United Nations Sustainable Transport Conference Beijing

Report on Sustainable Transport in China

China Academy of Transportation Sciences

NPCD?AC

The second United Nations Global Sustainable Transport Conference will be held in Beijing from October 14 to 16, 2021. Report on Sustainable Transport in China is intended to review China's progress in sustainable transport and share its practices.

Focusing on China's new development philosophy for innovative, coordinated, green, open, and shared development, this Report presents China's initiatives and activities focusing on the "5 Ps" that shape the 2030 Agenda for Sustainable Development – people, planet, prosperity, peace and partnership. It underscores China's commitment to implementing the 2030 Agenda, and introduces new ideas on sustainable development. This Report aims to make a useful contribution to this conference.

The Report consists of seven chapters. The ýrst provides an overall perspective on sustainable transport in China and outlines its general approach. The second to sixth chapters detail the progress China has made in sustainable transport and the results that have been achieved based on the ýve elements of China's new development philosophy, and the seventh chapter focuses on transport safety.

The chapters document in turn the coordinated development of integrated transport, innovation-driven transport development, transition to green and low-carbon transport, opening-up and exchanges & cooperation, transport shared by all and life-ýrst safe transport.

This Report would not be possible without the valuable advice and support of the Ministry of Transport, relevant government departments, local transport authorities, research institutes, enterprises and experts. We would like to express our warmest thanks for their contributions.

AMLRCLRQ

Chapter 1 Overview ····· 1

I. Sustainable Transport in China: History and Progress ····· 2
II. General Approach to Sustainable Transport in China ····· 11

Chapter 2 Coordinated and Integrated Transport Development ····· 15

I. Improving the Integrated Transport Infrastructure Network ····· 15
II. Improving Comprehensive Transport Services ····· 25
III. Serving Social and Economic Development ····· 30

Chapter 3 Innovation-Driven Development ····· 39

I. Creating a Supportive Environment for Innovation ····· 39
II. Enhancing Scientiýc and Technological Innovation in Transport ····· 41
III. Promoting Innovation in Law-Based Transport Governance ····· 54
IV. Improving the Business Environment for Transport ····· 58

Chapter 4 Towards Green and Low-Carbon Transport ····· 61

I. Energy Conservation, Emissions Reduction and Low-Carbon Development ····· 61
II. Intensive and Economical Use and Recycling of Transport Resources ····· 67
III. Eco-Environmental Protection and Restoration ····· 72
IV. Comprehensive Prevention and Control of Transport Pollution ····· 78

Chapter 5 Opening Up and International Cooperation on Transport ····· 83

I. Transport Connectivity via the Belt and Road Initiative ····· 83
II. International Exchanges and Cooperation on Transport ····· 90
III. Smooth International Logistics and Supply Chains ····· 93

Chapter 6 Distributing the Beneýts of Transport Improvements to All ····· 95

I. Serving a Moderately Prosperous Society in All Respects ····· 95
II. Prioritizing Urban Public Transport ····· 101
III. Diverse Travel Choices ····· 104
IV. Accessible Travel ····· 107

Chapter 7 Safe Transport That Puts Lives First ····· 111

I. Safe Transport ····· 111

II. A Stronger Transport Emergency Management System ·· 117
III. Battle Against Covid-19 ····· 123

Postscript ····· 129

Chapter 1
Overview

Transport has an important bearing on global sustainable development. Its role was ýrst conýrmed in Agenda 21 at the 1992 Earth Summit, and highlighted in the Plan of Implementation adopted at the 2002 World Summit on Sustainable Development in Johannesburg, South Africa. At the 2012 United Nations Conference on Sustainable Development, a consensus was reached among global leaders on the central role of transport in sustainable development.

To promote and support international cooperation on sustainable transport, the UN held the first Global Sustainable Transport Conference in Ashgabat, Turkmenistan in 2016, which emphasized the enabling power of sustainable transport and its roles in supporting the Sustainable Development Goals (SDGs) set by the 2030 Agenda.

Themed “Sustainable Transport, Sustainable Development”, the second Global Sustainable Transport Conference in 2021 will focus on poverty reduction and eradication, global cooperation and connectivity, and green, innovative and safe development, to expand consensus and further promote sustainable transport in countries and regions around the world.

Sustainable development has always been high on the government agenda in China. In 1996, China made sustainability a national strategy in all areas. It was one of the ýrst countries to introduce this concept into state policies. Since the 18th National Congress of the Communist Party of China (CPC) in 2012, under the guidance of Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era, China has made historic progress in transport and the industry has entered a period of high-quality development.

Following the new development philosophy and in service of the new development dynamic, China will address imbalances and inadequacies in the transport sector and steer this industry towards higher quality and efýciency and greater equity, sustainability and safety. It hopes to contribute ingenuity and strength to global sustainable development and to building a global community of shared future.

I. Sustainable Transport in China: History and Progress

Since the founding of the People's Republic of China (PRC) in 1949, and particularly since the beginning of reform and opening up in 1978, under the CPC's leadership, China has followed a strategy of coordinating the development of its transport industry with economic and social progress, and ensuring harmony between the transport system and the natural environment. Based on a self-reliant approach, China has made a great effort to create a transport industry that fully responds to public needs. Remarkable results have been achieved, and a once-backward transport industry with a weak base has been hugely improved.

In the new era, China will continue to pursue innovative, coordinated, green, open, and shared development in growing its transport industry and forming a modern transport system.

1. A history of sustainable transport in China

1949-1978: A transport network built from scratch

China had no proper transport facilities before 1949. When the People's Republic was founded, the government decided the basic infrastructure must be prepared for rebuilding the country's transport network. During the three-year economic recovery from 1949 to 1952, facilities were restored for water, land and air transport.

Systematic construction of transport facilities began in 1953. During the ýrst and second Five-year Plan periods and the economic adjustment period between 1953 and 1965, the state prioritized expenditures on building and renovating railways, highways, ports, and civil airports, with a focus on remote locations and western areas in need of transport infrastructure. The main waterways were dredged to enable them to resume operations, new domestic and international airlines and waterways were opened up, and the postal network was expanded with more vehicles in service.

From 1966 to 1976, transport facilities, vehicles and routes continued to expand in number, and port infrastructure was strengthened to respond to growing demand for capacity.

1978-2012: Supercharged growth

When reform and opening up introduced a new chapter of economic and social progress in China in 1978, it also heralded rapid development of the

transport sector. Greater policy support was directed to the transport sector, and the government took pioneering steps in opening up the transport market and exploring public financing channels. Transport was no longer a bottleneck slowing down the economy.

In 1984 the transport market was opened up, allowing access for all individuals, collectives and state-owned entities in all sectors and areas across the country. A contract responsibility system was applied in the railway industry. Highway and waterway projects began to invite tenders; road maintenance fees were raised, vehicle purchase surcharges were introduced, and highways were built on loans which were repaid with tolls. Ports were among the ýrst to open up internationally, construction fees were collected, and the shipping industry started to operate globally. Civil aviation began to follow a corporate model, and an air transport market took shape. Reform in postal management led to the founding of the China Postal Express and Logistics and the resumption of postal savings services. The government transport budget further increased and private capital was attracted to infrastructure projects.

In 1992 China set its reform goal of establishing a socialist market economy. The transport sector has since expanded reform accordingly to develop all means of transport.

From 1997, China's railways were upgraded six times for higher speed, and new lines were opened connecting Datong and Qinhuangdao, Beijing and Kowloon, and Qinghai and Tibet. A high-speed railway was built between Beijing and Shanghai. The construction of highways was boosted as China introduced proactive ýscal policies in response to the Asian ýnancial crisis in 1997 and the global ýnancial crisis in 2008.

In 2003 a new surge in expanding the rural road network took place as the Ministry of Transport promised access to asphalt and concrete roads for all rural residents. Reform was also carried out in the management of ports as more

ports were built. Civil airports began to collect construction fees, and infrastructure funds were set up for civil airports, railways, and inland waterways for transport. Postal services were separated from telecommunications and government functions were separated from corporate management at China Post, a state-owned enterprise. The postal industry thus began modernization by integrating the þows of information, capital, and logistics. Passenger transport, urban public transit, and transport emergency response were all strengthened.

In China, planning always comes first. A national highway network was delineated in 1981, and trunk lines and hubs were planned for highways, waterways and ports in 1992, complemented with a support system. Since 2002, China has implemented a series of plans and programs in the transport sector, including the Medium- and Long-Term Railway Network Plan, the National Expressway Network Plan, the National Rural Road Plan, the National Coastal Ports Layout, and the National Inland Waterways and Ports Layout. To support the national strategy to develop west China, the government introduced a series of plans and outlines to strengthen transport infrastructure in the western region. In 2007 the state laid out the goal of building a modern transport network in the Medium- and Long-Term Plan for a Comprehensive Transport Network.

Reform continued in transport management. In 1998, reform was carried out in water transport safety regulation, and monitoring sites were set up for every waterway and port. In 2008, the Ministry of Transport was reorganized. This was a substantive step towards establishing larger government departments, providing institutional support to form a comprehensive system of transport.

2012-2021: Quality development based on an extensive transport network

Since the 18th CPC National Congress in 2012, China has moved faster

in building a modern transport system, with well-balanced development of its railways, highways, waterways, civil aviation, and postal services. Guided by the new development philosophy, China has expanded supply-side structural reform of the transport sector, and improved transport infrastructure with increasing investment. Different modes of transport are coordinated to create a modern and integrated transport system that is safe, convenient, efficient, green, and cost-effective.

In regional development, transport has been planned in advance for key national strategies such as the coordinated development of the Beijing-Tianjin-Hebei Region, the development of the Yangtze River Economic Belt, the Guangdong-Hong Kong-Macao Greater Bay Area, the Yangtze River Delta and the Chengdu-Chongqing Economic Circle, and ecological conservation and high-quality development in the Yellow River Basin.

Beginning in 2014, efforts have been strengthened in the construction, management, maintenance and operation of roads in rural areas. Towns and administrative villages, where conditions permitted, had been provided with access to asphalt or concrete roads by 2019, and to bus services by 2020. This signifies that the goals of poverty eradication in the transport sector have been met.

A modern logistics service network has been established with reduced costs and increased efficiency, and advanced operating models such as multimodal transport, drop and pull transport, and non-truck operation have been developed.

The through transport of passengers has seen faster growth, with better passenger transport services in cities, between cities, and between urban and rural areas. New growth drivers of the transport industry have been boosted, new types of infrastructure have been built, and new forms of business such as online ride-hailing and bike-sharing services have flourished.

Active measures have been adopted to spur green development in transport infrastructure, equipment, and organization. Transport safety has also increased. Relevant systems and mechanisms have been improved for regulating the transport sector, with reforms to streamline administration, delegate power, improve regulation and upgrade services.

Further reform has been carried out in administrative law enforcement, and in delineating ýscal powers and the responsibilities for expenditure, giving an impetus to law-based governance of the transport sector.

Internationally, China has formed a comprehensive, multi-level and multi-channel framework of opening up and cooperation in transport. China has facilitated transport and infrastructure connectivity in cooperation with participants of the Belt and Road Initiative. It has contributed to global transport governance and fulýlled its international obligations.

To drive high-quality growth of its transport industry, China has launched a series of programs, including the National Highway Network Plan (2013-2030), the Medium- and Long-Term Plan for Developing the Logistics Industry (2014-2020), and the Plan for Developing a Modern and Integrated Transport Network in the 13th Five-Year Plan Period, and issued guidelines for the healthy development of railways, highways, shipping, civil aviation, and express delivery.

In 2017, the 19th CPC National Congress set the goal of building China into a country strong in transport. The CPC Central Committee and the State Council issued the Outline for Building China's Strength in Transport and the Outline on Developing Integrated National Transport Network respectively in 2019 and 2021. According the above documents, China will have basically built up its strength in transport by 2035, and turned into a country strong in transport with high public satisfaction levels and a reliable support system by the mid-21st century.

2. China's progress in sustainable transport

The growing transport infrastructure network supports the economy and society. An integrated transport network has formed, underpinned by 10 north-south and 10 east-west main corridors that traverses the whole country and connects it to the world.

China now leads the world in terms of the route length of its high-speed railways, expressways, navigable inland waterways, and urban rail transit lines, the number of certiýed civil airports and coastal berths of 10,000-tonne-class or above, and the network length of postal and express delivery services. High-speed railways cover 95 percent of cities with a population of one million and above, expressways connect 98 percent of cities with a population of 200,000 and above, and civil airports reach 92 percent of prefecture-level cities.

As the distribution of transport hubs becomes more balanced and various means of transport are better connected, China has entered a new stage of integrated, coordinated development of its transport sector. Economic belts and city clusters are thriving along the transport corridors between Beijing and Shanghai, between Beijing and Guangdong, along the Yangtze River and the coastlines, and near the ports in the Yangtze River Delta and Pearl River Delta and along the Bohai Sea Rim. They are becoming the most economically dynamic and populous areas in the country.

Better transport services benefit public wellbeing. China has one of the world's busiest transport networks. Its passenger and cargo turnover by rail, highway, waterway and air, its port cargo throughput, and its postal and express deliveries are among the world's highest.

Passengers now enjoy more convenient and comfortable trips and professional, personalized services on their way. Public transit services are expanding at all levels to meet different needs. With more efýcient freight services operating in diverse forms such as multimodal transport, the transport industry now plays a bigger role in supporting economic and social development in China.

Transport services are also becoming smarter, as 5G, big data, artiýcial intelligence and other new technologies are applied more widely. New forms of business þourish in the transport industry, providing tailored services for the public.

Green transport contributes to the harmony between humanity and nature. China upholds green development and implements this principle in transport. The transport modal shift has seen further progress, and the intensive and efýcient use of transport routes, hubs, equipment and other resources has produced solid results.

Green technologies have been applied in model projects involving railways, highways, ports, waterways, postal services, and aviation projects aimed at saving energy and cutting emissions. More vehicles now run on new and clean energy. The per unit energy consumption in operating railways, vehicles, vessels, and airplanes has continued to fall.

China uses the strictest systems and laws to control environmental pollution from transport. It has achieved solid results in controlling pollution from vessels and ports in the Yangtze River Economic Belt, launched the Blue Sea Action Plan, and continued to introduce green packaging in postal and express delivery services. New technologies have been applied for greater environmental friendliness in restoring the eco-environment damaged by transport infrastructure in deserts, alpine areas, and coastal reclamation areas. Green transport is lending strong support to improving the eco-environment and ad-

vancing the Beautiful China initiative.

Growing transport safety and emergency response increases the public's sense of security. Safe transport has always been a top priority in China, where growth is pursued subject to safety being guaranteed. Transport safety has improved markedly in China, evidenced in its world-leading safety levels in railway and civil aviation passenger services. With greater workplace safety along highways and waterways, the incidence of major accidents has been effectively curbed and the total number of accidents has fallen by a large margin. The public now enjoy safer, better, and more reliable transport services. The transport sector's emergency response capacity has improved. Effective measures have been taken to tackle Covid-19 and other public health emergencies, and major risks that jeopardize transport safety have been defused in a timely manner. Disasters and accidents have been addressed with targeted measures, and the capacity of maritime rescue and emergency response to major offshore oil spills has been strengthened. Safe transport supports socio-economic growth and ensures safe travel for the public.

