nature-based solutions, thus improving the climate adaptability of the PRC’s natural ecosystem.

Section 1 Water Resources

Construct smart monitoring systems for water resources as well as flood and drought disasters. We should optimize the layout of hydrology monitoring station networks, including improving the key monitoring systems such as large rivers and their branches, medium- and small-sized rivers, and medium- and small-sized reservoirs, and enhancing the capabilities of monitoring underground water, water metering, the ecological flow of rivers and lakes, and conservation of water and soil. We should implement upgrading of basic national hydrological stations, promote the application of new monitoring methods, expand the scope of real-time online monitoring, and enhance the ability of intelligent monitoring of water security. We should promote the development of digital twin river basins, promote “space, sky and ground” monitoring for full coverage of watersheds, and improve the construction of hydrological monitoring system for glaciers, permafrost, accumulated snow, and water-resource conservation zones in the western cold highland areas. By 2035, monitoring, forecasting, early-warning, rehearsal, pre-plan, and flood-control operations will be greatly improved, resulting in much enhanced water-security intelligence.

Advance the intensive and economical use of water resources. We should thoroughly implement a national water-saving initiative by establishing a rigid constraint system for water resources, strictly controlling the upper limits of water-resource development and utilization, comprehensively building a water-saving society, and driving further change to embrace intensive and economical use of water resources. The water-saving standards and water-use quota system should be strengthened, the water pricing mechanism should be improved, the market-based trading of water rights and the reform

of water resource tax should be advanced, and overall reforms of agricultural water prices should be enhanced. Firm constraints on water resources should be strengthened and the strictest water-resource management system should be adopted to improve the index system for controlling the total amount and intensity of water use in the administrative districts at the provincial, municipal, and county levels, firmly curbing unreasonable water demand. By 2025, a rigid water-resource constraint system will be basically established, the efficiency and effectiveness of water-resource use will be greatly improved, the total water use of the PRC will be contained within 640 billion cubic meters, and the water use per CNY10,000 of GDP will be 16% less than that of 2020. By 2035, a water-saving society will be fully operational, total national water use will be within 700 billion cubic meters, and the saving and recycling of water resources will reach international levels.

Carry out major national water network projects. Based on the overall watersheds and spatial allocation of water resources, we should strengthen the construction of major water-resource projects and improve optimization of water resource allocation. We should promote the construction of major water-channeling and diversion projects, which includes promoting high-quality development of follow-up projects to the South–North Water Diversion Project, carrying out major cross-watershed and cross-region water diversion projects, strengthening construction of key water sources and regional water-supply projects, and comprehensively improving our ability to coordinate and allocate water resources and ensure water-supply security. Multiple measures should be taken to build emergency backup water sources to improve the ability to address extreme droughts and sudden water-security incidents. The continued construction of supporting facilities and modernized transformation of large- and medium-sized irrigated areas should be accelerated, along with integration of urban- and rural-water supply, scaled development of rural water supply, and standardized transformation of small-scale water supply projects. By 2025, the water-resource allocation project system will be more complete, the proportion of rural population covered by large-scale water supply projects will reach 55%, and the proportion of rural population using tap-water will reach 88%. By 2035, the economic and social development will be basically coordinated with the carrying capacity of water resources, and the capacity of urban- and rural-water supply security will be significantly enhanced.

Improve the river basin flood control engineering system and flood-risk prevention and control system. We should strengthen management of rivers and lakes, carry out the construction of embankments to meet standards and improve river courses,

and flood discharge capacity via river channels. We should accelerate the construction of control hub projects, implement the sluice reinforcement of dangerous reservoirs, and strengthen combined groups of reservoirs in river basins to enhance flood-control capacity. The optimization, adjustment, and construction of flood-storage and retention areas should be accelerated, and the functions of flood diversion and storage areas for diverted flood water should be secured. Mountain torrent prevention and the strengthening of urban flood-control capacity should be enhanced, and the weak links of flood control should be mitigated. We should also fully consider the impact of extreme weather and climate events caused by climate change and the resulting changes in terms of flood control, so that we can scientifically improve flood-control project standards and flood-risk prevention and control capabilities. By 2035, the flood-control and disaster-reduction systems for rivers and lakes will be basically improved, and the ability to prevent and reduce natural disasters will be significantly enhanced.

Enhance the ability to protect and manage the ecology of major rivers and lakes.

We should reinforce the protection and management of rivers and lakes as well as coordinate the work of water and soil conservation, groundwater management, ecological restoration of damaged rivers and lakes, etc. to preserve and expand the ecological space of rivers and lakes. Scientific management of soil erosion should be carried out to improve the rate of soil and water conservation, and the management of key areas such as the middle reaches of the Yellow River, the upper reaches of the Yangtze River, and the black soil area in the Northeast should be intensified. Water systems need to be connected and beautified in the countryside. We should strengthen ecological protection and management of major rivers and major lakes, and ensure the ecological flow of rivers and lakes, with an emphasis on water-resource overload areas, areas with fragile and degraded water ecology based on river basins. The intensity of groundwater usage and development needs to be strictly controlled and water recharges undertaken through multiple channels. Management of groundwater should be continuously advanced. By 2025, more than 90% of key rivers and lakes will meet basic ecological flow standards, and the national soil- and water-conservation rate will increase to over 73%. By 2035, water will be ecologically protected, soil erosion will be effectively controlled, ecological water in rivers and lakes will be effectively guaranteed, and a beautiful and healthy water ecosystem will basically take shape.

Section 2 Terrestrial Ecosystem

Build a comprehensive monitoring system for the terrestrial ecosystem. We should continuously investigate and monitor natural resources and ecological conditions nationwide, carry out comprehensive surveys and monitoring of forests, grasslands, wetlands, oceans, soils, permafrost, karst outcrops, glaciers, and deserts based on the results of the third national land survey, build a protection, monitoring and assessment system for vegetation phenology, wild animals and their habitats, undertake surveys, monitoring, and assessment of soil erosion, desertification, sandification, and stony desertification, and strengthen the supervision of key ecological functional areas, ecological protection red lines and key illegal fields. Based on the science of natural resources and earth science, we need to establish a natural resource survey and a system for monitoring standards with natural resource classification standards at its core. We also need to build an efficient survey and monitoring technology system of natural resources by means of spatial information, artificial intelligence, big data, and other advanced technologies. Depending on the basic mapping results and various natural resource surveys and monitoring data, a three-dimensional spatial-temporal database and management system for natural resources should be established to realize centralized management of survey and monitoring data.

Establish and improve protection and supervision of the terrestrial ecosystem. We should gradually build a nature reserve classification system with national parks as the main body, nature reserves as the basis, and various supplementary nature parks to significantly improve management effectiveness and the ecological products supply capacity, so that the scale and management of nature reserves reach international standards and the total area reaches more than 18% of the PRC's land area. We should strengthen the construction of forest and grass germplasm resource preservation centers that adapt to climate change in order to protect rare, precious, endangered, and endemic forest and grass germplasm resources. We need to push forward the introduction of the *Regulations on Ecological Protection Compensation* to complete the eco-compensation system and reinforce the protection of natural ecosystems. We also need to apply national laws and regulations on ecosystem protection, clarify territorial management responsibilities, strictly perform ecological protection supervision in accordance with the law, strengthen the supervision of nature reserves and ecological protection red lines, reinforce supervision and punishment of ecological destruction, continuously promote the Green Shield Initiative for nature reserves, and severely investigate and curb all violations

of the laws and regulations.

