

GEF City Cluster Eco-Transport Project (P121263)

**ET/CP5 Beijing-Tianjin-Hebei (JingJinJi)
City Cluster Transport Integration
Planning Study**

**Main Report
(Brief)**

**Beijing Transportation Research Center
Shenzhen Metropolitan Transportation Planning &
Design Institute Co., Ltd. (Sub-contractor)**

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1 Project Profile

1.1 Project background and significance

In the process of rapid new industrialization and urbanization in recent years in China, with continuously extended urban size and perfection of transportation systems among cities in the process of regional economy and urbanization development in China, the megalopolis-centered development trend with rapid rise of City Clusters formed by some metropolises and middle-sized and small cities occurs gradually, which becomes a new pattern for urbanization development in China. As the bond of regional economic relation and an important carrier of space construction of City Cluster, transportation will greatly restrict function of overall efficiency of City Cluster, and greatly affect ecological environment, space structure and land form of City Cluster, and living quality of urban residents, without properly solving comprehensive transportation development issues of City Cluster systematically. Therefore, it is vital to establish a safe, unblocked, convenient and green comprehensive transportation system development pattern for healthy and sustainable development of City Cluster.

Transportation integration is the leading field of the Coordinated Development for the Beijing-Tianjin-Hebei (Jingjinji) City Cluster, which is a major national strategy of china. At present, the Guideline of the Plan for Coordinated Development for the Jingjinji City Cluster and the Transportation Integration Planning for Jingjinji Coordinated Development have been released. Relevant cities of the Jingjinji City Cluster are accelerating the implementation of Jingjinji coordinated development strategy, and continually exploring new thought, path and pattern for regional transportation integration development.

In this overall background, GEF gives financial aid to China's Ministry of Transport to carry out the "ecological comprehensive transportation development project of City Cluster", and takes the "Beijing-Tianjin-Hebei (JingJinJi) City Cluster Transport Integration Planning Study" as a pilot, which have very important guiding significance for further deepening and perfecting the Guideline for the Coordinated Development of the Jingjinji City Cluster, and promoting sustainable development of comprehensive transportation of Jingjinji City Cluster. Meanwhile, research achievement and successful experiences of this project will provide important reference for construction and development of City Cluster in China and other developing countries.

1.2 Objectives and Methodology

This project aims to study the key issues for the transportation integration of Jingjinji City Cluster under the guidance of the Guideline of the Plan for Coordinated Development for the Jingjinji City Cluster and the Transportation Integration Planning for Jingjinji Coordinated

Development, totally covering the Terms of Reference. The study will improve the efficiency of passenger and freight transportation system, optimize the regional transportation mode, and guide the transportation to develop towards a greener direction. The study will strengthen on policy measures, so as to make the proposed plan be with operability, advancement and demonstration.

The methodology is as follows: First, summarize and analyze the status and problems of regional comprehensive transportation system and service in Jingjinji City Cluster, and review relevant documents; Second, transportation demand forecast and analysis of Jingjinji City Cluster; analysis on transportation development trend of Jingjinji City Cluster; After that, put forward a planning on passenger transport and freight transport of Jingjinji City Cluster, and to establish a comprehensive transportation system and planning effect evaluation of green and low carbon; at last, put forward suggestions of the integrated transport system and mechanism of Jingjinji City Cluster.

1.3 Key achievements and conclusions

(1) Identify and analyze the main problems of comprehensive system of transportation in Jingjinji City Cluster, by combining the requirements of national development strategy

In the national strategy of Jingjinji coordinated development, it clearly puts forward the functional orientation, spatial pattern and urban system layout of Jingjinji City Cluster, and meanwhile puts forward that it shall first break through the transportation integration, together with corresponding development requirements. By combining the requirements of national development strategy, this book summarizes social and economic development characteristics of Jingjinji City Cluster from four aspects of strategic position, population distribution, economic pattern and urbanization development. On this basis, it further summarizes development status of comprehensive system of transportation in Jingjinji City Cluster in four aspects of railway, highway, airport and port, and analyzes the problems existing in comprehensive system of transportation in Jingjinji City Cluster from the aspects of passenger transport and freight systems. The main problems are reflected in the relatively extensive transportation structure, imperfect networked transportation system, green and low-carbon system to be established, and urgent need to innovate system and mechanism and investment and financing mode.