Closer international exchanges and cooperation on transport facilitate the global community of shared future. As transport infrastructure becomes more connected between countries, transport now plays a primary and leading role in promoting global connectivity and common prosperity. China is building closer connections in transport infrastructure with the participants of the Belt and Road Initiative, and a connectivity framework consisting of six corridors, six routes and multiple countries and ports has taken shape, promoting the orderly þow and optimized allocation of cross-regional resources. While facilitating international transport, China also promotes the coordination of policies, rules and standards, so that BRI participants can enjoy closer cooperation, more convenient exchanges, and more shared interests. Through broad and in-depth exchanges and cooperation, China has broken new ground

in mutually beneýcial market-based cooperation, experience-sharing and mutual learning. It actively promotes the evolution of the global transport governance system, ýrmly supports multilateralism, takes an active part in international organizations and global climate governance, and contributes China's vision and approach to global transport governance.

II. General Approach to Sustainable Transport in China

The guiding principles for China to develop sustainable transport are Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era, the decisions made at the 19th CPC National Congress and the second to fifth plenary sessions of the 19th CPC Central Committee, the Five-sphere Integrated Plan, the Four-pronged Comprehensive Strategy, the new development philosophy, and the underlying principle of pursuing progress while ensuring stability. To drive quality development in the new era and to forge a new development dynamic, China will continue to focus on supply-side reform and meet the people's growing needs for a better life. Drawing strength from reform and innovation, it will balance growth and safety and emphasize efýciency. The goal is to build a modern and integrated transport system that is safe, convenient, efýcient, green, and cost-effective, equipped with world-class facilities and technology, driven by top quality management, providing the best possible services.

By 2035, China will have built up significant strength in transport. A modern and integrated transport system will be in place, guaranteeing public satisfaction and supporting national modernization. Equipped with an ad-

vanced express network, sound trunk network, and extensive basic network, the system will raise the coordinated transport development in urban and rural areas to a new level. The National 1-2-3 Travel Circle (one hour to commute in cities, two hours to travel within city clusters, and three hours to travel between major domestic cities) and the Global 1-2-3 Logistics Circle (one day to deliver within China, two days to deliver to neighboring countries, and three days to deliver to major global cities) will be in place, providing convenient combined transport of passengers, and economical and efýcient multimodal transport of goods. China will make further progress in developing intelligent, safe, green and shared transport, easing urban trafýc congestion, and creating a barrier-free travel system. It will establish a sci-tech innovation system for transport, develop advanced and safe key equipment, train high-caliber professionals, and create a sound market environment, achieving the basic modernization of its transport governance. It will be competitive and inþuential in the international transport arena. Overall, China will make all-round progress in transport to meet the people's growing expectation for a better life and provide a strong boost to basic socialist modernization.

By the mid-21st century, China will have built globally strong transport sector that provides strong support and responds to the public needs. Its position will be manifested in the scale and quality of its transport infrastructure, its technology and equipment, its ability to innovate, and its potential for smart and green growth. It will lead in terms of safety, governance, competitiveness, and inþuence. Transport will serve the goal of building China into a strong, modern socialist country, and the people will enjoy better transport services.

The National 1-2-3 Travel Circle and the Global 1-2-3 Logistics Circle

Public satisfaction is the goal of sustainable transport. Committed to people-centered development, China relies on the people to develop the transport sector and meet public needs. Progress in transport is enjoyed by all, and quality, tailored transport services are supplied to increase the public's sense of gain, happiness and security.

Sustainable transport plays a leading role in national planning. China is moving faster to build an integrated and multidimensional transport network, and always plans its transport infrastructure in advance. When implementing major plans and strategies such as regional coordinated development, new urbanization, and rural rejuvenation, China always strengthens weaker links in transport and promotes integrated transport in city clusters, metropolitan circles, and between urban and rural areas, for greater efýciency and coordinated regional growth.

Sustainable transport is guided by the new development philosophy.

Under the guidance of the new development philosophy, China is focusing on supply-side structural reform. It is shoring up the weaker links in infrastructure to form a high-quality rapid transit network, an efficient regular artery network, and an extensive network of basic services. It is reducing the structural, institutional, technical, administrative, and service costs of transport, and helping the logistics industry to reduce costs and increase efýciency. It is promoting law-based governance of the country, further streamlining administration and delegating powers, providing better services to the transport industry, and improving the business environment. By promoting healthy new business models, China is boosting the growth drivers of transport.

Sustainable transport is driven by reform and opening up. China is persevering with its reform to build the socialist market economy, and creating stronger synergy between a well-functioning market and an enabling government. It is extending reform of the transport sector and forming a uniýed, open transport market with orderly competition, so as to unleash the productive potential of the transport industry. With further opening up, China will build a globally-oriented and well-connected transport network, seeking closer and broader cooperation with other countries on transport, and facilitating the connectivity of transport rules, technologies and standards.

Sustainable transport is supported by innovation. With technological innovation as the driver, China promotes innovation in management, institutions, culture, and the business environment, and optimizes its human resources in support of the transport industry. Big data, artiýcial intelligence and other new technologies are being integrated with the transport industry to make it smarter, and trigger innovation in its models, forms, products and services. New technologies are being applied to transport infrastructure, equipment and organization, and digital, internet-based, intelligent and green technologies are making transport more sustainable.

Chapter 2
Coordinated and Integrated Transport Development

To form a modern integrated transport system represents a major part of China's efforts to pursue sustainable transport, China is promoting the integration of multiple means of transport. Through two rounds of reform of government institutions in 2008 and 2013, China has established a transport administrative structure composed of larger departments. The Ministry of Transport is in charge of the overall planning of railways, highways, waterways, civil aviation and postal services, providing strong institutional support for an integrated transport network.

I. Improving the Integrated Transport Infrastructure Network

China has a vast territory, a huge population, and an extremely imbalanced distribution of resources and labor. Therefore, to achieve sustainable

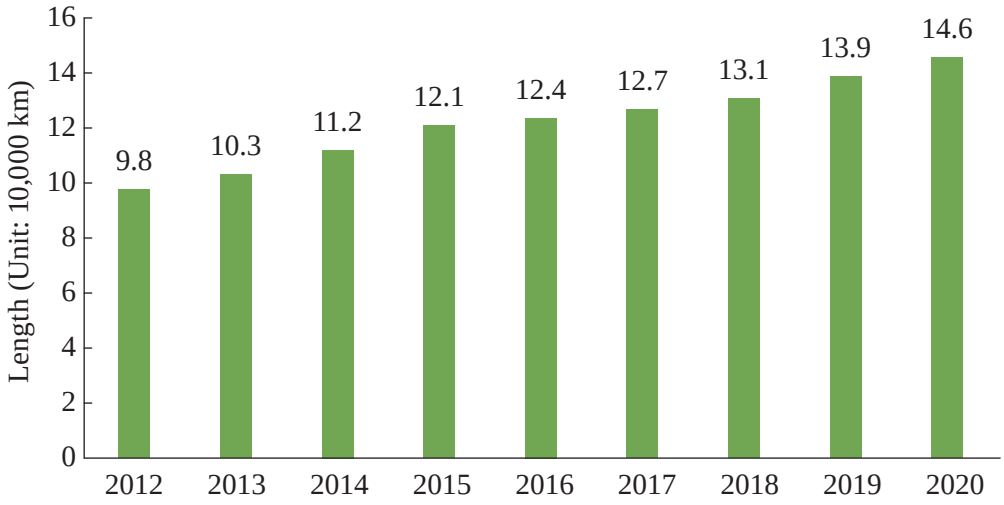
development, China must build an integrated multidimensional and interconnected transport infrastructure network serving social and economic development. To this end, infrastructure construction has been strengthened and the network has expanded in scale and risen in quality.

1. Building a complete, integrated and multidimensional national transport network

To coordinate and integrate transport development, China is addressing shortcomings, improving interconnectivity, optimizing the network coverage, and boosting operational efýciency. It will improve the infrastructure network covering railway, highway, waterway, civil aviation, postal services and express delivery, and form an integrated, multidimensional transport network underpinned by trunk railways and highways and supported by waterway and civil air routes.

The railway network is extending its reach. China has accelerated the construction of high-speed rail. The network is growing ahead of schedule, now consisting of four vertical lines (Beijing-Shanghai, Beijing-Hong Kong, Beijing-Harbin, and Hangzhou-Fuzhou-Shenzhen) and four horizontal lines (Shanghai-Wuhan-Chengdu, Xuzhou-Lanzhou, Shanghai-Kunming, and Qingdao-Taiyuan). The standard railway network is being steadily optimized. The layout and construction of the national railway network has been substantially improved.

By the end of 2020, China had a total of 146,000 km of rail in operation, of which high-speed lines represented 38,000 km, accounting for two thirds of the world's total.



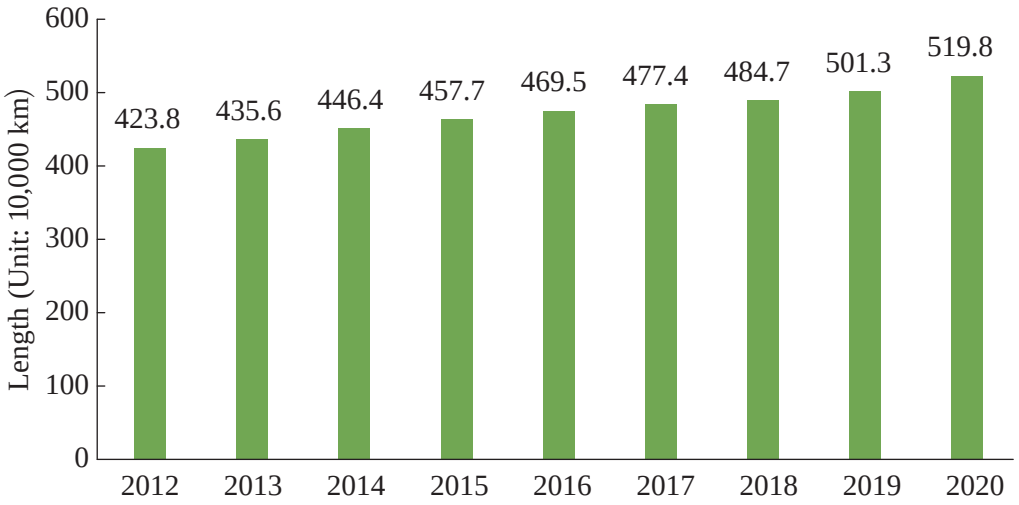
China's Total Railway Length in Operation 2012-2020

A Fuxing EMU train

The highway network has reached all parts of the country. China has accelerated work on its expressway network, completing national expressways, expanding trafýc capacity for busy and crowded sections, and upgrading national and provincial trunk highways. A rural highway network with counties as centers,

towns and townships as junctions, and villages as terminals, has taken shape.

By the end of 2020, China had a total of 5.2 million km of highways, of which expressways represented 161,000 km. A national highway network radiating in all directions has been completed: national and provincial trunk highways have connected all administrative units above the county level; rural highways have reached all villages, towns and administrative villages where practicable.

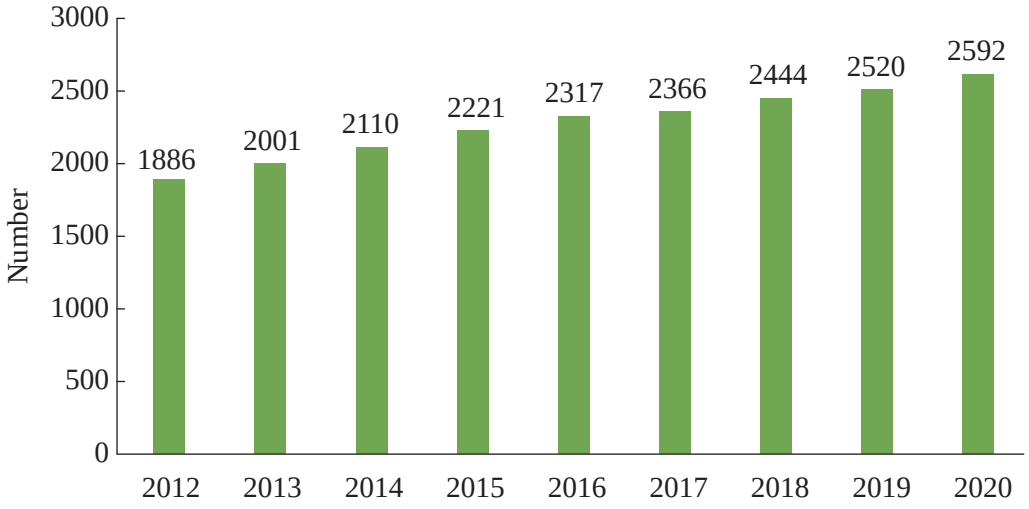


China's Total Highway Length 2012-2020

Beipanjiang Bridge on the Guizhou-Yunnan border

The waterway network has expanded. China has improved the conýguration of ports and integrated port resources to create a well-deýned and balanced waterway network. The construction of deep-water channels has achieved substantial progress; the role of the Yangtze River as the "golden waterway" has been expanded; shipping capacity has been increased and upgraded; both coastal and inland docks are offering more professional services.

By the end of 2020, China had 22,000 operative berths, including 2,592 berths of 10,000-tonne-class and above, accounting for 11.7 percent of the total. There were 128,000 km of navigable inland waterways, completing a national waterway network linking rivers and seas, trunk rivers and tributaries.



China's Berths of 10,000-Tonne-Class and Above 2012-2020

Beijing-Hangzhou Grand Canal and its logistics docks

The civil airport network has been improved. China has further improved the network of civil airports by enhancing the functions of key regional airports, and by building, relocating, expanding and renovating a number of airports on busy main þight routes. Modern airports such as Beijing Daxing International Airport are now complete and operational; construction work has started on Ezhou Huahu Airport in Hubei Province, Chinaôs ýrst freight airport. By the end of 2020, China had 241 certiýed civil airports and a total of 237,000 km of air routes and lines.

Beijing Daxing International Airport

The postal service network has been expanded. Every township has a post ofýce and every village is reachable by post. Express delivery is accessible in almost all towns and townships, and its network is expanding to an increasing number of countries and regions. A modern postal and express delivery network, covering urban and rural areas nationwide and connecting China with the rest of the world, is in place. By the end of 2020, China had 349,000 postal outlets, 224,000 express delivery outlets, and the total network length of postal and express delivery services approximated 52.8 million km.

A China Postal Airlines cargo plane

According to the Outline on Developing Integrated National Transport Network, China will complete a national comprehensive and multidimensional transport network by 2035, featuring modern and high-quality services, smooth and convenient trafýc, efýcient and economical operation, and safe, smart, green and energy-intensive transport. The aims are: internationally, to improve trafýc interconnectivity between China and the world; domestically, to ensure efýcient and comprehensive transit between major cities and transport accessibility for county-level junctions.

In accordance with this plan, China will build a national transport network composed of six axes, seven corridors, and eight trunk lines, with a total route length of about 700,000 km (excluding the overseas sections of international land routes as well as air routes, sea routes, and postal routes). There will be 200,000 km of railways, 460,000 km of highways, 25,000 km of high-grade waterways, 27 key coastal ports, 36 key inland ports, 400 civil airports, and 80 postal and express delivery hubs.

2. Building a national multi-tiered and integrated system of transport hubs

China prioritizes the construction of comprehensive transport hubs that provide multi-tiered, integrated services. Comprehensive transport hubs have been built in cities at international, national and regional levels, with Beijing, Shanghai and Guangzhou serving as international hubs; international and national transport hub cities have been able to serve wider areas.

The Ministry of Transport supported the creation of a group of comprehensive transport hubs to realize convenient passenger transfer and efýcient multimodal freight transport, and is now improving their layouts.