Strengthen the protection of typical ecosystems and the restoration of degraded ecosystems. We should continuously increase the total amount of forest resources, strengthen the tending of natural young and medium-aged forests, promote the restoration of degraded secondary forests, and improve the diversity of planted forest species. Efforts should be made to transform grassland animal husbandry production methods and restore degraded grasslands. It is necessary to work on wetland restoration to enhance the ecological function of important wetlands. We need to establish a technical system for the restoration and governance of degraded ecosystems such as desertification, soil erosion, and stony desertification, and strengthen the protection of natural vegetation in sandy areas. By 2035, the forest coverage rate of the PRC will reach 26%, the vegetation coverage of grasslands will reach 60%, the wetland protection rate will be increased to 60%, and more than 75% of treatable sandy land will be treated. Protection of glaciers and permafrost should be improved, including implementation of regulations on glacial tourism development and the formulation of special protection policies. We should also carry out ecological restoration demonstration projects for abandoned mines, improve regional ecological conditions, and enhance the quality and service functions of ecosystems. In response to the protection and restoration needs of important ecosystems, we need to scientifically carry out weather modification that restores the ecology of key areas, and promote the modernization of ecological protection, restoration, and governance capabilities. We should also coordinately promote the integrated protection and systematic management of mountains, rivers, forests, farmlands, lakes, grasslands, and deserts, balancing the relationship between protection and utilization, and implementing overall protection, systematic restoration, and comprehensive management.

Enhance disaster early warning, defense, and governance capabilities. We should strictly control possible sources of wildfires, complete a national comprehensive fire-risk early-warning system for forests and grasslands, comprehensively enhance the ability to identify forest and grassland fire risks, so as to increase the fire-watch rate in key areas to 95% and above. We should improve the quarantine and supervision of biological pests and diseases by establishing a monitoring and early-warning site network system, promoting biological control, ecological control, and other prevention and control technologies. It is necessary to formulate a directory of invasive alien species and measures for managing them, apply strict guidelines for the introduction of alien species, strengthen the management and control of their use after introduction, and reinforce the

investigation, monitoring, early warning, control, assessment, and removal of invasive alien species. We also need to promote the implementation of insurance for disasters such as forest and grass fires, low-temperature snow and ice, biological pests and diseases, and biological invasions to disperse ecosystem disaster risks and enhance post-disaster recovery capabilities. It is also necessary to improve sandstorm-disaster forecasting and monitoring to intensify the investigation and monitoring of sandy land conditions in sandstorm areas and build more ground stations for comprehensive monitoring, so as to enhance the accuracy of sandstorm disaster early warning and forecast as well as the capability of emergency response.

Implement the planning and construction of major projects for ecological protection and restoration. Focusing on national key ecological areas, ecological protection red lines, national nature reserves, etc., and highlighting ecological support for major national strategies, we should solidly promote the construction of major projects for the protection and restoration of ecology. We should implement the “Master Plan for Major Projects to Protect and Restore China's Major Ecosystems (2021–2035)”, carry out the construction of national parks and other protected natural areas and wildlife conservation, and implement the special construction plan for major projects supporting ecological protection and restoration. The ecological protection and restoration of the ecological screen areas of the Qinghai–Tibet Plateau, the key ecological zones of the Yellow River (including the ecological screen areas of the Loess Plateau), the key ecological zones of the Yangtze River (including the ecological screen areas of Sichuan and Yunnan), the northeast forest belt, the northern sand prevention belt, the southern hills and mountains belt, and the coastal zone should be strengthened. The quality of national ecological security screens should be comprehensively improved, the quality and stability of ecosystems should be enhanced, and biodiversity should be protected and restored.

Strengthen biodiversity protection for the terrestrial ecosystem. A national-level biodiversity monitoring and protection network should be built to investigate and assess the background of areas with biodiversity protection priority. We need to complete biodiversity protection and regulatory systems to ensure that important ecosystems, biological species, and biological genetic resources are comprehensively protected and the stability of various ecosystems is improved. We also need to continuously improve the policy and legal systems for biological diversity protection as well as the mechanism for sustainable utilization of biological resources to form a consolidated and orderly biodiversity protection spatial framework nationwide.

Section 3 Marine and Coastal Zone

Improve the marine disaster observation, early warning, and assessment system. The marine observation and forecasting system should be improved to strengthen the early forecasting, early warning, and comprehensive risk assessment of major climate disasters in offshore and coastal zones, enhance early warning capabilities of major marine disasters, extreme weather and climate events, and flood risks in coastal cities, and continuously intensify the monitoring and assessment of sea-level changes. The marine ecological early-warning and monitoring system needs to be established to conduct operational marine ecological surveying, monitoring, assessment, and early warnings, and strengthen early warnings of ecological disasters such as red tides and green tides.

Enhance disaster prevention and control capabilities of coastal zones. We should strengthen the prevention of marine disaster risks caused by rising sea levels against the background of climate change, and promote coastal cities to improve the capacity building of climate change adaptation and disaster prevention and reduction. The construction of disaster prevention and reduction hardware should be reinforced to build an integrated coastal zone protection system that is more resilient, aiming to completely eliminate areas that are the most prone to waterlogging in key coastal flood-control cities by 2035. Danger elimination and reinforcement measures of major coastal projects should be made and the design standards for coastal dams, roads, power plants, airports, ports, docks, and other projects should be improved to cope with climate disasters.

Intensify the protection and restoration of coastal ecosystems. We should continue to improve the construction of marine nature reserves, promote the integrated protection and restoration of typical coastal zone ecosystems; by 2035, the remediation and restoration area of coastal wetland will reach 50,000 hectares, and the approved backbone forest strips of coastal protection forests will be not less than 98%. We should also strengthen shoreline protection and restoration to retain not less than 35% of natural shorelines on mainland and restore not less than 400 kilometers of shorelines by 2025, and 1,200 kilometers by 2035. We should carry out marine ecological protection and restoration projects to improve the quality of marine environment and enhance its carbon-sink capacity. It is necessary to adhere to and strictly execute the summer fishing moratorium system, promote implementation of a quantity management system of marine fishery resources, intensify the supervision and inspection of fishery law enforcement, reinforce marine fishery resource protection, and thus promote the sustainable use of marine fishery resources.

Continuously improve the quality of the marine ecological environment. We should systematically promote the protection and construction of beautiful bays, strengthen the integrated, systematic, and source management of land-sea coordination, and continuously improve the environmental quality of offshore areas. We need to strictly implement red-line supervision for marine nature reserves and ecological protection, increase efforts to protect marine biodiversity, and control alien species, further reduce pollutant discharge from rivers into the sea, explore and develop green mariculture, and deploy marine acidification and dysoxia monitoring work, so that we can mitigate deteriorating ecological environment risks such as eutrophication, ocean acidification, and dysoxia, and improve the quality, stability, and climate resilience of marine ecosystems. By 2025, the quality of marine ecological environment will continue to improve steadily, and the proportion of high-quality water in offshore areas will reach 79%. By 2035, the quality of marine ecological environment will have fundamentally improved, and the disaster prevention and reduction level of marine ecosystems will also have improved.

<p>Special Column 2: Key Projects for Marine and Coastal Zone Ecosystems</p>
<p>The project of comprehensive governance of bay ecological environment: We should consolidate and deepen our achievements in comprehensive management of the Bohai Sea, and take comprehensive measures to control the waters adjacent to Yangtze Estuary—Hangzhou Bay and the Pearl River Estuary. Guided by major ecological and environmental problems in the above-mentioned sea areas, we should take targeted measures to combat pollution scientifically and in accordance with the law, and deeply implement integrated, systematic, and sourced management of land-sea coordination, We should focus on promoting the Beautiful Bays demonstration construction work in the Yellow Sea and Bohai Sea area, the Yangtze River Delta area, Western Taiwan Strait area, the Guangdong—Hong Kong—Macao Greater Bay area, the Beibu Gulf area, and the South China Sea islands and reefs area, exploring the synergy of enhancing climate resilience and reducing pollution and carbon emissions.</p> <p>The coastal zone ecosystem protection and restoration project. Driven by the aim to restore the coastal zone ecosystem structure, improve its functions, and strengthen the climate adaptability of coastal zone ecosystems, we need to comprehensively protect the natural coastlines for key marine ecological areas in coastal zones by promoting the protection and restoration of a variety of typical marine ecosystems such as estuaries, bays, coastal wetlands and mangroves, coral reefs, and the Chinese tamarisk while</p>

strengthening prevention and control of alien species such as *Sporobolus alterniflorus*. The priority is to improve the ecological environment of important bays and estuaries such as the Guangdong–Hong Kong–Macao Greater Bay Area, the Bohai Sea, the Yangtze Estuary, and the Yellow River Estuary, as well as promote land–sea coordination and river–sea governance to accelerate the restoration of marine hydrodynamic conditions in offshore local waters. Meanwhile, important ecological corridors in coastal zones should be maintained to protect biodiversity, the ecological structure and the functions of the coastal wetland ecosystem in the Beibu Gulf should be restored, the endemic plants and animals in the rainforest and sea of Hainan Island and their habitats need to be protected and aquatic ecology protection and restoration should be strengthened to improve disaster prevention and environmental enhancement of coastal zone ecosystems.