(2) Analyze to construct passenger transport demand forecast model of Jingjinji City Cluster on the basis of regional social economy, population and industry

In this study, it innovatively constructs passenger transport demand model of Jingjinji City Cluster, provides quantitative support for regional integration of city cluster, and provides basis for transportation planning program and low-carbon comprehensive transportation research within

scope of future city cluster. On the basis of various available survey data, and by fully combining city size, spatial layout planning, population gross and structure, industrial distribution, economic development level and transportation integration planning program, and by referring to city cluster development experience at abroad and home meanwhile, the Jingjinji City Cluster passenger transport demand model breaks through traditional demand forecast method, and divide models by adopting hierarchical forecast, trip rate based trip generation model and gravity improvement model based traffic distribution model, and scenario assumption. Judge passenger transport trend of Jingjinji City Cluster in accordance with the model analysis results:

- With the construction of intercity railway and high-speed railway, the linkage among Beijing, Tianjin and Shijiazhuang will be further closer. Beijing-Shanghai channel and Beijing-Guangzhou channel will carry large traffic flow ;
- The commuting flow will be increased between Beijing center zones and new towns, cities/towns surrounding Beijing (Yanjiao, Langfang, Ku'an and Zhuozhou ;
- The traffic flow demands in major channels in the metropolitan circle present a multi-layer and composite trend.

(3) Adopting the method of total volume variation tendency judgment, combining the hub and network evaluation, forecast the freight demand of Jingjinji

In this research, judge the freight development trend over the annual total freight volume in Jingjinji. Adopting freight traffic of major hubs such as the ports and airports, as well as road and rail freight survey data, analyze the current situation of demand. According to the national industrial structure and economic development policy, regional collaborative industrial planning, combined with necessary experience and horizontal comparison, make judgments of freight transport development trend.

- From the feature of goods, the density of goods is reduced, the value increased, and the timeliness increased;
- From the aspect of freight spatial distribution: Beijing cargo accounted for lower, freight volumes of Tianjin and Hebei grow rapidly.
- From the aspect of freight organization mode: The proportion of rail transport increases, the demand for advanced freight organization mode enhances.
- From the aspect of transportation mode: Aviation freight volume in 2020 doubled compared to 2013, while the volume in 2030 doubled compared to 2020, regional air cargo throughput capacity will basically meet the demand; Port throughput influenced by multiple factors, such as the energy structure adjustment, economic slowdown, the proportion of goods suitable for container increasing, has a slow growth. Bulk cargos accounted for a lower proportion of port throughput and container's ratio further increase; Railway transport demand for traditional bulk cargo (coal, oil, ore, grain, etc.)

decreases, goods transport services for the high-tech manufacturing and urban life will have a rapid increase; The average distance of highway transportation will further reduce, the radial transport network taking the core city and the hub as a dot was further enhanced. Because of the regional rail transport network improved and coal transport demand decreased, coal transport needs relying on highway further reduced.

(4) Propose countermeasures and suggestions for developing regional integration from three aspects of rail integration, airport integration and connecting flight and combined transportation of passengers

Rail transit is the core and top priority of transportation integration development of Jingjinji City Cluster. According to the requirements of developing “Jingjinji city cluster on rails”, this research puts forward the development thinking and suggestions of creating “composite corridor of rail transit of metropolitan area”, and constructing “cities on hubs” from two respective levels of channel and hub, to strengthen interconnection and interworking and mutual fusion of rail transits in different levels. For development of airport integration, on the basis of judgment for airports development status and main problems of Jingjinji City Cluster, this research puts forward the path and suggestions for coordinated development of regional airports from four aspects of strengthening overall plan for airspace resource, encouraging development of low-cost and general aviation, strengthening the construction of fast rail transit channel between Beijing New Airport and main node cities in the region, and strengthening system coordination and policy guidance. For connecting flight and combined transportation of passengers, on the basis of development and practice at home and abroad, this text summarizes three main development modes, and puts forward specific countermeasures and suggestions in the aspects of fully achieving One-Card of regional transportation, constructing regional comprehensive transportation information service platform, creating integrated comprehensive transportation hub, constructing whole-link trip planning information service platform, and strengthening the formulation and application of connecting flight and combined transportation of passengers.

(5) Put forward countermeasures and suggestions for developing regional integration freight from three aspects of making up short slab of transportation infrastructures, constructing modern Jingjinji port cluster, and developing advanced transportation organization mode.