- The interconnectivity between comprehensive passenger terminals has been greatly improved; 80 percent of new passenger terminals have reduced the passenger transfer distance to less than 200 m; 68 percent of airline hubs are seamlessly connected to rail transit.
- The layout of freight hubs has been improved; the construction and renovation of railway logistics bases, port logistics hubs, air transshipment centers, express delivery logistics parks have been accelerated; freight services have been upgraded at ports, generating agglomeration effects and increasing logistics efýciency.

Transport hubs have been integrated locally to form a number of urban complexes, airport economic zones and port economic zones.

Shanghai Hongqiao Comprehensive Transport Hub

According to the Outline on Developing Integrated National Transport Network, China will build:

- a national comprehensive transport hub network integrating transport hub clusters, cities, and key ports and terminals;
- four international comprehensive transport hub clusters in the Beijing-Tianjin-Hebei Region, the Yangtze River Delta, the Guangdong-Hong Kong-Macao Greater Bay Area, and the Chengdu-Chongqing Economic Circle;
- 20 international transport hub cities and 80 national transport hub cities, and a group of key national and international ports and terminals.

II. Improving Comprehensive Transport Services

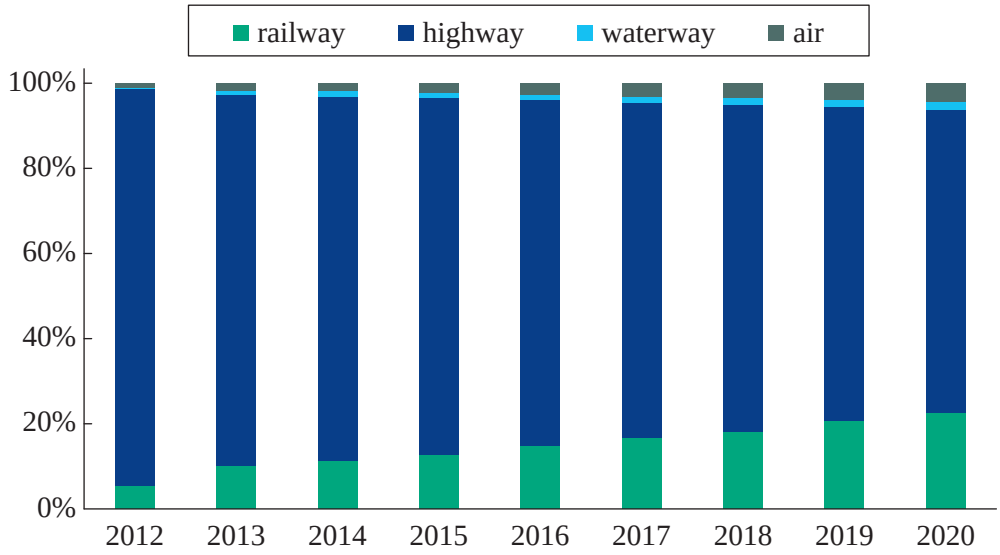
China is creating an efýcient, high-quality modern transport network that provides better services in diverse forms, geared to improving public satisfaction.

1. Promoting efficient and convenient transport services

China is building an interregional system for fast passenger transit, which has a large capacity and high efýciency, with high-speed rail and air services at the core.

In 2020, 22.8 percent of passengers traveled by railway, 71.3 percent by highway, 1.6 percent by waterway, and 4.3 percent by air.

- EMU trains have become the major means of railway passenger transport, carrying about 70 percent of the total number of passengers, with over 80 percent of the tickets sold online.
- The on-time arrival rate for þights has exceeded 80 percent for the past three years.
- Highway passenger transport has been upgraded, with an integrated urban-rural system prioritizing bus services.



Proportions of Passengers Traveling by Various Means of Transport 2012-2020

China encourages stronger integration between various means of transport, developing intermodal transport such as highway-railway, air-railway, highway-air, and air-sea services. China is improving combined transport of passengers through one-stop ticket booking, and by creating new services such as shuttle buses to high-speed rail stations, offsite airport terminals, and luggage through-check. Hangzhou Xiaoshan International Airport and Shenzhen Bao'an International Airport have enabled luggage through-check from offsite terminals by intermodal air-highway transport. China has improved the digital management of passenger information, and established information service platforms at comprehensive passenger terminals to better serve combined transport of passengers.

2. Building a green and efýcient modern logistics system

China is improving the efficiency and modal split of freight transport, shifting more bulk cargo from highways to rail and waterways, in order to

pursue green and high-quality development.

- From 2016 to 2020, the railway freight transport volume increased from 3.33 billion to 4.55 billion tonnes, rising from 7.6 percent to 9.8 percent of total freight volume. Waterway freight transport volume rose from 6.38 billion to 7.62 billion tonnes, up from 14.5 percent to 14.8 percent of total freight volume. Railway and waterway play a key role in long-distance bulk freighting.
- By the end of 2020, the coal terminals at key ports along the Bohai Sea Rim, and in Shandong Province and the Yangtze River Delta, had completely shifted their coal freighting to railway or waterway; evacuation of ore containers from ports by railway, waterway and belt conveyor accounted for 61.3 percent of the total, up by 20 percent from 2017.

China has built an efýcient freight transport network, and is working on developing express delivery by rail and by air, promoting large-scale and intensive road freighting, optimizing the rural logistics network, and improving urban delivery services.

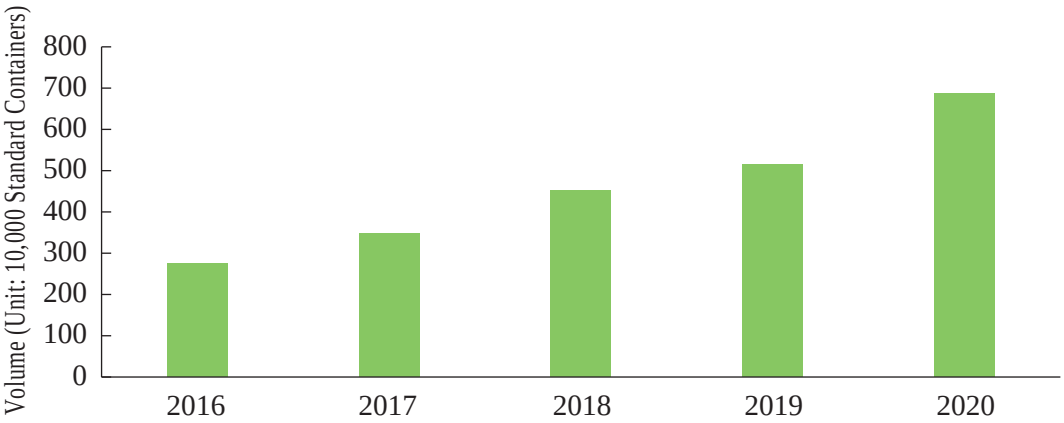
- China is developing efýcient logistics featuring Internet Plus models; nearly 1,300 road freight companies operating online are exploring new business models such as urban-rural delivery, multimodal transport, integration of transportation routes, drop-and-pull transport, and cold-chain logistics. The owners of about three million freight vehicles have found a way to orders through these companies.
- China is developing specialized logistics to serve e-commerce and cold-chain businesses and move heavy and hazardous cargo.
- China has expanded the capacity and digital transformation of express delivery, giving stronger support to new business forms and models such as supply chain service, cold-chain delivery, and instant delivery.

Meishan Terminal at Zhoushan Port, Ningbo City, Zhejiang Province

Multimodal transport is an important means for reducing costs and increasing efficiency in the logistics industry and for pursuing sustainable development of transport. Efficient transport links have been created, such as rail-highway, air-rail, rail-waterway and river-sea transport, ship-to-ship transfer, and roll-on/roll-off shipping.

- The Notice of the Ministry of Transport and Other 17 Departments Under the Central Government on Further Developing Multimodal Transport was issued, which improved the top-level design of multimodal transport.
- China has launched 70 multimodal transport demonstration projects in 28 provinces, seeking breakthroughs in infrastructure construction, combined transport models, R&D of technology and equipment, and information interconnectivity. These projects have opened 390 transport routes, and completed multimodal transport of 14 million TEU.

- Container rail-waterway freighting increased to 6.8 million TEU in 2020, an annual average growth of 23 percent between 2016 and 2020.



China's Container Rail-Waterway Transport Volumes 2016-2020

3. Creating new Internet Plus business models

Internet Plus Transport is changing how people travel.

- Online car-hailing services cover 300 cities, with 20 million trips each day.
- Online bike rentals are available in 360 cities, with 19.45 million bikes in service and 45.7 million daily hires.
- There are over 50 hourly car-rental companies, with 200,000 vehicles in service.

To encourage the sound development of new business models, the Ministry of Transport has issued a succession of regulations and policies, including the Interim Measures for the Management of Online Car-Hailing Services, Measures for the Management of Passenger Car Rental Services, Guidelines on Promoting the Sound Development of Passenger Car Rental Services, and

the Guidelines on Encouraging and Regulating Online Bike Rental Services, pointing out the position, direction and goals for these new businesses.

China is promoting smart transport services through the Mobility as a Service (MaaS) model. Pilot projects have been launched in Beijing, Guangzhou and Shenzhen, focusing on urban public transport, taxi services, and shared rides, to fully integrate data resource management, vehicle operations and dispatch, transport revenue clearing, aggregated payments, information services, and supervision of business operations.

- Beijing has established an integrated service platform for green transport, to provide smart, multimodal transport services.
- Guangzhou has piloted a one-stop transport service system, integrating the public transport network with online shopping and consumer services, via an integrated payment platform.
- Shenzhen has launched a MaaS project at Shenzhen Bay Eco-tech Park. The mini program, SOGO, enables passengers to plan efficient commuting routes, choose combined bus/subway services, and confirm boarding time and location in advance.

III. Serving Social and Economic Development

China is leveraging the strengths of transport to advance social and economic progress, serving coordinated development between regions and balanced development between urban and rural areas.

1. Fueling economic growth

China is increasing investment in transport infrastructure as an important means of counter-cyclical regulation to achieve steady economic growth. The national transport network has become more efýcient and convenient, which in turn accelerates the circulation of factors of production, optimizes the industrial structure, boosts manufacturing, logistics and tourism, facilitates population movement, and increases employment.

China is integrating transport and tourism. New types of tourism are growing, such as scenic train rides, road trips, river cruises, RV campgrounds, yacht cruises, and low-altitude þight. Transport infrastructure, including passenger terminals and expressway service areas, has been improved to better serve tourism. Customized travel services that integrate tourism and transport services have improved travel quality.

- Construction of scenic highways is advancing. Key tourist cities such as Guiyang in Guizhou Province, Guilin in Guangxi Zhuang Autonomous Region, and Huangshan in Anhui Province, are now served by high-speed rail. Shangri-La and Tengchong in Yunnan Province, and Changbaishan in Jilin Province, have airports to serve tourism.
- Highway access to rural scenic sites has been improved signiýcantly, with passenger lines reaching almost all AAAA and AAAAA scenic spots; bus routes cover all key urban scenic spots.

Shenyang-Dalian Expressway Encourages Industrial Clusters Along the Route

The Shenyang-Dalian Expressway was the ýrst expressway built in China. Work started in June 1984, and the road was completed and opened to trafýc on September 1, 1990. It is 375 km long, connecting Shenyang, Liaoyang, Anshan, Yingkou and Dalian ï ýve major industrial cities in Liaoning Province. It is an economic artery of Liaoning and a major access to the sea in Northeast China. A cluster of industries, such as equipment manufacturing, petrochemical engineering, shipbuilding, high and new technology, and steel manufacturing, have thrived along the route and formed the Shenyang-Liaoyang-Anshan-Yingkou-Dalian Expressway Economic Belt. The economic belt has been a powerful engine for Liaoning's economic growth, generating 70 percent of the province's total GDP.

Shenyang-Dalian Expressway

The Scenic Highway in Chishui River Valley

The Scenic Highway in Chishui River Valley is located in Guizhou Province. It extends from Maotai Town of Renhuai City, via Tucheng Town of Xishui County, to Chishui City. It comprises 160 km of red-surfaced mountain biking trails and 154 km of black-surfaced roads, with a designed speed limit of 40 km/h. The entire route has 12 road stations, 26 campsites, and 23 observation decks. The highway has attracted a large number of tourists and investment, and stimulated industrial development along the route.

The scenic highway in Chishui River Valley, Zunyi City, Guizhou Province

2. Coordinated development between regions

In accordance with the regional development strategy, China has been improving regional transport networks to support coordinated development between regions.

- Transport shortcomings in the western region have been overcome. Currently, provincial capitals are accessible by high-speed rail; prefectural-level cities are accessible by expressways and standard rail; counties where conditions permit are connected to highways of Grade II and above; towns and administrative villages where conditions permit are served by asphalt and concrete roads.
- Transport infrastructure in the northeastern region has been improved, and it is now better connected to the national road network.
- Major transport corridors and hubs have been strengthened in the central region. Its function as a comprehensive transport hub connecting the north and the south, the west and the east has been reinforced.
- The eastern region has focused on high-quality integrated transport, improving transport structure, and taking the lead in building a modern integrated transport system.

Shanghai-Chongqing Expressway

Transport plays a key role in supporting and steering the implementation of major national strategies.

- China is integrating transport services in the Beijing-Tianjin-Hebei Region, with the goal of building a multi-junction transport matrix for world-class city clusters with Beijing at the core. With rail transit as a priority, the transport network will shorten the travel time in the core area of the region to less than an hour. An integrated transport system in the Xiong'an New Area is under construction.
- A multimodal transport corridor is in progress along the Yangtze River Economic Belt including expressways, railways and inland waterways, to ensure smooth transport between waterways, between waterway junctions, and between rivers and seas.
- International comprehensive transport hub clusters are being built in the Guangdong-Hong Kong-Macao Greater Bay Area, including airport clusters, port clusters, expressways, national and provincial highways, high-speed railways, and intercity railways, to realize one-hour commuting in the area.
- Transport is being integrated in the Yangtze River Delta. A multi-tiered and well-connected transport network, with Shanghai, Nanjing, Hangzhou, Hefei, Suzhou, Wuxi, Changzhou and Ningbo as the junctions, has been completed, to allow 1.5-hour fast travel between major cities.
- China is coordinating eco-protection and high-quality transport development in the Yellow River Basin, focusing on optimizing the spatial layout of transport infrastructure.
- A multi-directional transport network in the Chengdu-Chongqing Economic Circle is complete, consisting of trunk railways, expressways, and the Yangtze River golden waterway. An international civil aviation hub has taken shape. One-hour travel between the two cities has been realized.
- China has built a multi-junction, province-wide transport matrix of

railways, intercity rails and trunk highways in Hainan Province, to give full support to the development of the Hainan Free Trade Port.

Beijing-Xiong'an Expressway

3. Serving balanced development between urban and rural areas

China highlights the role of transport in serving the coordinated development of urban and rural areas and revitalizing the countryside by addressing rural transport weaknesses in infrastructure and services.

- In 2016, the Ministry of Transport, along with other departments under the central government, issued the Guidelines on Promoting Urban-Rural Transport Integration and Improving Basic Public Services, to integrate transport infrastructure, passenger services, and freight logistics ser-

vices between urban and rural areas.

- China has launched pilot projects for urban-rural transport integration in 52 counties and equivalent administrative units, such as Countywide Bus Transit in Shucheng, Anhui Province, Internet Plus Rural Cooperatives in Pingding, Shanxi Province, and Transport-postal Service Integration in Muling, Heilongjiang Province. These have provided successful models for urban-rural transport integration and economic integration in other parts of the country.