Chapter V Improve Climate Adaptability of Economic and Social Systems

To prevent the transmission of climate risks from natural ecosystems to economic and social systems, we need to adhere to the concept of the synergistic effect between mitigation, adaptation, and sustainable development, focusing on key sectors that are sensitive to the impact of climate change, so as to enhance the climate resilience of the PRC's economic and social systems.

Section 1 Agriculture and Food Security

Optimize the utilization pattern of agro-climatic resource. Dynamic assessment and refined zoning of agro-climatic resources should be carried out to optimize the industrial layout, cropping structures, and crop variety configuration and adjust the trade patterns of agricultural products. In mid- and high-latitude zones, it is necessary to increase the multiple cropping index appropriately and extend the cultivation of thermophilic crops to the north to adjust the maturity of crop species; in the low-latitude zones, it is necessary to expand the scale of winter sowing to fully exploit the potential of agricultural production. We should select and breed high-yielding, high-quality and stress-resistant crops, livestock, poultry, and aquatic products, as well as adaptable varieties of forestry, fruits, flowers, and grasses. Climate-friendly and low-carbon agricultural product certification should be launched and local agricultural products of geographical indications should be developed to increase farmers' incomes.

Reinforce a work system that adapts to changes and reduces agricultural disasters. In response to arising agricultural disasters and hazards caused by extreme weather and climate events such as droughts, floods, freezing temperatures, heatwaves, and wind-driven hail, we need to strengthen the monitoring, early-warning, and response mechanisms for disasters and improve disaster-diagnosis techniques and standards. Region-specific, disaster-specific, and variety-based disaster reduction plans should be made to improve protection standards and heighten preparedness against disasters. We need to develop intelligent drainage and irrigation for farmlands, climate-adapted crops, the planting of adaptable forest and fruits, and healthy breeding technology systems for livestock, poultry, and aquatic products, as well as promote water-saving irrigation, dry farming, drought-resistance and soil-moisture preservation, flooded fields drainage, and other adaptive approaches to agriculture. Agricultural producers and operators should be

trained in disaster prevention and reduction as well as adaptive technologies.

Enhance the climate resilience of agricultural ecosystems. Ecology should be the priority for agricultural development—including strengthening soil and water conservation and ecological protection, promoting conservative farming wherever suitable, developing agroforestry and hilly areas “3D farming”, and encouraging reasonable row intercropping and relay intercropping. In accordance with ecological changes and new pests and diseases caused by climate change, we need to improve pesticide efficiency while reducing its dosage, while implementing integrated prevention and control technology and green control technology. It is also necessary to control invasive alien species and protect agricultural biodiversity. Fertilizers should be made more efficient at lower volumes, and scientific fertilization techniques should be promoted. As for farmland quality, action plans need to be implemented for farmland protection and improvement of quality, increasing the organic matter in soil, and improving soil fertility. We need to accelerate the construction of germplasm resource protection bases and seed banks to protect endangered agricultural animal and plant species. We should also protect our traditional agricultural cultural heritage, optimize the design of farmlands, and enhance the functions of agricultural ecosystems.

Establish a climate-adaptable food security system. We should implement the strategies of “securing agricultural production by scientific land use” and “technology-based modern agricultural production” and adjust the layout of agricultural infrastructure construction according to the changes of spatial and temporal distribution of agro-climatic resources and climate-related disasters. We should also establish a system for monitoring and forecasting supply and demand, and risk assessment of grain yields and production potentials in main agricultural production areas at home and abroad. As for enhancing farmland protection and quality construction, it is necessary to adhere to the red line of 1.8 billion mu of farmland, adopt the strictest farmland protection system, strengthen controls over farmland use, and implement special protection for permanent basic farmlands. We should also promote high-standard farmlands, with the aim of having 1.075 billion mu of high-standard farmlands by 2025. Climate-smart agriculture should be energetically developed to improve agricultural production capacity. We need to enhance technological innovation for agricultural climate adaptability to realize breakthroughs in revolutionary technology for agricultural climate change adaptation and build demonstration bases for climate change adaptation technologies in major agricultural production areas. We also need to improve the meteorological system and risk-sharing mechanisms for agriculture,

including the promotion of weather index insurance and exploring the mechanism of agricultural catastrophe insurance.

Special Column 3: Special Actions of Climate Change Adaptation in the Agriculture and Food Systems

Demonstration of agricultural climate change adaptation technologies: By 2025, national demonstration bases will be set up for the crop-farming industry in areas that are sensitive and vulnerable to climate change by drawing on construction of national agricultural high-tech industry demonstration zones and national modern agricultural science and technology demonstration bases. By 2035, a number of national technology demonstration bases will be set up for the farming, forestry, husbandry, fishing, and poultry raising industries guided by the construction of national agricultural science and technology parks and national modern agricultural science, and technology demonstration bases.

Climate-smart agriculture demonstration project: By 2025, a climate-smart crop-farming technology system will be primarily established, under which several pilot and demonstration bases will be built in main food production areas in North China and Northeast China. By 2035, a complete and well-functioning climate-smart agricultural technology system will be built and promoted, leading to agricultural advantages countrywide.

Certification of climate-friendly and low-carbon agricultural products: By 2025, certification standards will be established for climate-friendly and low-carbon agricultural products to fully demonstrate the synergistic effect of adaptation and mitigation. Pilots for the certification of climate-friendly and low-carbon agricultural products will be launched with some high value-added cash crops, and leading brands will be created for excellent climate-friendly and low-carbon agricultural products with local features in some key agricultural counties and cities. By 2035, the certification work of climate-friendly and low-carbon agricultural products will be comprehensively promoted.

Section 2 Health and Public Sanitation

Carry out assessment of climate-change related health risks and adaptability.

We should formulate the assessment plan and guidelines for health risks caused by climate change, set up comprehensive, frequent evaluation mechanisms, and clarify climate-

change related health risks and identify vulnerable populations. Based on the results of climate-change related health-risk assessment and fully considering climate features of different regions and health-risk exposure levels of vulnerable populations, assessments of the climate adaptability of healthcare systems and key vulnerable populations should be carried out and an adaptability enhancement plan should be developed.

Improve the monitoring, early warning, prevention, and control of climate-change induced diseases. We should strengthen departmental joint action and data sharing, take full advantage of new technologies to complete the monitoring network and data-reporting system for climate-sensitive diseases and zoonoses, and intensify the real-time monitoring, quarantine, and early warning, so as to effectively improve the monitoring and early warning capability of key communicable diseases such as the plague, dengue, and epidemic encephalitis B as well as chronic noncommunicable diseases such as cardiovascular diseases and respiratory diseases. Planning for prevention and control of climate-sensitive diseases and health risks under extreme weather and climate events should be reinforced by developing contingency plans and emergency treatment regulations, so as to improve health emergency response capabilities. Labor protection standards under extreme weather and climate events such as heatwaves also need to be improved.