In recent years, the structure of China's urban-rural road network has improved signiýcantly. By the end of 2020, all towns and administrative villages where conditions permitted were served by asphalt and concrete roads; bus parks and terminals had been established throughout urban and rural areas; and a functional and effective three-tiered rural logistics network at county, township and village levels had been completed.

- Rural areas have been provided with much better passenger services: all towns and administrative villages where conditions permit have access to bus services; urban bus routes have extended to surrounding towns and townships; rural passenger transport routes have been reconýgured into regular bus rides for rural residents, who now enjoy passenger services as urban dwellers do.
- A rural logistics system has been established to provide a wider range of services, including passenger transport, freight transport, postal services and express delivery. Goods sent by post and express delivery services are also brought to rural residents by passenger cars and buses operating in these areas. There is additional rural logistics capacity to deliver farm produce from villages to cities, and daily necessities from cities to villages.

Rural highways in Cangxi County, Sichuan Province

A comprehensive transport service station in Shucheng County, Anhui Province

Chapter 3
Innovation-Driven Development

China attaches great importance to innovation as a driver of new advances in transport. It has worked hard to boost the contribution of scientiýc and technological innovation, encourage innovative, law-abiding management, improve the business environment, and enhance the capacity for sustainable development.

I. Creating a Supportive Environment for Innovation

In recent years, China has made constant efforts to improve relevant policies and systems, develop a contingent of competent professionals, conýgure research platforms, and support technological advances, in order to strengthen its capacity for innovation in transport.

1. Improving policies and systems

China pays close attention to improving policies and systems for innovation in transport. In formulating ýve-year plans, it has made a constant effort to encourage scientiýc and technological development, and guided the allocation of sci-tech resources, so as to promote progress and innovation in this ýeld. It has actively implemented innovation-related reform policies for transport, and worked to establish a leading innovation system to meet the needs of modern transport. It has introduced the Interim Measures of the Ministry of Transport to Promote the Transformation of Scientiýc and Technological Achievements as encouragement and support.

2. Developing a competent workforce

China firmly believes that competent professionals are the primary asset for transport, and has accelerated its efforts to build a quality workforce through the following measures:

- Training technical professionals through research and key engineering projects;
- Gathering professionals at key laboratories and R&D centers;
- Cultivating professionals through industry plans for young sci-tech elites and for creative talent;
- Optimizing the deployment of professionals by use of market mechanisms and by encouraging employers to establish sound mechanisms for supporting leading professionals and teams in innovation.

These efforts have led to signiýcant improvement in the number, composition, and quality of the reserve of professional talent.

3. Conýguration of research platforms

China highlights the importance of innovative sci-tech bases for transport issues such as infrastructure construction and maintenance, transport equipment, and green/low-carbon development. To this end, it has set up three types of bases – on applied basic research, on technological innovation and conversion of results, and on infrastructure and other support facilities.

By the end of 2020, China had, in the ýeld of transport, 22 national key laboratories, 28 national engineering and technological research centers, 24 national engineering laboratories, 8 national engineering research centers, and 3 national ýeld scientiýc observation and research stations. It had also set up 254 ministerial-level scientiýc and technological innovation bases.

II. Enhancing Scientiýc and Technological Innovation in Transport

China attaches great importance to scientific and technological innovation. It has made breakthroughs in a number of key technologies in transport infrastructure, equipment, and services, leading to highly practicable inventions that lead the world in this ýeld, and provide strong support for sustainable development.

1. World-leading technologies in transport infrastructure

China leads the world in technology for expressways, high altitude rail, extremely low temperature rail, high-speed rail, and heavy-haul rail. It has solved the most challenging technical problems confronting highway construction in difýcult terrain such as expansive soil and desert. It also leads in core technologies for building extra-long suspension bridges, cable-stayed bridges, deep-water offshore ports, improving massive estuaries and long waterways, and building large airports.

A number of major projects such as the Hong Kong-Zhuhai-Macao Bridge, the Beijing-Zhangjiakou High-speed Railway, Beijing Daxing International Airport, and the 12.5-m deepwater channel of the Yangtze River from Nanjing have been completed and brought into use.

The Hong Kong-Zhuhai-Macao Bridge

Extending over a total length of 55 km, the Hong Kong-Zhuhai-Macao Bridge spans the Lingdingyang Bay and connects Hong Kong on the eastern side and Zhuhai and Macao on the western side. It is a mega cross-sea project built jointly by Guangdong, Hong Kong and Macao. Opened on October 23, 2018, the bridge has effectively connected the three locations, and is of great signiýcance to the development of the Guangdong-Hong Kong-Macao Greater Bay Area.

During the construction process, technicians were faced with many extreme technical problems, such as the rapid formation of artiýcial islands, the

design of deeply-buried immersed pipe structures, and the composite foundation of tunnels. This project involved the most complex technology and the most difýcult construction challenges, and was the largest in scale in the history of highway construction in China.

The project set a number of world bests, demonstrating China's national strength and its capacity for independent innovation. It is a bridge through which dreams have been realized ï a bridge of solidarity, self-conýdence, and rejuvenation.

The Hong Kong-Zhuhai-Macao Bridge

The Shanghai-Suzhou-Nantong Yangtze River Bridge ï the worldîs ýrst cable-stayed bridge with a span of over 1,000 m for both highways and railways

The desert-spanning Beijing-Xinjiang Expressway

2. Major breakthroughs in transport technology

China has substantially improved the level of its independent research and development in key transport technology.

China has set a world ýrst by successfully testing its self-developed Fuxing EMU trains at 420 km/h for meeting and coupling with another þeet of EMU trains. The Fuxing EMUs are already running at 350 km/h – the highest operating speed in the world – on the Beijing-Shanghai High-speed Rail, the Beijing-Tianjin Intercity Rail and the Beijing-Zhangjiakou High-speed Rail. China is the ýrst country in the world to utilize autopilot on trains running at 350 km/h. 600 km/h prototype maglev trains have completed trial runs, and high-speed trains running at 400 km/h that are capable of changing gauge and making international trips have now rolled off the production line.

Major breakthroughs have been achieved in the research and development of special construction machinery such as shield tunneling machines. China has increased its capabilities in independently designing and building large and medium cruise ships, large LNG (liquefied natural gas) carriers, polar expedition ships, smart ships, and new energy ships. It has become an important manufacturer and exporter of port equipment. Its marine engineering equipment has progressed from shallow seas to deep waters, from coastal waters to open seas, from surface to underwater, and from temperate seas to polar regions. Land-based experiments on 500-m saturation diving by a manned submersible have been successful.

The C919 large passenger aircraft has made its maiden þight. The ARJ21 regional jet is now in commercial service. Sorting technology in express delivery is developing rapidly. The fuel-efýcient and new energy vehicle industry is prospering.

China's Innovation in High-speed Rail Technology and Equipment

China has steadily improved its independent innovation capacity and made numerous technical breakthroughs. Its self-developed Fuxing EMU trains have reached the most advanced international standards. China became the first country in the world to utilize autopilot on its smart Fuxing EMU trains, running at a speed of 350 km/h. China now has a fleet of Fuxing trains, which, with speeds from 160 to 350 km/h, can adapt to numerous operating environments such as plateaus, frigid zones, deserts, and areas subject to high winds.

To meet the high-speed rail network's special requirements for communication signals and traction power supply, China has independently developed the China Train Control System (CTCS)-3, and established the Supervisory Control and Data Acquisition (SCADA) system for power supply control on high-speed trains, both of which are powerful, secure and reliable. Advanced technologies such as BeiDou Navigation Satellite System (BDS), 5G, and big data have been successfully applied in high-speed rail.

C919 large passenger aircraft

A membrane-type LNG carrier with a capacity of 147,000 cu m built by China

Dock cranes built by Zhenhua Heavy Industries Co., Ltd. for the ports of Rotterdam in the Netherlands and Hamburg in Germany

3. Application of digital technology in transport infrastructure

China has actively promoted the application of new-generation information technologies such as 5G and BDS in the transport industry. Focusing on railways, highways, ports, waterways, civil aviation, and postal services, it has advanced pilot demonstration projects, transformed and upgraded transport infrastructure to become digital and intelligent, and published design speciýcations and construction guidelines for automated container terminals.

Since 2017, the Ministry of Transport has piloted smart ports and smart highways, and explored intelligent infrastructure, Internet Plus applications, and new infrastructure operation models.

Automated Container Terminals

The COSCO SHIPPING Ports Limited's Automated Container Terminal in Xiamen was completed and entered service in March 2016. Cloud computing, wireless communication, automatic navigation and positioning, intelligent identification, unmanned automation equipment, a lithium battery-powered drive system and a number of other latest technologies and equipment were used in its design and construction. The automated terminal operating system and equipment control system (TOS-ECS) developed in China is world-leading, and has solved some major technical problems, for example, information interaction between handling equipment and terminal management, model solutions to multiple management and control of terminal operations, and unmanned monitoring of intelligent crossings.

Qingdao Port of the Shandong Port Group has an automated container terminal, which employs a dozen new technologies, including cyclic charging of automatic guided vehicles (AGVs), "one click" anchoring of large equipment, and locking and unlocking of container twist locks by robots. The terminal has broken its own world best for automated terminal loading and unloading efýciency six times. It represents a Chinese approach to building cheaper and faster automated terminals that are fully intelligent, safe, efficient and zero-emission.

The fourth phase of Shanghai Yangshan Port covers a land area of 2.23 sq km. The container terminal has 7 container berths and extends along a coastline of 2,350 m. An automated operating system developed in China was used for the ýrst time to connect to major data platforms of Shanghai Port, realizing automatic scheduling at main links. The port is equipped with 26 dock cranes, 119 rail cranes, 135 AGVs, and 4 tire cranes. It is the largest automated terminal in the world with the highest degree of integrated automation.

Xiamen Yuanhai Automated Container Terminal

Qingdao Port's automated container terminal

An automated terminal in the fourth phase of Shanghai Yangshan Port

An intelligent railway signal system is now in widespread use. The Beijing-Zhangjiakou High-speed Railway is the world's first intelligent railway to adopt BDS and utilize autopilot and some other functions. Video surveillance is now in use for extensive coverage of expressways. The electronic cargo release platform is running well at various ports and supporting the blockchain-based global shipping business network. Paperless boarding at civil aviation airports has improved passengers' travel experience.

Intelligent delivery outlets are found everywhere in all major cities, and automated sorting has been adopted by all the major distribution centers of express delivery services. China has released administrative rules on road testing of self-driving vehicles, technical guidelines on the construction of en-

closed testing ýelds for autopilot, and rules on smart ships. It has built a test area for unmanned cargo ships and piloted the use of drones and unmanned ground vehicles (UGVs) in delivery services.

Automated sorting at an express delivery enterprise

4. IT application in transport management and services

China has integrated cloud computing, big data and other new technologies into transport management and services. A national transport information platform is in place. Comprehensive big data centers for the transport industry have been built at the ministerial and provincial levels. A framework for data exchange and sharing between ministries and provincial-level administrative units and among ministries has been put in place, extending the sharing of transport data resources.

BDS has been extensively applied in the transport sector, for functions such

as monitoring and managing priority transport, urban transit services, highway infrastructure safety, real-time high-precision positioning and scheduling at ports, railway testing and monitoring, and transport operations, leading to remarkable improvements in management efýciency and transport safety.

An information system has been established that coordinates Ministry of Transport of China and provincial-level administrative units and covers highways, waterways, road transport, maritime affairs, salvage, ship survey and other ýelds, improving the efýciency of collaborative work. Ministry of Transport has set up a data-based platform and an integrated licensing system for trans-provincial heavy-cargo transport, allowing the general public to access major transport-related services online.

Integrated Application of Transport Big Data

To promote public sharing, integrated application of transport big data and to realize efýcient operation and effective governance of the transport industry China has followed the Action Outline for Promoting the Development of Big Data issued by the State Council to actively improve the policy environment, and develop a platform for IT application and data sharing. With a platform for transport information sharing and exchange, China has fully realized data sharing and exchange among ministries and provincial-level administrative units, supporting data application in the operation of waterways, maritime affairs, road transport, emergency scheduling, comprehensive law enforcement, and epidemic prevention and control. An open cloud platform of transport big data enables government departments and companies to share data and put it into new use. The platform also fully utilizes resources of the transport industry by providing big data analysis for road network management, public transport management, Spring Festival mobility services, and integrated transport.

III. Promoting Innovation in Law-Based Transport Governance

As China is advancing law-based governance, transport departments are promoting rule of law, improving transport laws, regulations, and standards and transport governance capabilities to provide a solid guarantee for sustainable transport development.

1. Developing law-based transport departments

Implementing Xi Jinping Thought on the Rule of Law and enhancing law-based governance in transport departments, China exercises the rule of law in all aspects of transport, including planning, construction, operation, management, and workplace safety.

Guidelines have been published for ensuring law-based governance in transport departments, and a system of indicators has been established for assessment. China has improved the public decision-making mechanism and the procedures for making major administrative decisions, and expanded public participation for reasonable, democratic and law-based decision-making in transport. It has increased disclosure of governmental powers, published and acted upon the list of powers and responsibilities, and released information on government affairs to increase transparency of government work in accordance with the law. The mechanism for education and publicity on the rule of

law and the general knowledge of law has been improved.

2. Improving the legal framework for integrated transport

Based on overall arrangements for the integrated transport development, China is coordinating laws and systems on different modes of transport and improving the legal framework for integrated transport.

The Ministry of Transport has issued the Opinions on Improving the Legal Framework for Integrated Transport. This framework covers six legal systems for different modes of transport: railways, highways, waterways, civil aviation, and postal services. China has promulgated overarching laws on railways, highways, maritime traffic safety, ports, waterways, maritime affairs, civil aviation, and postal services. It has also released regulations on emergency rescue, investigation and handling of railway traffic accidents, administration of toll roads, road transport, administration of domestic water transport, international maritime transport, and administration of trafýc safety in inland rivers, plus the interim regulations on express delivery, and other administrative regulations.

In addition, China is working on the transport law, regulations on rural roads and on urban public transport, provisional regulations on unmanned aircraft, and a range of other laws and regulations.

Departmental regulations have been made to strengthen safety in the workplace, facilitate public travel, improve the business environment, and prevent and control pollution.

As of the end of 2020, a legal framework for transport was in place consisting of 8 laws, 43 administrative regulations, more than 300 local regula-

tions, 288 departmental regulations, and nearly 300 local government regulations. There are laws regulating all the areas and types of transport.

By 2035, China will have put in place a well-established legal system of transport wherein laws and regulations are clearly deýned and closely coordinated with one another.

3. Ensuring strict, procedure-based, impartial, and civilized law enforcement

China continues to reform administrative law enforcement in transport. A sound comprehensive administrative law enforcement system that is authoritative and efýcient, balances powers with responsibilities, and features effective regulation and high-quality service is now in place.

Clean and efficient law enforcement teams work diligently and exhibit ýrm political faith, professional competency, strict discipline, and sound conduct.

China has implemented three systems of law enforcement for publicizing information on administrative law enforcement, recording of the entire process, and legal review of major decisions to ensure strict, procedure-based, impartial, and civilized law enforcement. It has also strengthened team building for primary-level law enforcement, bringing law enforcement stations and their management up to standard, and applying information technology in primary-level law enforcement, thus consolidating the foundation of law enforcement at the primary level.

Procedures are in place for efficient administrative law enforcement in transport, standardizing the discretionary power of administrative penalties, and strengthening law enforcement review, assessment and supervision. The

national information system for managing administrative law enforcement in transport is continuously optimized. Off-site law enforcement is encouraged.

Law enforcement vessel of China's Maritime Safety Administration

4. Standardization in integrated transport

China has advanced the standardization of integrated transport. The Administrative Measures for Standardization in Transport have been promulgated, a plan for the work has been devised, and the policy system has been improved.

China has issued the Transport Standardization System. Five systems of standards for integrated transport, safety and emergency, green transport, logistics, and IT application have been published. Key standards have been established or revised, focusing on high-speed rail, multimodal transport, standardization of ship types, shore power at ports, urban rail transit, green

packaging and some other areas. As of the end of 2020, China had 3,854 effective standards in the transport industry, including 870 national standards and 2,984 industry standards, 411 of which are mandatory and 3,443 recommended.

China has taken the lead in formulating a number of international standards for high-speed railways, smart transport, and dredging equipment. In addition, it has set up an information service platform on standardization, offering free access to online texts of different industry standards to the public. Translation of standards on engineering projects and key products and equipment has been accelerated to have Chinese standards applied more extensively.

IV. Improving the Business Environment for Transport

In managing the government-market relationship in transport, China has designed reforms to streamline administration, delegate powers, improve regulation, and upgrade services, and adopted a series of reform initiatives to relax market access and reduce the burden on market entities. These efforts have stimulated their vitality and improved the business environment.

1. Streamlining administration

To transform functions and improve efficiency more quickly, China's Ministry of Transport has made constant efforts to streamline and delegate administrative approval items and separate applications for business licenses

from those for business permits.

Since the reform to streamline administration, delegate powers, improve regulation, and upgrade services started in 2013, 46 items, or over 70% of the total subject to administrative approval by the Ministry of Transport have been cancelled or delegated to lower levels, and 21 items to be approved by central government-designated regional authorities have been canceled or delegated to lower levels, representing over 34% of the items of the kind. All intermediary services have been cleared from the list of items of administrative examination and approval. Approval prior to business registration has been changed to post-registration approval.

China has worked to establish simple, efýcient, fair, and transparent rules for easy application and approval for business licenses and permits, but strict post-registration regulation, making the process more predictable and increasing convenience for market entities. Tax and fee reduction policies in the transport sector have been implemented to stimulate the market.

2. Improving regulatory and supervisory capacity

China has moved faster to establish a new supervision mechanism based on credit, and to strengthen in-process and follow-up oversight. Information technology is being used more extensively in the transport industry. China has spread the model of Internet Plus Oversight, and created innovative and integrated online and ofþine regulation models. Supervision based on big data has been strengthened to ensure resource-sharing and information exchange, increase capacity, and improve efýciency.

Supervision conducted through the random selection of both inspectors and inspection targets with the prompt release of results has been implement-

ed throughout the industry as a regular and institutionalized practice. The regulation of new business forms in transport, including online taxi-hailing and online bicycle-renting, is being coordinated.

3. Improving government services

China adopts an innovative approach to administrative management and services. It has promoted the Internet Plus Government Service and improved administrative approval services regarding transport. It has enabled access to government services via a single website to make it easier for people to have their problems solved by one single department through a one-stop service. In addition, it has improved the mechanism for the public to evaluate and oversee government services.

High-frequency service issues for drivers in road transport are handled online. Access to government services such as heavy-cargo transport permits is available on a single website regardless of location.

China has improved the procedures for handling government services related to maritime matters, enabling them to be submitted, accepted, and concluded in a single process. A “single window” service for international trade has been rolled out to different departments. Information is shared and used among maritime, customs, immigration and other port inspection departments. All procedures for port inspection departments are completed in a single step and feedback is provided to ships or their agents in a single communication. By the end of 2021, all crew will have electronic certiýcates.

Chapter 4
Towards Green and Low-Carbon Transport

China strives to peak carbon dioxide emissions before 2030 and achieve carbon neutrality before 2060. Promoting the transition to green and low-carbon transport is a strategic task for China's transport authorities in sustainable development of the industry, where it seeks to meet the needs of social and economic development, to further the public interest with the least resource and environmental cost, and to build a beautiful China.

I. Energy Conservation, Emissions Reduction and Low-Carbon Development

Transport is one of the key areas of energy consumption and greenhouse gas emissions. Thus strengthening energy conservation, advocating green travel, reducing emissions, energy and resource consumption, and limiting the environmental impact of transport are important contributors to environ-

mental sustainability.

1. Reducing energy consumption and carbon emission intensity

China has formulated action plans and phased measures for energy conservation and carbon reduction in transport, and is adjusting the transport structure, improving the energy efýciency of equipment, optimizing energy consumption structure, innovating systems for energy conservation and carbon reduction, and applying relevant technologies. It has carried out pilot and demonstration projects and conducted 130 ministerial-level demonstration projects in 6 phases. It has launched a campaign for low-carbon transport that involves more than 1,000 enterprises in automobile, shipping, highway, and port sectors, and published *Catalogs for Promoting Key Energy-saving and Low-carbon Technologies in Transport* (2016 and 2019). The annual energy saved by green transport provinces and cities, green highways, green ports and other demonstration projects has exceeded 630,000 tonnes of coal equivalent. With the above, China has gradually formed a set of green transport management concepts and models. Energy consumption and carbon emission intensity in the transport industry continues to decline. In 2020, the carbon dioxide emission intensity of the industry dropped by 7.5 percent compared with that in 2015.

ETC Technology Promoting Energy Conservation and Emissions Reduction

Electronic Toll Collection (ETC) technology is an important means of improving the efýciency of Chinaôs expressways, conserving energy, and reducing emissions. In 2019, China built more than 24,000 ETC gate systems, transformed more than 48,000 conventional lanes into ETC lanes, and removed all the 487 expressway toll stations at borders of 29 provincial-level administrative units connected to the systems, integrating expressways across the country into a single network. As of the end of 2020, ETC users reached a total of 225 million. ETC helps vehicles to reduce the number of stops at toll stations. As a result, the average daily fuel saved was 730.4 tonnes, carbon monoxide emissions were reduced by 217.2 tonnes, nitrogen oxide emissions by 1.7 tonnes, and hydrocarbon emissions by 5.8 tonnes. Annual fuel consumption could be reduced by 240 million liters and carbon dioxide emissions by more than 650,000 tonnes.

A toll station in Sanyuanli, Guangzhou

2. Utilizing equipment and facilities fueled by or providing new energy

China is actively pushing for diversified energy use in transport equipment and facilities, and promoting the use of new energy and clean energy. As of the end of 2020, 466,000 new-energy city buses, 132,000 taxis, and 430,000 urban logistics and distribution vehicles were operating. The railway electriýcation rate had reached 74.9 percent. Substitute equipment for aircraft auxiliary power unit (APU) was in widespread use. A total of 1,500 expressway service areas (including parking areas) in 31 provincial-level administrative units had been equipped with charging and battery replacement facilities. China is actively exploring the application of liqueýed natural gas (LNG) in water transport. It has built more than 290 LNG-powered ships, 4 LNG-powered tugboats in coastal ports, more than 2,000 LNG-powered container trucks, and more than 20 port vehicle refueling stations.

New-Energy Vehicle Demonstration in Shenzhen

In 2009, Shenzhen became one of the first 13 demonstration cities for energy-efýcient and new-energy vehicles in China. In 2017, it became the ýrst city in the country whose franchised bus services were fully electric. In 2018, it basically achieved electriýcation of its taxi þeet, making it the city with the largest number of purely electric taxis in the world. In 2020, all vehicles in the online car-hailing industry in Shenzhen went fully electric.

New-energy buses in Shenzhen

3. Promoting the use of shore power by vessels

China actively promotes shore power for ports and vessels. By the end of 2020, more than 7,500 berths in the country's ports had shore-power access, and 90 percent of harbor utility craft and public service ships in major ports used shore power during berthing. China has strengthened the construction of shore power facilities and promoted the use of shore power in the Yangtze River Economic Belt. It has built more than 4,700 shore-power berths. In 2020, the berths were used on approximately 230,000 occasions, for 2.3 million hours, and consuming 50 million kWh, reducing sulfur oxides, nitrogen oxides and particulate matter by about 720 tonnes, and carbon dioxide by 35,000 tonnes. Full coverage of shore power has been largely achieved, and

almost all large cruise ships and passenger terminals on the Yangtze River now use shore power.

4. Promoting green travel

China promotes green travel. It makes full use of the government, enterprises, social organizations and other entities to raise public awareness and cultivate public acceptance of green travel, green development, and green lifestyles. It has formulated the Green Travel Action Plan (2019-2022) and carried out campaigns to promote green travel, with the goal of building a diverse green travel system based around rail transit and urban buses, and supplemented by community buses, customized shuttle buses, and non-motorized transport. China is committed to building a safe, continuous and comfortable environment for non-motorized urban transport, adding non-motorized vehicle lanes and pedestrian paths to promote green travel.

The First Bicycle Path in Beijing

The ýrst bicycle-only path in Beijing is 6.5-km long and 6-m wide, with a speed limit of 15 km/h. It has a tidal lane and 8 entrances/exits along the way. It saves commuters an average of 20 minutes and provides them with a green and healthy option for travel.

The ýrst bicycle path in Beijing

II. Intensive and Economical Use and Recycling of Transport Resources

Sustainable transport entails measures such as transforming the use of transport resources, promoting the intensive and economical use of resources such as land and shorelines, and strengthening the resource recycling.

1. Intensive and economical use of resources such as passages, land and shorelines

While integrating railways, highways, waterways, civil aviation, postal ser-

vices and other transport sectors, China implements national planning for land use and draws up red lines to protect ecosystems and permanent basic cropland, and to restrict urban development. It applies the principles of "coordinated planning, rational layout, and intensive and efýcient useò to the routes and bridges of railways, highways, and municipal roads. In expansion, upgrading and transformation projects, existing corridors should be fully used, with the objective of creating integrated three-dimensional transport passages. China has strengthened the protection and comprehensive utilization of land resources along highways and railways by building low embankments or bridges and tunnels instead of roads, in an effort to raise the intensity and efýciency of land use.

It has been strict in administering and supervising the examination and approval of applications for the use of port shorelines, and improved the efýciency of shoreline use by strictly controlling the intensity of development and utilization. It has coordinated the development of ports within a region, shared resources such as waterways, anchorages and pilotage in a region, and realized intensive port operations.

Pingtan Strait Road-Rail Bridge in Fujian Province

2. Recycling materials

China promotes the recycling of a wide range of scrap materials such as road surfacing, asphalt, steel, and cement; the recycling rate of waste highway surfacing has reached 95 percent. There are measures to facilitate comprehensive utilization of waste materials such as þy ash, coal gangue, slag, and used tires, and construction waste is subject to damage-free reprocessing and re-utilization. The beneýcial use of dredged sediments has also been strengthened.

3. Making express packaging environment-friendly

China is steadily promoting the reduction, recycling, and green treatment of delivery packaging. It is replacing disposable plastic woven bags with recyclable transit packaging; the utilization rate has reached 93.8 percent. The ratio of packaging with slim sticky tape has reached 96.4 percent, and 74 percent of e-commerce express mails no longer have secondary packaging. Full coverage of electronic waybills has been achieved. China actively promotes the use of turnover boxes, and carries out campaigns to address excessive and non-planned packaging of mail express.

Recyclable packaging boxes

4. Reducing life cycle costs of transport infrastructure

China is implementing and improving a modern management system for project quality, promoting high-quality construction and delicacy management, and focusing on project safety and durability. Through key construction projects such as river- and sea-crossing bridges, tunnels, ports, and waterways, it is building high-quality infrastructure designed to last for a century or longer. It boosts the standardized, intelligent, and industrialized construction of transport infrastructure, and the use of high-performance concrete and steel in bridges. It encourages life cycle maintenance, regular preventive maintenance, and sound decision-making in maintenance management. It promotes new maintenance technologies and maintenance mechanization. All this aims to extend the service life and reduce the life cycle costs of infrastructure.

Preventive Highway Maintenance in Henan Province

Henan Province has formulated and implements local standards for preventive highway maintenance. Every year a special preventive maintenance fund of 200 million (RMB) is allocated in the provincial budget, and the average length of roads maintained is about 1,000 km, accounting for 5.1 percent of the total length of highways in the province. It conducts preventive maintenance of bridges and tunnels, and deals with concrete damage, common cracks, steel corrosion and other problems in a timely manner. It regularly replaces vulnerable components such as bridge supports and expansion joints, and improves the durability of bridges and tunnels and increases the number of Grade I and II bridges and tunnels. It employs new materials, equipment, processes, and technologies. To address early-stage bridge problems, Henan adopted glass fiber pipe reinforcement, carbon fiber sheet reinforcement, scouring-preventive coating on the surface of piers, and hollow girder hinge joints without interrupting the trafýc þow. Early intervention using these technologies helps extend the service life of bridges.

Deck runoff catchment system for preventive bridge maintenance

III. Eco-Environmental Protection and Restoration

Acting on the understanding that "Lucid waters and lush mountains are invaluable assets", China enforces eco-environmental standards throughout the planning, construction, operation and maintenance of transport infrastructure, and ensures that transport infrastructure does not violate the environmental red lines set for the protection of ecosystems and sees to that the infrastructure is compatible with the carrying capacity of resources and the environment.

1. Promoting green infrastructure

China upholds the philosophy of green development throughout the life cycle of infrastructure, and carries out green design, construction, operation and maintenance. It is committed to building green highways. It has issued top-level design documents such as Guidelines on Implementing Green Highway Construction, and Technical Guidelines on Green Highway Construction. It has organized and carried out 33 green highway demonstration projects over a total length of nearly 3,700 km. It employs advanced technologies and products in ecosystem protection and restoration along highways, and promotes harmony between humanity and nature.

China builds green ports and green waterways. It has issued a series of evaluation standards, technical guidelines and other standards and norms. It

has steered the upgrading and transformation of old terminals and the construction of new ones towards the highest green standards. It has launched a series of green waterway projects including the Jingjiang eco-waterway and the 12.5m deep-water channel on the lower reaches of the Yangtze River from Nanjing. The Jingjiang waterway project has restored the eco-environment of an area of 2.18 million sq m.

To develop green railways, China has formulated and implemented a number of design speciýcations and regulation standards for the environmental protection and energy conservation, to strengthen environment-friendly route selection, ecosystem protection, and soil and water conservation at source.

The systems of planning, policies, standards and evaluation for the green development of civil aviation have been continuously improved. The electriý-cation rate of airport operations exceeds 60 percent.

Jidong green highway in Heilongjiang Province

Nanxingzhou reinforcement project in the Douhudi waterway, a part of the Jingjiang project

2. Ecosystem protection measures in infrastructure construction

In building transport infrastructure, China has put in place a system for protecting and restoring ecosystems and strictly enforces all red lines. It has adopted a model of “avoidance-protection-restoration” that promotes eco-friendly route planning, site selection and design. Particular efforts have been made to avoid disturbing ecosystems in natural reserves, water sources and other areas with vulnerable nature, and to avoid disturbing territorial spaces such as farmland, forestland, wetland and other types with key eco-environmental functions, so as to provide maximum protection.

Engineering measures for ecosystem protection and engineering structures, building materials and construction techniques are selected speciýcally to reduce the environmental impact caused by transport infrastructure construction.