Enhance the climate resilience of healthcare systems. When accelerating the expansion of high-quality medical resources and balanced regional layouts, health risks arising from climate-sensitive diseases and extreme weather and climate events should be fully considered. It is necessary to stock national public-health emergency supplies and medical-supply reserves, upgrade the capacity of emergency production reserves of pharmaceutical and medical-device production systems, and guarantee the development and equipping of mobile emergency medical equipment. We should drive the informatization of energy and resource management in the healthcare system, build a hierarchical and tiered emergency care, treatment, nursing, and rehabilitation network for climate-sensitive diseases as well as a mental-health service system for victims of extreme weather and climate events.

Comprehensively promote the adaptation actions of health to climate change. We should develop action plans for health adaptation to climate change to improve health adaptation levels under extreme weather and climate events. We should perform pilot work on health adaptation to climate change in cities, villages, communities, and key places

(schools, hospitals, nursing homes, etc.) with the aim of summarizing feasible models that can be promoted. We need to set up platforms such as climate change and health expert advisory commissions, technical alliances, and key laboratories to strengthen both basic and applied research on health risks associated with climate change and extreme weather and climate events, and develop countermeasures. Advocacy and education on health risks due to climate change and extreme weather and climate events should be carried out in various forms, such as providing climate-change health and nutrition guidelines to improve the awareness and climate adaptability of the public.

Special Column 4: Special Actions for Adaptation of Health to Climate Change

Conduct special studies on health adaptation to climate change: By 2025, research on health effects will be carried out regarding climate change, extreme weather, and climate events such as heat, heatwaves, and floods to clarify the major health risks and characteristics of vulnerable places and vulnerable populations with a view to establishing adaptation strategies, technologies, and counter-measures. By 2035, basic and applied research into climate-change adaptation strategies and technologies will be undertaken to develop adaptation strategies, technologies, and plans for climate change and extreme weather and climate events.

Develop health risk assessment guidelines, standards, and implementation plans for climate-change adaptation and extreme weather and climate events: By 2025, China will develop health-risk assessment guidelines, standards, and implementation plans for climate-change adaptation. By 2035, China will develop health-risk assessment guidelines, standards, and implementation plans for adaptation under major extreme weather and climate events such as heat, heatwaves, floods, and freezing in various regions.

Carry out demonstration of climate-change health adaptation actions and extreme weather and climate events: By 2025, based on factors such as climate, ecological environment, and population characteristics of different regions, pilot work for health adaptation to climate change and extreme weather and climate events will be carried out in cities, villages, communities, and key places (schools, hospitals, nursing homes, etc.) in order to come up with feasible models and formulate health and nutrition guidelines for people with potential climate-change health risks. By 2035, the actions for health adaptation to climate change and extreme weather and climate events in urban

areas nationwide will be implemented, significantly improving overall climate adaptability.

Section 3 Infrastructure and Major Engineering Projects

Reinforce climate-risk management of infrastructure and major engineering projects. With the help of new information technologies such as the Internet of Things (IoT), big data, artificial intelligence and so on, we should strengthen the monitoring and risk warning of climate-change impacts on infrastructure and major engineering projects, controlling the weak links and various risk points and dynamically assessing levels and intensities of risk. We should also implement climate-change risk zoning for infrastructure and major projects to set up a full-chain risk-management system composed of real-time monitoring, information transfer, risk assessment, dynamic dispatch, and effect analysis by adopting differentiated measures and classified policies.

Promote climate-resilient construction of infrastructure and major engineering projects. We need to strengthen the construction of resilient transportation infrastructure by effectively integrating greenhouse-gas emissions controls and climate change adaptation requirements into the transportation infrastructure construction process. The aim is to basically build a modern and high-quality national three-dimensional transportation network by 2035. We should build a digital, networked, and intelligent smart hydraulic engineering system to improve the ability to deal with water hazards of different levels and intensities. It is also necessary to reinforce the security of energy-infrastructure everyday operations to enhance its ability to withstand extreme weather and climate events such as storm surges, extreme heat, and freezing. We need to improve the security level of energy supply through in-depth integration of “energy + meteorology” information. We also need to promote the renewal of urban and rural infrastructures to build smart cities and digital villages while integrating organically urban and rural infrastructure construction with nature-based solutions. Project layouts should be adjusted considering the adverse impact of climate change on major projects, so as to improve construction, dispatch and operation levels.

Perfect technology standards for infrastructure and major engineering projects. Based on a full-lifecycle concept, climate change adaptation should be integrated into the formulation and revision process of technology standards for infrastructure and major engineering projects. Combining climate change and its impact and risk assessment, we should reexamine the existing engineering project standards and immediately revise them based on the results of reexamination, so as to perfect technology standards, making them

compatible with climate change for infrastructure and engineering projects in stages. We also need to formulate plans for the adjustment and revision of future engineering technical standards and conduct preliminary research based on predictions of mid- and long-term climate change trends.

Make breakthroughs in key adaptation technologies in infrastructure and major engineering projects. Efforts should be put into the development of climate-impact monitoring and early-warning risk technology for infrastructure and major engineering projects to improve monitoring and early-warning capabilities. For transport infrastructure, the priority is technology to guard against permafrost thawing, low-temperatures and snow-ice weather and storm surges and the development technology of product materials and equipment. We could improve the subgrade stability technology used in the Qinghai–Tibet, Sichuan–Tibet, and Yunnan–Tibet railways and highways. For hydraulic engineering infrastructure, we should focus on the research and development of new corrosion-resistant dam-building materials and adaptation technology compatible with droughts and high temperatures, abrupt drought–flood alternation, extremely low temperatures, and other unfavorable working conditions. In terms of the facilities for energy engineering and power-grid security, we need to enhance the technologies for multigrid combination interconnection, absorption, and dispatch. As for urban and rural infrastructure, the priority is adaptative technology for water supply, power supply, transportation, and emergency communication.

Section 4 City and Human Habitat Environments

Reinforce risk assessments of urban climates. We should scientifically analyze the current situation of urban climate change, identify the main impacts and risk of climate change on urban societies, economies, and ecologies according to projected regional climate-change trends, and reasonably assess the vulnerability of various fields, regions, and city dwellers. We also need to establish and perfect a “physical examination” evaluation system—“one examination a year; one evaluation every five years”—for cities. Efforts should be made to promote cities at or above prefectural level to prepare urban climate-risk maps.

Adjust and optimize the urban layout functions. Fully consider climate-bearing capacity to make overall arrangements for urban construction, industrial development, ecological conservation, infrastructure, and public services. We need to reasonably plan urban layout and functions to curb unlimited sprawl that might lead to regional climatic

deterioration, increased disaster risks and increased urban diseases. We should take the mid- and long-term impacts of climate change into full account in the planning, design and approval process of urban buildings and infrastructure construction projects. Urban and rural infrastructure and public service facilities should be integrated to promote the coordinated development of urban and rural facilities. Public firefighting facilities, civil air defense facilities as well as disaster prevention and sheltering places should be reasonably distributed, basic public service facilities in communities should be reasonably allocated, and construction of a barrier-free environment should be reinforced.

Ensure the safe operation of urban infrastructure. We should conduct comprehensive urban infrastructure census, archiving, examination, and assessment to identify and investigate the risks, seek out shortcomings, and implement precise measures. It is necessary to develop or revise construction standards for drainage, ventilation, wall strengths, and improve subgrade stability of underground urban projects according to the impact of climate change on urban precipitation, temperature, humidity, wind speed, groundwater level, soil water content and basic stability of subgrades. It is also necessary to adjust design requirements for relevant protective facilities in coastal cities according to changes of sea level. We should promote the construction of urban electric power cable galleries and change overhead lines to underground lines where possible, while continuing the renewal of old gas-pipeline network facilities in cities and towns. We should also promote new urban infrastructure construction to ensure systematic, smart, and green construction and safe and stable infrastructure operations.