Railway and highway construction projects make room for wildlife corridors. The wildlife corridors built along the Qinghai-Tibet Railway have protected the safe migration of Tibetan antelopes and the movement of other plateau animals to achieve harmony and unity with nature.

Wildlife Protection in the Construction of the Qinghai-Tibet Railway

The Golmud-Lhasa section of the Qinghai-Tibet Railway is 1,142 km long, and the eco-environment along its route is vulnerable. To protect the living environment of Tibetan antelopes and other wild animals, engineers tried their best to avoid key areas inhabited by wild animals in route selection, and set up 33 wildlife passages of different forms along the line. The Qinghai-Tibet Railway won the National Award for Environment-Friendly Projects and the special prize of the National Award for Science and Technology Progress. The IPCC Fourth and Fifth Assessment Reports identiýed the Qinghai-Tibet Railway as a successful example of countries adapting to climate change by building green railways. The US-based magazine *Science* published an article which pointed out that the Qinghai-Tibet Railway has promoted the sustainable development of western China in ecological, social, and economic ways, and called it not only a railway project, but also “an ecological miracle”.

A wildlife passage on the Qinghai-Tibet Railway

Simao-Xiaomengyang Expressway built in tropical rainforest, Yunnan Province

3. Environmental restoration

China always seeks to restore ecosystems on transport infrastructure sites that do not meet ecosystem protection requirements due to design and technical limits in their construction. It has organized and carried out pilot highway and port projects focusing on the restoration of slopes, borrow pits, spoil grounds and bank revetments. To restore the ecosystems along railways and highways running through key ecological function zones such as frigid and high altitude areas, water sources, and soil and water conservation zones, China has developed technologies of turf transplantation and erosion control blankets. When building ports and renovating waterways, China takes environmental restoration measures such as restoring tidal þat wetlands, building ecological revetments, building ýsh ways and artificial fish nests, and enhancing aquatic resources through breeding and release. Along railways, highways and waterways, it has reinforced the efforts to protect and utilize original natural features, protect and restore slope vegetation and ecosystems, and enhance eco-environmental functions and landscape quality.

Turf Transplant to Protect Plateau Highways

In areas such as the Qinghai-Tibet Plateau in western China, the ecosystem is extremely fragile. Once the turf on the ground is destroyed, it may take hundreds of years to recover. When a highway is built in these areas, the turf and its attached surface soil are removed in pieces and stored elsewhere. After the construction of highway is completed, the turf and the surface soil attached are paved on the side slopes of the roadbed and continue to grow. This is called a “turf transplant surgery”.

IV. Comprehensive Prevention and Control of Transport Pollution

In order to win the battle against pollution in the transport industry and better serve the goal of building a beautiful China, the transport authorities strictly implement ecosystem protection requirements and continuously strengthen the comprehensive prevention and control of air and water pollution.

1. Strengthening the control of air pollution from vessels and motor vehicles

To improve the air quality in coastal areas and inland river basins, especially in port cities, in 2015 China established three vessel emission control zones in the Pearl River and Yangtze River deltas, and Bohai-rim region (Beijing-Tianjin-Hebei). In December 2018, the *Implementation Scheme of the Domestic Emission Control Areas for Atmospheric Pollution from Vessels* was issued, expanding the scope of control to cover coastal waters, ports, and inland waters across the country, such as the main stream of the Yangtze River.

The requirements for the control of sulfur oxides were raised, and standards were set for the sulfur content of ship fuel. The control measures for nitrogen oxides and volatile organic compounds were speciýed, and the use

of clean energy was encouraged. Transport authorities have better equipped grassroots maritime administrative agencies with rapid fuel testing equipment, remote monitoring drones for ship exhaust gas, and airborne sniffing equipment etc. to improve supervision efýciency.

The emissions of air pollutants from vessels have dropped signiýcantly. In 2020, the emissions of sulfur oxides from ships had been reduced by approximately 614,000 tonnes, and those of particulate matter by approximately 82,000 tonnes compared with 2015.

Ship exhausts remote sensing drone and airborne snifýng equipment

China has strengthened the control over motor vehicle emissions at the very source. With the vehicle emission inspection and maintenance system, China strengthened the maintenance and repair of vehicles with excessive emissions, and reduced the emission intensity of vehicles in use. It has accelerated, as planned, to phase-out the commercial diesel trucks that did not comply with its national III vehicle emission standards in the Beijing-Tianjin-Hebei Region and its surrounding areas and the Fenhe-Weihe River Plain.

2. Strengthening the control over water pollutant discharge

China's transport authorities have strictly implemented the standards and have strengthened the control over water pollutant discharge from vessels in accordance with the requirements of the Water Pollution Prevention Action Plan, the Action Plan for Prevention and Control of Pollution from Ships and Ports (2015-2020), and the Programme on Addressing Prominent Problems of Pollution from Ships and Ports in the Yangtze River Economic Belt. China has established and improved a joint supervision system for the transfer and treatment of water pollutants from vessels.

China has facilitated the development of the Yangtze River Economic Belt by promoting well-coordinated environmental conservation. In the Yangtze Economic Belt, China has launched special rectification campaigns to deal with conspicuous pollution problems of vessels and ports and carried out comprehensive treatment of sewage in port areas in the Economic Belt, required all vessels with a gross tonnage of 400 and above in the Economic Belt be equipped with sanitary sewage collection and treatment devices, and achieved full coverage of port reception facilities for pollutants from inland vessels. China has promoted mandatory tank cleaning and the collection and treatment of tank-cleaning wastewater for vessels carrying dangerous liquid cargo in bulk.

China has strengthened sewage treatment and recycling in railway passenger stations, highway transport hubs, and civil aviation airports, and built more than 6,000 sewage treatment facilities in expressway service areas, with an annual treatment capacity of more than 200 million tonnes.

3. Strengthening the control over trafýc noise

China's traffic noise control technology has been improving, and noise monitoring and control have been strengthened in highway construction and operation. Various types of noise barriers, low-noise road surfaces, ventilation and sound insulation windows, sound-absorbing panels, and other technologies are in widespread use. China has carried out technical research on high-speed railway noise source identification, low-noise vehicle manufacturing, and noise reduction using acoustic barriers. It has stepped up efforts in preventing and controlling noise pollution in areas close to airports.

Expressway noise barrier

Chapter 5
Opening Up and International Cooperation on Transport

China attaches great importance to the fundamental role transport plays in promoting global connectivity and common prosperity, and strengthens cooperation with other countries in transport. It takes an active part in global transport governance, and earnestly fulfills its international responsibilities and obligations, contributing to a global community of shared future.

I. Transport Connectivity via the Belt and Road Initiative

China strengthens connectivity partnerships with countries along the Belt and Road to build a transport network featuring comprehensive and multi-modal infrastructure connectivity, and promote diverse, independent, balanced and sustainable development.

1. Improving transport cooperation mechanisms along the Belt and Road

China actively promotes transport connectivity with countries along the Belt and Road, and strengthens the "soft connectivity" of policies, rules and standards. It hosted the Parallel Conference themed Enhancing Infrastructure Connectivity at the High-level Dialogue of the First Belt and Road Forum (BRF) for International Cooperation, and the thematic session on Infrastructure Connectivity in the Second BRF. Most of the Belt and Road cooperation documents signed by China with 140 countries and 32 international organizations have devoted paragraphs to transport connectivity cooperation. Working with countries of common interest, China has co-established the Working Group on Transport Infrastructure of the China-Pakistan Economic Corridor, the Working Group on Transport Cooperation of the China-Myanmar Economic Corridor, and other Belt and Road transport cooperation mechanisms, and jointly formulated the Greater Mekong Subregion (GMS) Transport Strategy 2030, the Transport Strategy 2030 of the Central Asia Regional Economic Cooperation (CAREC), the CAREC Railway Development Strategy 2030, and the Long-Range Transportation Planning of the China-Pakistan Economic Corridor (2014-2030), etc. to design regional transport development plans and to better incorporate the existing plans with them.

2. Strengthening railway connectivity

Major progress has been made in railway cooperation projects. The Addis

Ababa-Djibouti Railway, the Mombasa-Nairobi Railway, the Lagos-Ibadan Railway and the Tongjiang-Nizhneleninskoye Railway Bridge linking China and Russia have been completed. Steady progress has been made on the China-Laos Railway, the China-Thailand Railway, the Hungary-Serbia Railway and the Jakarta-Bandung High-speed Rail. Preliminary investigation is under way on the Pakistan Main Line 1 (ML-1) upgrading project and the China-Kyrgyzstan-Uzbekistan Railway. More than 40,000 China Railway Express Trains have made trans-continental voyages to Europe, reaching 174 cities in 23 European countries. An international railway operation mechanism with cooperation among multiple countries has taken shape.

Kenya's Mombasa-Nairobi Railway

China Railway Express

China Railway Express (CR Express for short) runs international joint railway transport services including container transport based on fixed train numbers and lines, schedules and whole-course operation hours between China and Europe as well as countries interested in the Belt and Road Initiative. Since its ýrst trip in 2011, CR Express has expanded its coverage and cargo categories, and built a new low-carbon, round-the-clock, large-capacity land transport channel to ensure the stability of global industrial and supply chains. The value of its annual delivered goods jumped from US$8 billion in 2016 to US$56 billion in 2020. Since the outbreak of Covid-19, by the end of June 2021, CR Express had carried 12.32 million packages weighing 96,000 tonnes to Europe.

China Railway Express

3. Advancing road connectivity

Working with its neighbors, China has completed the construction of the Kunming-Bangkok Expressway, the Kunming-Hanoi-Haiphong Expressway, the Havelian-Thakot section of the Karakoram Highway, the Sukkur-Multan section of the Peshawar-Karachi Motorway, and the Heihe-Blagoveshchensk Highway Bridge. Steady progress has been made on the construction of Two Westerns Expressway (the one that connects western China and western Europe). China has signed 22 bilateral and multilateral intergovernmental agreements on international road transport facilitation with 19 countries under the Belt and Road Initiative. Trial operations have been carried out on non-stop transport along the roads such as China-Mongolia-Russia, China-Kyrgyzstan-Uzbekistan, China-Tajikistan-Uzbekistan, China-Russia (Dalian-Novosibirsk) and China-Vietnam, which greatly contributed to the expansion of international road transport in this region. China, as a contracting country to the TIR Convention, has fully implemented its clauses and articles. Ten TIR contracting countries have conducted more than 3,000 transport operations via Chinese highway ports located along the borders, providing strong support for improved international road transport.

Trial operation trucks of China-Russia international road transport passing the Manchuria port

4. Enhancing maritime connectivity

China has signed 70 bilateral or regional shipping agreements with 66 countries and regions, with its shipping services covering all costal countries along the Belt and Road. It has also signed agreements with 27 countries and regions on mutual recognition of the seafarer's certificate of competency. China has signed a Memorandum of Understanding on electronic certiýcates with Singapore to facilitate customs clearance of ships and the application of electronic certiýcates in the global shipping industry. China has participated in the construction and operation of the Port of Piraeus in Greece, the Port of Colombo in Sri Lanka, the Gwadar Port in Pakistan and other overseas ports.

Great energy has been devoted to building the maritime Silk Road brand and providing high quality shipping services.

The Port of Piraeus in Greece

5. Promoting aviation connectivity

To exploit the important role of civil aviation in connectivity, China has signed bilateral air transport agreements with 128 countries and regions. It has expanded arrangements on air trafýc rights with countries such as Luxembourg, Russia, Armenia, Indonesia, Cambodia, Bangladesh, Israel, Mongolia, Malaysia, and Egypt. China actively promotes the liberalization and facilitation of air transport along the Belt and Road. By the end of 2020, Chinese airlines had regular international þights reaching 153 cities in 62 countries. China has helped Pakistan, Nepal, Maldives, Cambodia, Zambia, Zimbabwe and Togo implement projects to upgrade and expand their airports to improve

airport operations and security, and facilitate cross-border movement of people and trade.

II. International Exchanges and Cooperation on Transport

Guided by the principle of pursuing the greater good and shared interests, China enhances exchanges and cooperation with relevant countries, takes an active part in international affairs, and earnestly fulýlls its international obligations, contributing China's vision and approach to global transport governance.

1. Building transport partnership globally

Through mechanisms such as the Transport Cooperation Sub-Committee of the Committee for Regular Meetings between Chinese and Russian Heads of Government, the China-US Transportation Forum, and the China-CEEC Transport Ministers' Meeting, China furthers cooperation in transport and plays a constructive role in building a new model of international relations. China continues to strengthen cooperation with Russia in infrastructure construction, maintenance and management, cross-border transport, and intelligent transport, and with European countries in the frontiers including sustainable transport, autopilot, new energy utilization, and information sharing on trafýc safety and logistics. It has established maritime cooperation mech-

anisms with central and eastern Europe. The Chinese government and the European Union Aviation Safety Agency (EASA) have jointly launched the EU-China Aviation Partnership Project (EU-China APP).

Through the SCO and the China-ASEAN (10+1) regional cooperation mechanisms, China has deepened and expanded transport cooperation with relevant countries, and established the maritime consultation mechanism with ASEAN countries. It has participated in transport cooperation under the Greater Mekong Subregion (GMS), the Central Asia Regional Economic Cooperation (CAREC) and other frameworks. China has taken part in international cooperation projects including the Global Maritime Energy Efýciency Partnerships (GloMEEP) and the Green Voyage 2050, and is the host country for the establishment of International Maritime Organization-Maritime Technology Cooperation Centre for Asia (MTCC-Asia) located in Shanghai. It has helped neighboring developing countries in capacity-building, promoted maritime technology, and shared best practices on green shipping. China has enhanced transport cooperation with developing countries, and organized training courses for their transport personnel. It has helped to build transport capacity in African countries, and expanded transport cooperation with Latin American countries.

2. Earnestly fulýlling international responsibilities and obligations

As a major country that shoulders its international responsibilities and obligations, China ýrmly supports multilateralism and commits itself to implementing the United Nations 2030 Agenda for Sustainable Development. It has taken an active part in the UN Economic and Social Commission for Asia

and the Paciýc (ESCAP), the Organisation for Cooperation between Railways (OSJD), the International Union of Railways (UIC), the World Road Association (PIARC), the International Transport Forum (ITF), the International Maritime Organization (IMO), the International Civil Aviation Organization (ICAO), the Universal Postal Union (UPU), the International Hydrographic Organization(IHO), the International Mobile Satellite Organization (INMARSAT) and other international organizations. China has been repeatedly elected as a ýrst-class council member of the ICAO, a Category (a) Council member of the IMO and member of the councils of the UPU. It has taken an active part in the development of rules and regulations under the purview of these international organizations, as well as negotiations that aim to ensure the safety of navigation and prevention of pollution from ships. China earnestly implements the international conventions on transport, follows the relevant international standards and works to better incorporate in domestic laws the requirements in international conventions.

3. Contributing to global climate governance

China has been an active contributor in the negotiations on the reduction of greenhouse gas (GHG) emissions carried out under the UN Framework Convention on Climate Change (UNFCCC), the IMO and the ICAO. China has helped IMO in the formulation of its initial strategy on the reduction of GHG emissions from ships to make the strategy a well-balanced and practical one based on China's proposals. It has worked hard to safeguard the interests of developing countries during the formulation and implementation of the market-based Carbon Offsetting and Reduction Scheme for International Aviation, contributing to global sustainable development.

III. Smooth International Logistics and Supply Chains

International logistics and supply chains play an important role in ensuring a smooth and efýcient global industrial chain, and advancing international industrial division and collaboration, and economic exchanges and trade.