Improve service functions of urban ecosystems. We should build a compound ecological network that is blue and green, fresh and bright and a continuous, complete, and functionally sound ecological security barrier to improve the service functions of ecosystems for source-water conservation, water purification, storage of flood water for future drought conditions, climate regulation, and maintaining biodiversity, so as to effectively alleviate problems such as urban heat island effects, waterlogging and heavily polluted weather. Nature-based solutions will be given priority to protect key ecosystems such as forests, rivers, lakes, wetlands, and grasslands. It will be necessary to scientifically plan the layout of urban green belts, green corridors, green wedges, and greenways, and continuously promote urban ecological restoration, and improve systems of urban green spaces. It is also necessary to enrich types of urban parks to build a systematically connected and evenly distributed park system that has big, medium, and small parks with distinctive characteristics and reach the goal of “plants every 300 meters and parks every

500 meters.”

Strengthen urban flood prevention capability and secure water supply. We need to set up an urban flood prevention and drainage system that reduces discharge at source, combines water storage and drainage, drains flooded areas to eliminate risks, and responds to emergencies when exceeding standards. The construction of sponge cities should be promoted systematically and universally. By 2025, urban waterlogging prevention and control will be effectively addressed under standard rainfall, and formerly serious waterlogging-prone areas will be completely eliminated. By 2035, the drainage and waterlogging-control engineering system of each city will be further improved, and the drainage and waterlogging control capacity will be more compatible with the requirements of building climate-adaptive cities, sponge cities, and resilient cities. A multi-source water supply pattern needs to be built for cities while strengthening the construction of emergency backup water sources. Construction of water-saving cities should be advanced by controlling leakage and loss of urban public water, while promoting utilization of urban wastewater as a resource.

Improve capacity for dealing with urban climate risks. We should build a normalized management system for inter-departmental and cross-regional joint prevention and control, complete emergency response and disaster relief response mechanisms, and enhance scientific, well-tuned levels of urban climate risk management. We should also strengthen the monitoring, risk investigation and hidden-danger management of potentially dangerous entities such as old buildings, manhole covers, tunnels, bridges, underground spaces, and dilapidated buildings in rural areas under extreme weather and climate events in cities. We need to establish and improve the information management system and early-warning notice platform for extreme weather and climate events to ensure the accessibility, timeliness, and effectiveness of early warnings. We also need to promote the interconnection of government service platforms, community facilities, and home terminals to develop services that benefit communities including smart early warnings, emergency rescues, post-disaster psychological counselling, and senior care. It is a major task to improve the risk protection capability of vulnerable populations such as children, pregnant women, patients with chronic diseases, people over 65 years old, and the urban poverty-stricken population.

Special Column 5: Special Actions of Urban Climate Change Adaptation

Urban agglomerations and metropolitan areas: We will promote the interconnection of infrastructure, mutual recognition and sharing of public services, joint protection and management of ecological environment, and joint prevention and control of climate risks in urban agglomerations and metropolitan areas.

Pilots for construction of climate adaptive cities: To address the problems of urban climate change adaptation, we need to provide classified guidance, make overall plans, and actively explore construction and management models of urban climate change adaptation in line with the actual situations of different regions. By 2035, cities at and above the prefectural level will fully carry out the construction of climate adaptive cities, creating numerous “Beautiful China” model where people and nature coexist in harmony.

Urban flood control and drainage: Focusing on the 31 key flood-control cities and those along large rivers, we will upgrade urban flood control and drainage facilities such as floodwater storage and detention spaces, dykes, revetments, riverways, flood control projects, and drainage networks, and build sponge cities according to local conditions, to eliminate all sections that are prone to serious waterlogging in the city.

Shore up county weaknesses: We will shore up weaknesses in county seats, urban areas of county-level cities as well as super large towns, and improve general hospitals, centers for disease control and prevention, elderly care centers, kindergartens, municipal pipe networks, municipal transportation, parking lots, charging piles, sewage and garbage treatment facilities and industrial platform supporting facilities.

Section 5 Sensitive Secondary and Tertiary Industries

Enhance capacity to guarantee meteorological services. We should develop meteorological service products based on big data and AI to create a new model of smart meteorological service and improve the “intelligence” of meteorological services. The business model of “smart forecast + meteorological service” should be established to develop commercial meteorological services. We also need to promote rollout of a meteorological service guarantee system covering multiple fields, and improve the capability of sensitive secondary and tertiary industries in dealing with extreme weather and climate events and associated disasters.

Prevent financial risks related to climate. A mandatory disclosure system for climate and environmental information covering all types of financial institutions and financing entities should be established in a step-by-step manner to promote the disclosure of climate and environmental information by listed companies and debt-issuing enterprises in accordance with the law. The carbon emission information disclosure framework should be improved, and financial institutions should be encouraged to disclose exposure to high-carbon assets and establish emergency disclosure mechanisms for climate-related risks and emergencies. Climate-risk stress tests for financial institutions should be promoted, and the banking, securities, and insurance industries should be supported to formulate regulatory measures and response plans for climate risks. We should also encourage the dynamic management of climate risks through fintech and other measures. Enterprises and financial institutions are encouraged to establish transformation strategies, pathways and targets that are consistent with the goal of carbon peak and carbon neutrality. By 2035, the early warning mechanism for climate change-related risks will be fully promoted, and the capability of financial institutions to identify, assess and manage climate change-related financial risks will be significantly enhanced.

Improve climate resilience of the energy sector. Impact and risk assessment of climate change on the production, transport, storage, and distribution of energy should be conducted focusing on extreme weather and climate events such as heat, freezing, and rainstorms. Energy structure and land-use layout should be optimized according to changes in climate resources and energy demand. We also need to strengthen the protection and emergency dispatch of power transmission and the distribution systems in the event of extreme weather and climate events, intensify the monitoring, inspection, and maintenance of power equipment, promote the application of technologies such as energy storage, smart grid, and digitalization, complete the emergency planning system, and enhance the power infrastructure's capability of security risk early warning, countermeasures, and rapid recovery.

Develop climate-adaptive tourism. We should improve emergency responses to extreme weather and climate events and tourist safety management in tourist destinations. We should also identify and assess the potential risks of climate-sensitive tourism resources, and scientifically intervene in the protection of tourism resources such as ancient and famous trees, bridges, villages, ancient architecture, and historical sites. We need to scientifically grasp the opportunity of climate warming to explore the potential of climate resources and reasonably develop new temperature-sensitive business forms of

tour and sightseeing, science popularization, and vacations, such as summer and winter resorts, admiring flowers and leaves, ice, snow, cloud, and mist. Localities are encouraged to adopt tourist destination climate comfort indices, including temperature and humidity, wind, and dress guides.

Reinforce transportation disaster prevention and emergency support. It is necessary to promote the combination of climate change adaptation and transportation, complete the emergency interconnection mechanism with meteorological early-warning information, improve systems of work, school, business, and transportation suspension of work due to extreme weather conditions and climate events, establish a natural disaster transportation prevention and control system, and enhance the capability of transportation to prevent and fight disasters. We should improve the early-warning, prevention and control safety mechanisms of transportation, complete the transportation safety supervision system and the search, rescue and salvage system, as well as establish coordination mechanisms and security planning systems for comprehensive emergency transportation management. We should also plan the establishment of land, water, and air-emergency rescue capabilities in coordination, and strengthen the facility construction of emergency equipment, emergency communications as well as material storage and transportation in key regions to improve the disaster prevention and reduction level of important infrastructure.

Chapter VI Construct Regional Structures Adaptive to Climate Change

Taking into account the differences in climate change, natural conditions and economic and social development, and in line with the principles of relative consistency of climate characteristics and relative integrity of administrative divisions, we should construct regional structures that are adaptive to climate change with comprehensive coverage and highlighted focuses.

Section 1 Construct Territorial Space Adaptive to Climate Change

We should take natural resources, environmental bearing capacity and climate adaptability into account, organically linking climate-change adaptation with territorial space planning, incorporating climate factors into the process, and strengthening the assessments of climate-resource conditions, and climate-change impacts and risks. According to resource capacity and the evaluation results of territorial space development, we should scientifically plan agricultural, ecological, urban, and other functional spaces in order to determine the size and spatial structure of cities, while designating arable land and permanent basic farmland, ecological red lines, urban development boundaries and other spatial control boundaries as well as various types of sea/ocean protection lines. We should strengthen the integration of climate impact, comprehensive disaster risk assessment information and territorial space information, embracing the concept of “one map” planning countrywide.

By improving and implementing the main functional area strategy and comprehensively enhancing climate adaptability of various functional areas, we will ensure the security of territorial space. Urban spaces will focus on reducing the climate-risk impacts of population, social economy and infrastructure, building climate-adaptive cities to improve climate-risk prevention and the ability of cities to impose controls. Agricultural space will focus on enhancing the climate adaptability of agricultural production to safeguard national food security and the supply of important agricultural products. The ecological space will focus on protecting the ecological environment, enhancing biodiversity and providing ecological product supply to maintain national ecological security.

Section 2 Strengthen Regional Action on Climate Change Adaptation

Northeast China: We should adjust the layout of crops and their varieties while expanding northward in a timely manner, while also increasing the multiple cropping index

in the southern Liaoning area. Meanwhile, we also need to prevent and control the northward spread of plant diseases and pests. The national black soil protection project should be implemented by establishing a long-term mechanism for black soil protection to consolidate the key position for national food security. Key water sources and water-resource allocation projects should be planned to alleviate water shortages in the central and western parts of the region. We should strengthen ecological restoration and fire prevention for forests and grasslands to protect biodiversity and the wetland habitats of rare migratory birds. We also need to develop ecological tourism and build the region into the country's largest summer resort and world-class ice-and-snow tourism destination. In response to new characteristics of disasters such as spring drought, summer flood, extreme cold in winter, sandy winds in the west and typhoons with unpredictable paths, monitoring and early warning, as well as risk control, should be strengthened. Besides, we should adjust the layout and technical standards of buildings and transport engineering according to the degree of climate warming in winter.

North China: We should implement the rigid constraint requirements of water resources, build a water-saving society, develop and utilize non-traditional water resources, promote comprehensive treatment of groundwater over-exploitation in North China, and improve the water ecological environment. We need to strengthen monitoring and extreme-weather and climate-event early warnings, improve emergency planning and response, and revise disaster prevention engineering standards, so as to improve the ability to prevent floods, drain waterlogging, and regulate and store water for drought resilience. By promoting water-saving irrigation and agricultural techniques, preventing and controlling the spread and invasion of pests, and constructing agricultural disaster reduction and adaptation technology system, we will build the Huanghuaihai Plain (North China Plain) into a high-yield and high-quality agricultural products base, the country's largest green food processing and manufacturing base, and a high-quality food-ration supply base. We should also strengthen the monitoring of the impact of climate change on human health to prevent and control the northward spread of vector-borne diseases, and improve community-emergency management mechanisms for public health emergencies. In pastoral areas, the balance between grasslands and livestock should be maintained, and grasslands fire prevention and rodent and pest control should be enhanced. We should also coordinate and promote key tasks such as the vegetation restoration in forests and grasslands and the comprehensive management of Beijing–Tianjin sandstorm sources, so as to build an ecological husbandry and tourism industry and a Great Green Wall ecological barrier.

East China: We should adhere to the scientific planning of the layout of city clusters,

improve infrastructure, increase the proportion of blue and green space, and build communities with climate adaptability as well as resilient and livable cities. We should also improve monitoring, early warning and emergency prevention capabilities against typhoons, waterlogging, heat waves, cold waves, tornadoes and storm surges, and promote mitigation of heatwave hazards by using water to regulate temperatures. To improve the ability to cope with rising sea levels and marine disasters, we need to raise coastal protection standards, control the overspread of artificial coastline, and prevent and control the offshore red tide, the erosion of sea water and the upward movement of salt tide. We should improve the level of protection of coastal wetlands and sea grass beds in the Yellow Sea and mangroves and coral reefs along the southeast coast by implementing nature-based solutions. We should also develop climate-smart agriculture, expand double-cropping rice moderately, and mitigate the wet damage of overwintering crops and heat damage to rice in summer. In addition, we need to improve the level of meteorological security for marine economic activities, transportation, tourism, etc.

Central China: In mountainous areas, water and soil conservation and water conservancy infrastructure construction should be strengthened to improve the joint dispatching capacity of water body and flood storage and detention areas; in plains, we should reinforce dikes, remove flood discharge barriers, and improve drainage and irrigation systems and emergency plans. We should adjust the heating and cooling standards of buildings and labor protection standards, implement three-dimensional greening in cities, and improve insulation, ventilation, and shade of residential buildings. Returning farmland to lakes to a moderate degree is encouraged, and wetland biodiversity should be protected. Moderate northward expansion of double-cropping rice and stereo planting of special forestry and fruit in mountainous areas are encouraged, so as to build the largest high-yield and high-quality base for grain, oil and fishery in southern China. The disease prevention and control system should be improved to prevent and control the northward spread of schistosomiasis and other vector-borne diseases. We should also strengthen the monitoring and early warning of climate-sensitive disease conditions in vulnerable populations and the prediction of weather comfort level to improve the health level of residents.

South China: We should strengthen the monitoring and early warning and risk assessment for meteorological and marine disasters and the construction of protection facilities to reduce the damage caused by typhoons, storm surges and red tides. We should protect the natural shoreline, mangroves, coral reefs, and marine biodiversity in the South China Sea by implementing nature-based solutions. An international-standard modern meteorological operation marked by technological innovation and top-quality management

in the Greater Bay Area that covers the whole South China region should be built. We should also monitor vector-borne diseases such as dengue fever and biological invasions, and strengthen the early warning of high temperatures and heatwaves and the meteorological service for the protection of vulnerable populations. Circular and efficient ecological agriculture and fishery models should be promoted, winter agricultural production expanded, and an international-standard seed industry base built. As for the control of soil erosion and stone desertification, both biological and engineering measures should be adopted. We also need to moderately expand tropical and subtropical economic forestry and fruit northward to revitalize the economy of mountain village areas. Cold-sheltering tourism and coastal and marine tourism should be developed.

Northwest China: The achievements of soil and water conservation on the Loess Plateau should be consolidated by promoting rainwater harvesting for supplementary irrigation, mulching and protective farming and improving water utilization efficiency to prevent soil dry layers. Adjusting crop varieties and sowing periods based on the warming climate and developing special forestry and fruit are encouraged. We should protect rare species in the Qinling–Bashan Mountains and the water conservation regions along the middle route of the South–to–North Water Diversion Project, and build a beautiful and livable countryside pleasant to business and tourism with beautiful mountains and clear water. We should promote agricultural water conservation and efficiency, industrial water conservation and emissions reduction, and urban-water conservation and loss reduction via overall planning. We should also construct valley reservoirs in arid areas in Gansu and Xinjiang, improve the water transfer and irrigation area project, promote Northwest China’s weather modification capacity, and develop and utilize basin-wide water resources through overall planning. Bases for grain and cotton and high-quality special agricultural products such as melons and fruits will be built in the region. The level of desertification prevention and management, as well as disaster monitoring and early-warning capabilities, should be improved, while development of sand industry is encouraged according to local conditions. The monitoring, early warning, and emergency management of disasters such as snowmelt floods, sandstorms, snowstorms, heatwaves, and glacial disasters (glacial surging, ice avalanches, meltwater, etc.) should be strengthened. We should also protect biodiversity and natural heritage, and develop heritage landscapes, and ecological and historical-ethnic cultural tourism.