1. Improving the services of international logistics and supply chains

China’s grand passageway network has taken shape for international logistics, with container liners operating in the Paciýc, Europe, the Atlantic, the Asia-Paciýc, Southeast Asia and South Asia. A service system has been put in place for international logistics and supply chains, focusing on international shipping, air freight and rail transport. China has continued to improve its maritime service system, operating international shipping lines between the major ports of more than 100 countries and regions. China has an international shipping þeet with 314 million dead weight tonnes (DWT), and its registered seafarers amounted to 808,000, making it one of the major seafarer countries. China has seen rapid growth in international air freight. In 2020, its civil aviation completed 2.23 million tonnes of international freight and mails, representing an annual growth rate of 6.7 percent between 2016 and 2020. The international railway remains a reliable means of transport, and has become an important transport choice for the exchange of international goods.

2. Integrating international logistics and supply chains

China encourages strategic cooperation between the main bodies of international logistics along the Belt and Road to cut down total logistics costs of combined international transport. It encourages the integrated development of international logistics, manufacturing and foreign trade enterprises to modernize industry and supply chains. China has launched and built free trade ports, free trade zones, cross-border e-commerce comprehensive pilot areas and international shipping centers, promoted policy and institutional innovations, and aligned with international rules and standards, creating a good environment for the smooth development of international logistics and supply chains.

3. Strengthening emergency response of international logistics and supply chains

China has strengthened international cooperation to improve the early warning and safety monitoring of international logistics and supply chains which integrates risk identiýcation, classiýcation and evaluation, security control, early warning, and emergency relief. It has deepened the development and application of big data and artiýcial intelligence in areas such as information sharing, early warning, response and intelligent dispatch to improve the comprehensive quick-response capability. China is working together with other countries to put in place an emergency services system that provides rapid response and effective support for international logistics and supply chains.

Chapter 6
Distributing the Beneýts of Transport Improvements to All

With a people-centered approach and in the spirit of collaboration, participation, and common interests, China is making every effort to ensure that both urban and rural residents have equal access to basic transport services and beneýt from progress in the transport sector.

I. Serving a Moderately Prosperous Society in All Respects

China has a population of over 1.4 billion, of whom 510 million live in rural areas. Improving the rural transport network has a key role to play in achieving moderate prosperity in these areas, itself essential to completing the overall national task. China has acted upon its commitment that “no single region should be left behind in achieving moderate prosperity because of inadequate transport,” providing a solid foundation for rural people to escape

from poverty and move to moderate prosperity.

1. Winning the battle against poverty by boosting transport

China is improving its top-level strategy to leverage transport in support of poverty alleviation by formulating an appropriate policy framework, including ýve-year plans, three-year action plans, annual plans, and measures and programs. Where conditions permitted, all towns, townships and administrative villages had been connected to asphalt and concrete roads and to bus services by the end of 2020, as part of the efforts to prioritize transport projects that provide villages and households with better access. From 2012 to 2020, China built or upgraded 1.21 million km of rural roads in poor areas, connecting about 70,000 administrative villages with asphalt and concrete roads and over 50,000 with bus services. It also completed 309 projects to replace rope bridges with bridges, upgraded 996 ferry terminals, and replaced ferry services with bridge projects covering a total length of 52,000 linear meters. It has become easier to travel and transport goods in these areas. China has also improved logistics and delivery services in rural areas, and contributed to poverty alleviation through business development ï all deýnite steps to help poor areas win the ýght against poverty on schedule.

Rope Bridges Pass into History in Western China

From 2013, to facilitate travel and transport in mountainous areas in western China, the Ministry of Transport has coordinated with relevant departments to replace 309 rope bridges in seven provinces and autonomous regions including Sichuan, Guizhou, Yunnan, Shaanxi, Gansu, Qinghai and Xinjiang with safe, convenient and dependable vehicular bridges or foot bridges. Rope bridges have become a thing of the past for 1.65 million people living in about 1,168 administrative and 4,000 natural villages. They now enjoy safer travels and can send out goods more conveniently.

A stone bridge stands in contrast to rope bridges in Shangpa Town, Fugong County, Yunnan Province

China is making a particular effort to establish an accessible and comprehensive transport network in areas of extreme poverty. From 2016 to 2020,

it upgraded 17,000 km of national expressways, 53,000 km of national highways, and over 3,100 km of inland waterways in poor areas. It also subsidized railway construction in these areas, connecting some of them with high-speed train services accessing the rest of country. It launched 81 low-fare, slow-speed trains in revolutionary base areas, ethnic minority areas, remote mountainous areas, and poor areas. It supports airport construction and air transport development in poor areas. In the past five years, the civil aviation department has built 12 airports as part of poverty-relief programs, and launched 40 short-distance airlines in 16 provinces for greater access to poor areas.

A low-speed train in service

To promote economic development in poor areas, China encourages the integration of transport with distinctive local businesses, e-commerce, and tourism, exploring business models such as Transport Plus Agriculture Plus E-commerce, Transport Plus Culture Plus Tourism, and Transport Plus Employ-

ment Plus Public Welfare. It adopts targeted support polices in different areas to stimulate the development of local businesses such as animal husbandry, rural e-commerce, and tourism, creating a path to prosperity for local people.

2. Promoting high-quality transport in rural areas

The government helps poor areas to achieve prosperity by building high-quality rural roads that are properly operated, managed, and maintained.

A sound road network is the foundation for everything. From 2012 to 2020, China launched projects to build or upgrade 2.36 million km of rural roads, bringing the total length of rural roads to 4.4 million km. It also built 59,000 km of roads serving transport, tourism and industry in rural areas to help rural people escape from poverty.

Good management is the right approach. The government has introduced 16 policies and three standard speciýcations such as the Guidelines on Promoting High-quality Rural Roads, and designated 200 pilot counties to lead the development of high-quality rural roads that are properly built, operated, managed, and maintained.

Good maintenance is the guarantee. Institutional reform of rural road management and maintenance has advanced. The subsidy for maintenance funds has been raised significantly. Rural areas have promoted the “road chief” system and pooled efforts to upgrade 240,000 km of previously renovated roads in bad conditions.

Operational effectiveness is the goal. All towns, townships and administrative villages where conditions permit have been connected to bus services. A three-tiered rural logistics network is in place at county, township and village levels, with all administrative villages having direct access to postal services.

These measures have achieved solid results, bringing hope and opportunities to rural areas, especially to those suffering from poverty.

Rural roads in Changshun County, Qiannan Prefecture, Guizhou Province

Rural bus service in Shashi Town, Ganzhou City, Jiangxi Province

II. Prioritizing Urban Public Transport

Public transport will be the future of modern cities, and an effective means to achieve sustainable development of transport and enhance the life quality of urban citizens. China prioritizes public transport for the beneýt of the people and to meet their travel needs.

1. A sound policy framework for public transport

In December 2012, the Chinese government issued the Guidelines on Prioritizing the Development of Urban Public Transport as a national strategy. The Ministry of Transport has launched public transport demonstration projects in 87 cities since 2012. It has also issued and implemented a series of regulations such as the Provisions on Urban Bus and Trolley Services, and the Provisions on Urban Rail Services for their operational management and sound development.

2. Steady expansion of urban bus and trolley services

The numbers and routes of urban buses and trolleys are increasing. By the end of 2020, there were 704,000 urban buses and trolleys in operation, covering 70,000 routes representing a total length of 1.48 million km. Right

of way is guaranteed for buses, with transit lanes exceeding 16,000 km. The Bus Rapid Transit (RRT), an important sector of the public transport system, has been launched in 35 cities including Beijing, Shanghai and Guangzhou, with a total of 9,891 buses in service along some 6,700-km lines.

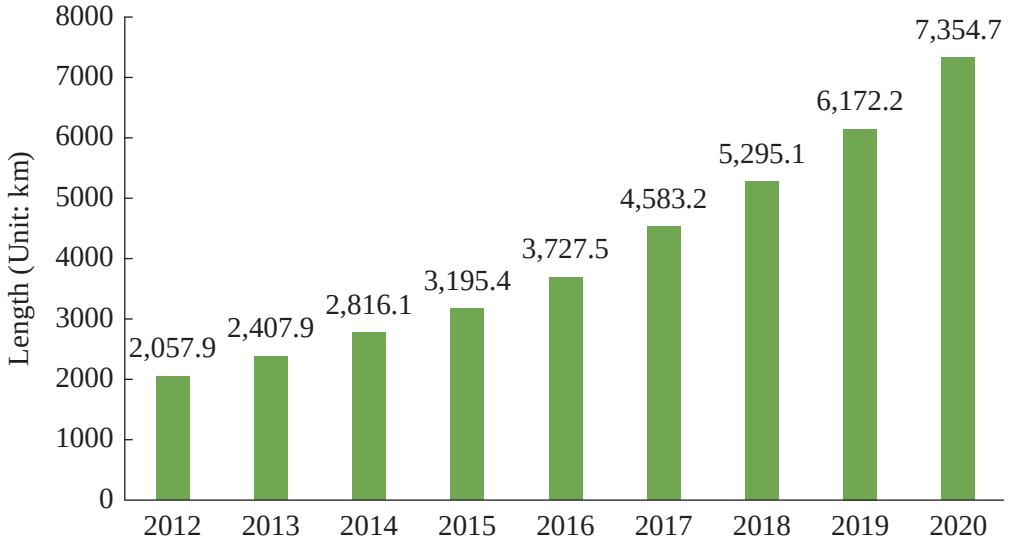
BRT in Nanning City, Guangxi Zhuang Autonomous Region

3. Rapid growth of urban rail transit

The expanding urban rail transit network has made it a popular choice for people's daily trips. By the end of 2020, 43 cities in China had opened 226 urban rail transit lines with 7354.7 km of track. The passenger volume in 2020 totaled 17.59 billion people.

The efficiency of the urban rail transit system is improving. In 2020, the minimum departure interval of rail transit in Beijing, Guangzhou, Chengdu and Hangzhou was shortened to 120 seconds or less, and to 105 seconds in Shanghai,

one of the best in the world. In 2020, the on-time performance of urban rail transit was over 99 percent. In cities like Beijing, Shanghai, Guangzhou and Shenzhen, over 50 percent of people are using urban rail transit systems for travel.



Operating mileage of China's urban rail transit 2012-2020

4. Upgrading urban public transport vehicles

China is upgrading urban public transport vehicles to improve their service efficiency. By 2020, China had over 460,000 new energy buses, accounting for 66.2 percent of the total. 82.1 percent of buses were air-conditioned, and 90.1 percent had GPS systems. Almost all the upgraded buses were equipped with on-board video surveillance, driver protection barriers, and barrier-free facilities. There were 1.39 million taxis in service across the country, 132,000 of which were new energy vehicles. China has basically achieved independent production of urban rail transit vehicles and will work on interchangeable design, modularity, system integration and vehicle standardization in the future.

III. Diverse Travel Choices

China is working to integrate transport with the internet, improving travel services to meet people's diverse and personalized travel needs.

1. Developing customized travel services

Based on big data analysis and available transport capacity, customized travel services can match travel routes perfectly with customers' requirements to better satisfy their point-to-point travel needs. In recent years, customized shuttle bus services have grown rapidly in China. By the end of 2020, over 50 cities had launched customized shuttle buses, tourist buses, and commuter buses to upgrade their bus services, and 25 provinces had opened over 3,000 customized passenger transport lines.

Customized Urban Shuttle Bus

In recent years, cities such as Beijing, Shenzhen, Shanghai, Guangzhou, Nanjing and Ji'nan have launched customized bus services. With a total of over 380,000 registered passengers and more than 300 customized bus routes, Beijing has a þeet of 371 buses ferrying 11,000 passengers on a daily basis. On-call cruising bus services are provided in Wangjing and Donghu areas:

Passengers can make an online reservation on boarding time and pick-up stations within the service zone and their orders are processed in one minute. This þexible and intelligent customized service operates 230 buses with a passenger volume of over 2,000 people every day.

A customized shuttle bus, Beijing

2. Popularizing mobile payments

More measures have been taken to integrate transit cards. By the end of 2020, transit card integration had been realized in 303 cities at the prefecture level and above, with about 100 million cards issued. Mobile payment is developing rapidly and is now used for bus fare in over 80 cities. Electronic ticketing operates in all high-speed railway and civil aviation passenger ser-

vices. A national ticketing network for road passenger transport is now in place. Eleven provinces have set up pilot electronic ticket booking ofýces for road passenger transport and over 800 bus stations above county level have launched electronic ticketing services.

3. Developing waterway transport services

China promotes online ticket booking and electronic ticketing for travels in key waterways. These services operate in the Qiongzhou Strait and are being piloted in Bohai Bay. Qiongzhou Strait operates ro-ro on liners at designated wharfs, on ýxed schedules, and with speciýed vessels, signiýcantly reducing the time for freight loading and passenger travel and making cross-strait transport more convenient and comfortable.

A ro-ro ship at the Qiongzhou Strait wharf

IV. Accessible Travel

China's population is aging fast, with 264 million people (18.7 percent) aged 60 or over. The population with disabilities has risen to more than 85 million. China is stepping up efforts to build accessible public transport and offer widespread, seamless, safe and comfortable travel services to all.

1. Formulating accessible travel polices

China has issued the Accessibility Design Guide for Urban Public Transport Facilities, General Technical Speciýcations of Accessible Facilities for Railway Passenger Cars and Multiple Units, and Technical Requirements of Barrier-free Low Floor and Low Entry City Buses, among others, to guide and regulate accessibility facilities in public transport. In 2018, the Ministry of Transport drafted the Opinions on Improving Transport Services for the Aged and People with Disabilities together with other departments to revamp services in this regard. Provincial capitals, cities with independent planning, and most cities at prefecture and county levels have either cut bus fare or made public transit free for individuals aged 65 years old and above. Cities such as Beijing, Hohhot, Zhengzhou, Shenzhen, Ji'nan, Qingdao, Kunming and Lhasa allow citizens of 60 years old and above to take buses and trolleys for free.

2. Strengthening accessible facilities in transport

In China, barrier-free facilities are designed, constructed and operated as part of transport infrastructure projects. Barrier-free access has been improved in train stations, bus stations, highway service areas, passenger ship terminals, airports, urban rail transit stations and urban public transport hubs. Active measures have been taken to equip passenger trains, ships, civil aircraft, buses, trolleys and urban rail transit vehicles with accessible facilities.

3. Improving accessible transport services

China is building an integrated transport information platform to provide timely and accurate transport information. It has provided better ride-hailing services for the elderly through hotline 95128, and is encouraging ride-hailing companies to optimize their apps by adding direct call buttons for the convenience of the elderly. Passenger transport hubs, bus stations, railway stations, airports, and transport vehicles have improved braille signage, communication systems, audio navigation systems and guidance systems for people with disabilities, and increased support for the elderly and the disabled on arrival and during check-in and boarding.

4. Protecting the rights and interests of women and children

China protects the rights and interests of women and children and strives

to provide them with better care. It has stepped up efforts to renovate transport infrastructure serving women and children, for example by setting up baby care rooms, optimizing the ratio of male and female toilets, designating women-only parking spaces and night parking spaces for women at major transport terminals and highway service areas. Courtesy seating is available on urban public transport vehicles for the elderly, the disabled, pregnant women, and others clearly in need. Special treatment is given at airports, railway stations and bus stations to certain types of passenger such as pregnant women and children. Some cities assign special subway cars and airport security screening checkpoints for women. The criteria for children qualifying for reduced or free tickets take age into consideration as well as height.