Southwest China: We should strengthen management of nature reserves, establish buffer zones and limit the impact of human activities on them. In terms of the protection of endangered species, we should establish seed banks and gene banks, prevent and control biological invasions, and conduct relocation when necessary, so as to build a model for

high-level biodiversity conservation. Afforestation and deployment of forest-fire prevention in the dry seasons should be adjusted according to the rising forest line. We should restore vegetation in karst mountainous areas and comprehensively manage stone desertification. We should strengthen the protection of distinctive landscapes, natural heritage, history, culture and ethnic customs in climate-sensitive and ecologically fragile areas, and build the region into a world-renowned ecological and ethnic cultural tourism destination. We should also carry out agricultural climate zoning, develop high-efficiency stereo farming, and alleviate winter and spring droughts on the plateau mainly by small-scale projects such as rain collection and storage, and water-pumping and water-saving irrigation, so as to build the region into an advantageous production area for special cash crops. In terms of the improvement of urban and rural infrastructure, we should strengthen the climate feasibility demonstration of infrastructure and major engineering construction on the plateau and in the mountains and revise engineering standards.

The Qinghai–Tibet Plateau: We should comprehensively strengthen the monitoring of climate system and ecological environment conditions of the plateau. We should also strengthen the monitoring, early-warning and emergency response to the ecological, snow and ice, and geological disasters involving water sources. In view of the shallow and unstable permafrost and the frequent occurrence of multiple disasters, we should strengthen the assessment of climate risk and meteorological services, adjust layout and technical standards, so as to ensure safe operation of major projects and infrastructure. We should perfect the ecological protection system on the plateau, build ecological corridors, improve the habitats of rare animals, and protect biodiversity and the ecological and cultural heritage of the Tibetan people. We should strengthen the protection of alpine grasslands and assessment of climate-bearing capacity, and determine the number of livestock in accordance with the area of pastures. In response to the comprehensive management of desertification and grassland degradation, we should optimize the species composition of forests, and prevent and control forest fires and insect and rodent infestations. We should adjust crop and variety distribution, and moderately expand cultivation scale and irrigated areas in river-valley plains. We should also moderately develop ecological tourism and ethnic cultural tourism, and promote adaptation technology for climate-sensitive industries in order to broaden farmers' and herders' livelihoods, accelerate urbanization, and make the railway economic belt prosper.

Section 3 Improve Climate Adaptability in Significantly Strategic Regions

The Beijing–Tianjin–Hebei Region: The key contents such as water resources, climate-bearing capacity and environmental capacity should be further developed in

regional territorial planning; the population-load of the region should be properly allocated, and a new model of optimized development in densely-populated areas should be explored, thus helping the region take the lead in achieving smart-climate economic transformation. The strictest water resources management policy and the early-warning mechanisms for total water collection and consumption red line should be implemented; the resource utilization of rainwater in major cities in the region should be strengthened, and the seawater desalination industry should be promoted. It is necessary to coordinate the protection and management of ecological environments, connect the zoning and use-control requirements of territorial planning, and strictly implement the requirements of the “three lines and a list.” The monitoring and early warning for extreme weather and climate events should be enhanced, and the coordination and joint action for disaster prevention and reduction should be strengthened. The advantages of science, education, and culture resources of the region should be emphasized to lead national scientific research and technology research and development on climate change adaptation. International advanced livable city clusters featured by climate change adaptation in the region will be basically completed by 2035.

The Yangtze River Economic Belt: We should continue to improve the quality of ecological environment in the Yangtze River Basin by adhering to the principle of natural restoration and promoting, via overall planning, key ecosystem protection and restoration projects such as water system connectivity and returning farmland to forests and wetlands. We should also carry out basin-wide investigation and evaluation of water ecosystem integrity and strengthen the protection and restoration of aquatic biodiversity. To ensure the security of water resources, we should strengthen the unified management and allocation of water resources in the Yangtze River Basin, carry out in-depth joint scheduling of water projects, and enhance monitoring and early warning for ecological discharge protection of key rivers and lakes. To promote the realization of ecological value, appropriate mechanisms, policies and systems need to be established and improved. Relying on the golden waterway of the Yangtze River, we should improve the comprehensive three-dimensional transportation network by strengthening the coordinated development and organic connection of various transportation modes such as railway–waterway and river–sea combined transportation, enhancing the ability to support the smooth domestic and international dual circulation.

The Guangdong–Hong Kong–Macao Greater Bay Area: We should build an ecological corridor and biodiversity conservation network, enhance use-regulation of natural ecological space, and carry out cross-border joint protection of coastal wetlands. We should optimize the construction of public slow-moving systems such as urban

greenways and footpaths in forests and wetlands, and build a quality living circle with an environment that is pleasant to live in, do business and attractive to tourism. We should improve the disaster consultation, information exchange, and collaborative handling mechanisms between Guangdong, Hong Kong and Macao, with the focus on strengthening collaborative monitoring, early warning and emergency response to sea level rise, typhoons and marine disasters. We should also expand the capacity of the reservoirs in the upper reaches of the Pearl River to enhance the ability to suppress the mixing of salt water with fresh water during the dry season. In terms of strengthening real-time high temperature health monitoring, we should release high temperature early-warning information for the thresholds of different groups, strengthen monitoring and early warning for transmission risks of climate-sensitive diseases, and plan health actions. Urban green space in Guangdong, Hong Kong and Macao should be planned and scientifically deployed in a unified manner, so as to alleviate the heat-island effect by increasing urban wetlands, green spaces, and water bodies. Efforts should be made to improve an efficiently connected spatial network between major cities and create a dynamic world-class climate adaptive city cluster.

The strategic region for the integration of Yangtze River Delta: We should establish an innovative mechanism for ecological environment joint monitoring and joint law enforcement between governments, and implement actions such as horizontal ecological protection compensation and relocation of development projects in city clusters. We should strengthen the construction of marine protected areas in the Yangtze River Delta region, optimize the spatial layout of ecological functions, improve the quality of the ecological environment, and build Chongming Island into a world-class ecological island. To prevent sea level from rising and submerging and the upward movement of salt tide, we need to raise and reinforce the seawall engineering and construct the Huangpu River estuary tidal-barrier project. We also need to promote the implementation of joint actions such as regional risk-data sharing, forecasting and early warning, joint prevention and control and scientific research collaboration. A digital platform for climate change risk supervision and climate governance technology should be established, and the monitoring and emergency response platform for high temperatures and heatwaves, as well as climate sensitive diseases, should be improved. We should establish and improve emergency plans and supporting systems for dealing with extreme weather and climate events, enhance professional search, rescue and salvage capabilities, and perfect the joint emergency response and social response system. We should also establish a coordination mechanism in the region to give full play to the scaling-up effect, and lead the

transformation and development of a smart-climate economy and the construction of a climate adaptive society.

The Yellow River Basin: We should implement further water conservation and control actions in the Yellow River Basin in an all-round manner, and promote the intensive and economical use of water resources. We should accurately identify functions of ecological space, strengthen ecological recovery and management, and promote the integrated protection and systematic management of mountains, rivers, forests, farmlands, lakes, grasslands, and deserts in a coordinated way. A network-based comprehensive monitoring and evaluation and refined prediction of climate change across the river basin should be promoted to deepen inter-regional data sharing and technical cooperation and improve disaster early-warning capacities. Infrastructure such as public safety, health, disaster prevention and emergency management should also be improved with prevention as the focus backed up by management. To prevent climate-change induced poverty, efforts should be focused on ecological protection and conservation of water sources in the upper reaches of the Yellow River, and local industries should be developed, with the focus on ecological construction in key ecological function areas and less developed areas. We should build integrated basin-wide transportation networks, infrastructure, and a public service system, while promoting cross-regional coordinated development and cross-industry connection in an all-round manner.