A baby care room in a coach station

Assistance for unaccompanied children at an airport

Chapter 7
Safe Transport That Puts Lives First

China emphasizes safety in transport. It incorporates safety requirements into every aspect and every stage of development of the transport industry, and improves the industry's capacity to address safety risks and respond to emergencies, so as to raise the overall safety level.

I. Safe Transport

Transport is interrelated with a wide range of industries, and transport safety is closely tied to people's wellbeing and sustainable economic and social development. China believes a well-established system is the best way to ensure workplace safety in transport, and has thus set up such a system that is standardized and effective and with well-conceived procedures.

1. Establishing a philosophy of safe development of transport

People and lives come ýrst in transport in China. The transport authorities always put peopleôs safety and property in the ýrst place, and coordinate safety with development of the industry. To ensure workplace safety, they implement a sound responsibility system, control risks, launch relevant campaigns, strengthen supervision and law enforcement, and raise the skills of safety personnel in the industry.

The transport authorities deliver public-interest advertisements and safety lessons learned from accidents, incorporate transport safety into basic curricula in schools, raise public safety awareness, skills and emergency response abilities, and foster a culture where everyone involves themselves in the improvement of transport safety.

These measures led to the following achievements from 2016 to 2020:

- There was no rail accidents of Grade I or Grade II[1];
- The number of road accidents rated Grades I and II decreased by 75 percent and the death toll by 69 percent;
- The number of water transport accidents rated Grades I, II and III dropped signiýcantly[2];

[1] There are four grades for land accidents (with Grade I as the most serious and Grade IV the least) in China according to the casualties or economic losses they cause.

[2] There are ýve grades for water transport accidents (with Grade I as the most serious and Grade V the least) in China according to the casualties, damages or economic losses they cause.

- Civil aviation has made a record of safe flight for consecutive 124 months;
- There was zero accident in postal and delivery services of Grade I, II or III.

2. Improving infrastructure to ensure safety

China has launched projects to secure safety in high-speed railways, built a security system that combines the protection measures in manpower, equipment and technology, and improved the security conditions along railway lines by removing potential risks from the high-speed rail routes and standard rail lines. Investment has been directed to upgrading outdated and unsafe bridges, building a monitoring system for the safety of highway bridge structures, updating road safety facilities, and launching a project of safe roads, bridges and passenger vehicles.

China has made further efforts in improving rural road safety by standardizing and improving safety warning signs and facilities on rural roads. From 2016 to 2020, it conducted safety projects covering 930,000 km of roads at township level and above[1], renovated 34,000 bridges considered as at risk, and completed a disaster prevention project along 7,890 km of national and provincial arterial highways. Road infrastructure was further improved to guarantee safety.

China works to ensure safety in water transport. Measures include eliminating hidden hazards that may cause vessels to collide with bridges, renovating outdated wharfs, upgrading ferry docks, dredging waterways, reinforcing dams serving as shipping hubs to remove potential risks, and improving rele-

[1] The road system in China distinguishes the following types of roads: national road, provincial road, county road, township road and village road.

vant safety facilities. Construction, routine testing, and maintenance of safety facilities in ports and waterways are also taken as a priority.

A rural road with upgraded facilities

3. Increasing the technical performance of transport vehicles and equipment

China makes every effort to improve the safety performance of transport vehicles and equipment, including improving technical norms for vehicles and vessels, standardizing models of freight vehicles, and encouraging the installation of intelligent monitoring and reporting, collision prevention and operation surveillance equipment.

By the end of 2020, 80 percent of tourist coaches, scheduled coaches in categories I, II and III[1], and trucks hauled with hazardous materials were

[1] Scheduled coaches are divided into four categories in line with their operation regions and lengths in China.

equipped with intelligent monitoring and reporting equipment to automatically identify and monitor unsafe behaviors by drivers, and provide real-time reporting to the police. Illegal vehicle modiýcations and vehicles that failed to meet safety requirements are strictly prohibited. China's transport industry has intensified the management of vehicle transporters, and disqualified 40,000 trucks between 2016 and 2020.

Sound testing and management procedures have been established for storage tanks and safety facilities at ports. China has also improved the safety facilities in ferries and docks, intensiýed security checks and improved the ability to identify hazardous items in passenger wharfs, and gradually achieved automated and unmanned operations at high-risk sites and sectors.

Workers examining subway trains to ensure safety

4. Safety training for personnel working in transport sector

China's transport authorities attach great importance to the training of personnel working in the transport sector. A program was launched to raise their safety skills, a basic knowledge database has been set up, and structured training courses have been provided to employees. The authorities hold routine exams on the safety knowledge of company heads and safety managers, urge enterprises to employ legally certified safety engineers, and supervise the results. Competitions are held on safety knowledge and skills. Professionalism and self-discipline are promoted, particularly for key posts like airplane pilots, ship's captains, and drivers.

5. Improving governance capacity on transport safety

China attaches great importance to improvement in laws and regulations, and technical standards on transport safety. The authorities employ measures like regulatory talks and bringing cases under public supervision. The responsibility system and capacity building have been improved, a list of administrative departments' rights and responsibilities for work safety have been established, and the primary responsibility for safety of enterprises has been implemented. China operates a double preventative mechanism for different levels of safety risk management and control, and identiýcation and removal of hidden dangers – as well as other mechanisms for risk assessment, analysis and prevention. There are detailed lists of major risks throughout the whole

process of transport to enable precise management and control. China has intensiýed the process of accident investigation, conducted in-depth analysis and research into typical accidents and major hazards, revised related procedures and policies, and implemented rectification measures. China has promoted wide use of products representing technical advances in the transport industry. Information technology and high-tech equipment are employed to improve the level of safety methods and intelligent supervision.

II. A Stronger Transport Emergency Management System

The transport emergency management system is responsible for ensuring trafýc and transport continuity in response to emergencies in the transport industry, natural disasters, public health incidents, security breaches and other such events. To consistently improve emergency response, China's transport authorities worked hard to modernize the transport emergency systems and to improve relevant skills.

1. Improving contingency planning

From 2009 to 2018, the Chinese government issued three special national plans: the National Contingency Plan for Maritime Search and Rescue, the National Contingency Plan for Urban Rail Transit Operation Emergencies, and the National Contingency Plan for Major Marine Oil Spills. In 2017, the

Ministry of Transport of China revised the Contingency Plan for Highway Traffic Emergencies and the Contingency Plan for Waterway Traffic Emergencies, and formulated ýve departmental plans including the Comprehensive Contingency Plan for Transport, thereby further improving the contingency planning system.

Transport authorities at all levels and their directly afýliated maritime administrative agencies have built contingency planning systems based on the conditions of their jurisdictions, prepared contingency plans and supporting work procedures including operating guidelines and other documents, and carried out regular emergency drills. Based on problems identiýed during the drills, they revise and upgrade their systems.

A large passenger ship in a distress drill

2. Improving the systems, mechanisms, and legal procedures for emergency response

China continues to improve its systems, mechanisms, and legal procedures for transport emergency management. The Ministry of Transport has established an emergency office to coordinate various transport means and integrate command systems for transport emergency response. The Chinese government has established and improved the Inter-ministerial Joint Conference for Maritime Search and Rescue and the Inter-ministerial Joint Conference for Major Offshore Oil Spill Response, forming a rapid and efýcient approach to maritime search and rescue and major offshore oil spills. It provides unified government leadership with the main operational responsibility on local authorities, and enlists help from both professional forces and the public in line with the principle of proximity and convenience.

The newly revised Maritime Trafýc Safety Law of the Peopleôs Republic of China entered into force on September 1, 2021. There is a chapter dedicated to the basic principles of maritime search and rescue, the process to upgrade search and rescue agencies, the rights and obligations of all parties participating in search and rescue operations, and the command and coordination mechanisms.

3. Building an information system for emergency response

Work on China’s integrated command platform for transport emergency response is accelerating. A national network for monitoring key vehicles and

an automatic identiýcation system (AIS) covering offshore waters, the main stream of the Yangtze River and other navigable waters of inland rivers have been established, and the China MSA AIS information service platform has been in operation. These measures have further enhanced the industry's operational monitoring and comprehensive emergency response.

Provincial-level transport authorities have established sound information systems with functions such as CCTV video monitoring, video conferencing, command and scheduling, and have developed other functions to adapt to the local geographic features, transport means and other local conditions.

Platform for Safe and Smooth Trafýc and Emergency Response in Highway and Waterway in Guizhou Province

The Platform is consisted of six systems and a set of mobile phone applications including comprehensive monitoring, road network operations, waterway transport, road transport, workplace safety, and emergency response.

It provides a panoramic display of real-time congestion on the province's road network, real-time weather conditions, and the conditions of infrastructure and equipment. It can offer real-time monitoring and forewarn of heavy trafýc þow and emergencies on the road network, with an accuracy rate above 90 percent. The platform can estimate the duration and impact of such emergencies and generate automatic traffic management plans, thereby assisting the trafýc authorities in making quick decisions. Combined with emergency command vehicles, mobile base stations, drones, handheld terminals, and other equipment, it can mobilize and dispatch emergency personnel, materials, and equipment in a timely manner to participate in emergency response, leading to an efýciency increase of 60 percent.

4. Improving emergency reserves and support

China is accelerating work on national equipment and material reserve centers for highway emergency response in different regions. Relying on expressway and highway maintenance units or material reserve units, all provinces and equivalent administrative units have built reserve stations at the provincial and municipal levels. Thus a basic highway emergency reserve system covering national, provincial, and municipal levels is in place.

China has improved safety supervision and rescue in waterway transport. An emergency equipment system has been established with large and medium-sized rescue vessels, rescue helicopters, large-tonnage salvage vessels, and saturation diving equipment as the main components. The response time in key coastal waters is within 90 minutes, and that for waters of main inland ports is less than 30 minutes.

China has further strengthened oil spill response. National oil spill equipment reserves are reasonably distributed and are under standard management. China can clean up 1,000 tonnes of spilled oil in key coastal areas with professional teams, and 10,000 tonnes in high-risk coastal areas by pooling social resources.

Chinaôs Maritime Search and Rescue

China has built 24 rescue bases, 3 integrated salvage bases, and 6 air bases. It has established the Sansha Maritime Rescue Center. More than 70 rescue vessels, over 120 salvage vessels, and 20-plus rescue aircraft have been commissioned into service. Nineteen emergency rescue teams have been formed. The emergency

support force can go into action under level 9 (phenomenal) sea conditions, and carry out effective rescue operations under level 6 (very rough) sea conditions.

Joint operation of air and marine rescue operation

Highway clearance operation

III. Battle Against Covid-19

In the face of the abrupt outbreak of the Covid-19, China's transport authorities made an overall plan to strike a balance between preventing the transmission of the coronavirus and guaranteeing the smooth transport of healthcare personnel and emergency supplies, which has laid a solid foundation for China's strategic victory in the battle against the Covid-19 pandemic.

1. Playing an important role in the prevention and control of Covid-19

China's transport authorities mobilized every means of transport such as rail, road, waterway, civil aviation and postal services to ensure unimpeded transport network, with particular emphasis on emergency express lanes and channels for transporting necessities for work and daily life, while totally blocking transmission of the virus.

China introduced a series of timely policies and measures to guarantee transport of key products, medical supplies and daily necessities: China Rail offered preferential services to emergency materials. Road transport ensured that emergency transport vehicles were given top priority and secured unimpeded toll-free passage for them. Priority was also given to emergency waterway transport to facilitate vessels in passing through locks, piloting, anchoring and docking. Civil aviation cut the number of þights but continued

with essential ones, and worked out ways to transport goods to match supply and demand between air transport enterprises and international trade and foreign-funded enterprises. Postal services have also arranged express channels to secure the delivery of key materials, medical supplies and daily necessities.

Working with other departments, the transport authorities organized the transport of Covid-19 vaccines and exempted the tolls for relevant vehicles to better serve the cause of vaccine production, supply and inoculation.

Air China dedicated to transport Covid-19 vaccines

2. Stopping the spread of Covid-19 via the transport network

The transport authorities adopted precise measures to stop inbound Covid-19 cases and prevent new domestic outbreaks.

All 8 rail ports and 65 road ports on China's border suspended or closed passenger services, with 39 road ports allowing freight passage. All types

of road passenger traffic between the mainland and Hong Kong or Macao, except for the shuttle buses on the Hong Kong-Zhuhai-Macao Bridge, were halted. Passenger services by waterway between the mainland and Taiwan were also suspended, as were international passenger services. Passenger cruises were also halted as well as inbound and outbound cruise lines.

Domestic transport enterprises strictly implemented epidemic prevention measures in passenger stations and transport vehicles, and guaranteed the smooth and orderly transport of goods. Together with public health departments, the transport authorities set up test and quarantine stations in highway service areas and in bus and railway stations and ports, to prevent Covid-19 from spreading.

Workers disinfecting a subway train

3. Strengthening international transport cooperation as part of the Covid-19 response

China has strengthened transport cooperation in Covid-19 prevention and control with other countries to promote a global community of health for all.

The International Maritime Organization recommended and circulated a number of documents from China to all of its member States and, associate members and relevant international organizations, including Guidance on the Prevention and Control of Covid-19 on Board, Guidance on the Prevention and Control of Covid-19 for Ports and Front-Line Staff, and Guidance on How to Handle and Offer Urgent Assistance to Seafarers in Case of Sickness or Injury During the Pandemic of Covid-19.

The Civil Aviation Administration of China shared two documents with its counterparts in more than 40 countries: Preventing the Spread of Coronavirus Disease 2019 (Covid-19) Guideline for Airlines, and Preventing the Spread of Coronavirus Disease 2019 (Covid-19) Guideline for Airports.

Via the Universal Postal Union, China Post shared with its 192 member states the Handbook for Covid-19 Prevention and Control.

China participated virtually in the Special Session of the Eighth China-Japan-Korea Ministerial Conference on Transport and Logistics, the China-ASEAN Transport Ministers' Special Meeting on Covid-19, and the 19th China-ASEAN Transport Ministers' Meeting, and joint statements were issued after the events.

Chinaôs transport authorities have intensiýed the management of key materials to maintain the international supply chain and ensure the smooth de-

livery of medical materials and foreign trade goods, and made every effort to facilitate the delivery of aid materials to other countries.

China-Europe Railway Express carrying protective supplies

Postscript

China has achieved its First Centenary Goal of building a moderately prosperous society in all respects, and eradicated extreme poverty within its territory. It is now marching towards the realization of the Second Centenary Goal of building China into a great modern socialist country.

Fully applying its development philosophy, China will make every effort to ensure that its transport network supports the new development dynamic. It will forge ahead with the Outline for Building China's Strength in Transport and the Outline on Developing Integrated National Transport Network to promote high-quality development, and step up efforts in building a world-class transport system that meets the expectations of people and serves the people with strong mobility. With these efforts, it lays a solid foundation for China's realization of socialist modernization by the year 2035, and the goal of building China into a great modern socialist country by the middle of the 21st century.

Sustainable development is the common goal for all of humanity. The world is still facing challenges posed by the Covid-19 pandemic and economic recession. During this difýcult time, transport can play an important role

in connecting countries, maintaining supply chains to rally global strength to fight against the Covid-19 pandemic, and promoting economic growth and sustainable development. Upholding the vision of a global community of shared future, China will continue to implement the 2030 Agenda and strengthen international exchanges and cooperation in the transport sector. China will work with other countries to promote sustainable transport and global connectivity, and make a greater contribution to the building of a better world for all.