Chapter VII Strategy Implementation

Adhering to the overall leadership of the CPC, we should improve guarantee mechanisms for strategy implementation, strengthen technology support, and promote international cooperation, so as to stimulate the vitality and creativity of various entities to the greatest extent and form a positive atmosphere for comprehensive adaptation.

Section 1 Strengthen Organization and Implementation

Reinforce organizational leadership. The Ministry of Ecology and Environment should take the lead in coordinating the implementation of strategy, researching and formulating guidelines for local climate-adaptation action plans, and coordinating and promoting relevant departments and local governments to strengthen climate-adaptation actions. All relevant departments should, according to the division of responsibilities, further refine the implementation measures, formulate climate adaptation action plans in their respective sectors, and implement them conscientiously. Ecology and environment departments (bureaus) of all provinces, autonomous regions, municipalities directly under the Central Government, and the Xinjiang Production and Construction Corps should take the lead in researching and preparing provincial-level climate adaptation action plans based on local conditions, and organize and implement them in conjunction with relevant departments.

Strengthen mechanism construction. We should establish and improve the relevant laws, regulations and systems for climate change adaptation. We should strengthen overall guidance and coordination, improve the coordinated working mechanism for climate change adaptation, forming a synergy of policies and actions for climate adaptation. We should explore to establish the national information-sharing mechanisms and platforms for climate change adaptation to promote the exchange and sharing of resources, information and data. We should also establish a mechanism for evaluating the effectiveness of adaptation: we need to regularly conduct evaluations of climate-adaptation policies and actions, adequately carry out task implementation and supervision and inspection, analyze implementation effects, and study and solve problems in a timely manner.

Promote pilot demonstration. By comprehensively considering factors such as climate type, regional characteristics, urban positioning and working foundations, we should adjust measures to local conditions, provide classified guidance, and further promote climate-adaptive city construction pilots. By 2035, the idea of climate change adaptation should be widely popularized in pilot cities, their capabilities of adaptation should be significantly improved, and their experience effectively promoted. We should

explore pilot-demonstration actions related to climate change adaptation in key vulnerable sectors and regions, and summarize and promote replicable experience and practices.

Section 2 Strengthen Fiscal and Financial Support

Improve fiscal and financial support policies. We should build a fiscal policy system that is conducive to addressing climate change. Through carbon emissions reduction-support tools, we should guide financial institutions to expand green funding. We should guide banks, securities, insurance, funds and other commercial financial institutions to invest in climate-adaptation projects. We should also accelerate the research and formulation of transition finance standards, and promote the financial system to respond systematically to climate-change goals.

Promote green financial market innovation. We should encourage the development of innovative products such as sustainability-linked bonds, catastrophe insurance and climate-risk insurance in key sectors, giving full play to the positive role of the financial market in providing funds for climate change adaptation. We should improve the mechanisms for supporting climate change adaptation by diversified funds to guide market resources such as venture capital funds, private equity investment funds, trust funds, etc. and strive for international funds and bilateral or multilateral cooperation loans and grants to invest in the field of climate change adaptation.

Construct climate investment and financing guarantee systems. We should carry out local pilot projects for climate investment and financing, establish a library of climate investment and financing projects, and promote innovation in climate investment and financing modes and mechanisms. We should give play to the role of the national industry and finance cooperation platform, and guide financial institutions to accurately meet the financing needs of enterprises. We should also build a guarantee system for adaptation investment and financing, establish climate-risk prevention and resolution mechanisms, and strengthen the statistics and information disclosure of climate adaptation data.

Section 3 Strengthen Technology Support

Strengthen basic scientific research. We should organize and carry out medium- and long-term climate-change scenario projection and pre-research to improve the quality of climate-change observation and reconstruction data, and accurately describe and simulate the key processes and trends of climate change. We should systematically carry out basic research on climate change adaptation, and strengthen study of major issues, such as climate-change monitoring and early warning, impact analysis and risk assessment, and vulnerability and adaptability assessment. We should also strengthen research on

standards related to climate change adaptation.

Accelerate technology R&D and promotion. We should strengthen R&D in key technologies for climate change adaptation, promote the integration and innovation of adaptation technologies, mature the core adaptation technologies, and build an adaptation technology system in various fields, industries, and regions. We should strengthen the construction of a platform for the transformation of technological achievements in climate change adaptation, select demonstration technologies for climate change adaptation, and promote the transformation and promotion of adaptation technologies. We should also carry out pre-research on adaptation technologies based on future long-term climate change scenarios to make necessary technical reserves.

Strengthen the allocation of scientific and technological resources. We should strengthen the collaborative sharing of scientific and technological resources for climate change adaptation in key industries and regions, improve the construction of scientific research infrastructure, as well as scientific and technological platforms, and strengthen long-term, stable and basic support of scientific and technological resources for climate change adaptation. We should also strengthen international and inter-regional scientific and technological exchanges on climate change adaptation, and promote experience learning and information sharing.

Section 4 Strengthen Capacity Building

Strengthen advocacy and education. We should carry out publicity activities on climate change adaptation in conjunction with important time nodes. We should compile a series of popular science education books on climate change adaptation, and promote climate change adaptation in schools through subject education, extracurricular activities, lectures and seminars. We should strengthen experience exchange and publicity of typical climate change adaptation cases. We should also innovate publicity methods and modes, popularize the idea of climate adaption, and guide green consumption and climate adaptive lifestyles, while strengthening publicity of China's climate change adaptation measures and achievements abroad.

Strengthen team building. We should strengthen the construction of grass-roots talent teams for climate change adaptation, building a team of cadres with firm ideological beliefs, professionalism, strict discipline, and excellent work style. We should establish a cross-field and multi-level adaptation expert bank, and carry out special professional help actions for adaptation. Regular knowledge and professional training on climate change adaptation should also be carried out to improve decision-making and implementation capacities for climate change adaptation.

Strengthen public participation. We should extensively mobilize enterprises, communities, associations and citizens to actively participate in climate change adaptation work, promoting the diversification of adaptation action subjects. We should also form a grid-based coordination mechanism for communities and enterprises, mobilize the power of all society and expanding volunteer teams, so as to create an atmosphere of broad participation by society as a whole.

Section 5 Deepen International Cooperation

Actively participate in the work of adaptation under the multilateral framework. We should fully engage in adaptation negotiations under the main channels such as the United Nations Framework Convention on Climate Change (UNFCCC) and the Paris Agreement, and properly coordinate international and domestic work. We should fully engage in the assessment process of the IPCC to improve China's scientific assessment capacity for climate change. We also need to improve rescue capabilities and actively participate in international humanitarian rescue operations for disasters caused by climate change. In addition, the cultivation and exchange of international talents to deal with climate change should be strengthened.

Expand opportunities for international cooperation on climate change adaptation. We should actively participate in international cooperation on adaptation, tell the PRC's story of climate change adaptation, and enhance the PRC's influence in the field of adaptation. We should also further expand the areas of cooperation with international institutions such as the Global Center on Adaptation (GCA) and the United Nations Environment Programme (UNEP), strengthen pragmatic cooperation with developed countries, multilateral financial institutions such as the World Bank, the Asian Development Bank, the Asian Infrastructure Investment Bank, and the New Development Bank, and performance fund mechanisms such as Green Climate Fund and Global Environment Facility, and reinforce the synergies with the performance of other international environmental conventions, so as to enhance climate adaptability.

Strengthen South–South cooperation on climate change adaptation. We should strengthen policy exchanges and mutual experience learning with relevant developing countries, and carry out exchanges and training on adaptation talents. We should strengthen South–South cooperation on climate change adaptation in sectors such as agricultural production, water resources management, disaster monitoring and early warning, and infrastructure construction, and within our reach, increase support for developing countries that are severely and adversely affected by climate change, such as the least developed countries, small island states and African countries.

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