Put forward the suggestion for constructing flow distribution hub network of capital from the aspects of railway and hub, including implementation suggestion for constructing capital freight loop and key node scheme; on the basis of coal transportation demand forecast result, make the judgment that capacity of the future regional coal transportation corridor is surplus, and thus put forward the development proposal of comprehensive utilization of coal transportation corridor; put forward suggestion of port collecting and distributing by combining transportation demand

change characteristics and distribution of source of supply in each port; refine division of labor of the port confirmed in the Guideline by combining zone bit of regional port in international navigation, resource endowment of each port and characteristics of hinterland economy, and put forward the coordinated development implementation thinking of withdrawal of government, takeover of association and enterprise oriented; put forward regional multimodal transportation network and supporting measures from three aspects of international regular train, intercity clusters and inner city cluster on the basis of regular train of multimodal transportation , and put forward suggestions for promoting development of drop and pull transportation in the aspects of financial support, enterprise collaboration, system improvement, etc. through the analysis on critical problems restricting drop and pull transportation .

(6) Put forward green and low-carbon comprehensive transportation development thinking of Jingjinji City Cluster, and establish planning effect evaluation method system.

According to Jingjinji green transportation development status, it puts forward to establish green and low-carbon oriented Jingjinji comprehensive transportation system development thinking in the aspects of transportation structure, facility construction, transportation organization, device selection, technology application and management system, by combining domestic and overseas policy and technology experience. Establish the model of measuring energy consumption, carbon emission and pollutant emission from bottom to top in the planning for passenger transport and freight integration of Jingjinji City Cluster, and measure and evaluate status of 2013 and planning for passenger transport and freight in 2020 and 2030. Carbon emissions of unit passenger turnover volume in 2020 and 2030 are respectively 8% and 19% lower than that of 2013, and carbon emissions of unit freight turnover volume in 2020 and 2030 are respectively 22% and 47% lower than that of 2013; decline proportions of energy consumption and carbon emission of unit passenger and freight turnover volume are similar; total emissions of highway pollutants including CO, HC, NOX, PM2.5 and PM10 in 2030 will respectively decline for 54%, 76%, 18%, 88% and 88%. The assessment indicates that effect of energy conservation and emissions reduction of planning for Jingjinji passenger transport and freight integration, and energy conservation and emission reduction space of freight is bigger than passenger transport.

(7) Put forward suggestions for the development of integrated system and mechanism of Jingjinji City Cluster from the aspects of regional overall planning, industry integration management, investment and financing mode innovation and guarantee of regulation.

On the basis of status summary and symptom analysis of transportation system and mechanism of Jingjinji City Cluster, and by combining interregional comprehensive transportation cooperation mechanism experience in foreign metropolitan area (city cluster), the book puts

forward suggestions for innovation of integrated system and mechanism of Jingjinji City Cluster. For the suggestions, the first is to perfect regional planning and overall plan, decision and coordination mechanism after discussion, research to make major planning of Jingjinji transportation integration development, coordinate major projects and major conflicts, create fair development environment, and give consideration to both overall regional interests and long-term development; the second is to establish traffic zones, achieve integrated management for key transportation industries in the region, and meet the requirements for integrated management for key transportation industries in Jingjinji City Cluster; the third is to innovate investment and financing system, construct sustainable transportation investment and financing mode, give full play to decisive effect of market disposition source, and accelerate the removal of system and mechanism obstacles restricting coordinated development and factor mobility; the fourth is to strengthen relevant guarantee for transportation related laws, policies and standards, promote interconnection and interworking and sharing of regional comprehensive transportation information, and form unified and open transportation market in the region. Through reform and innovation of system and mechanism, establish regional integrated development system on the basis of complementary advantages and mutual benefit and win-win result, promote multi-industry and deep communication and cooperation of Jingjinji City Cluster in the transportation field, release transportation development potential of Jingjinji City Cluster, and achieve sustainable development of Jingjinji City Cluster.

2 Status, problem and tendency analysis of comprehensive transportation of Jingjinji City Cluster

2.1 Economic characteristics

From the point of view of the social and economic development of Jingjinji City Cluster, there are four characteristics:

2.1.1 Important strategic role

Jingjinji City Cluster, located in the north of North China Plain, boasts a quite important strategic position, with Yanshan Mountains in the north, North China Plain in the south, Taihang Mountains in the west, and Bohai Bay in the east. Jingjinji City Cluster contains two municipalities directly under the Central Government including Beijing and Tianjin and 11 prefecture-level cities of Hebei Province including Shijiazhuang, Chengde, Zhangjiakou, Qinhuangdao, Tangshan, Langfang, Baoding, Cangzhou, Hengshui, Xingtai, Handan, etc., with the area of 216,000 square kilometers. its space scale equal to some world-class city groups including city cluster of Northeastern United States. In 2014, Jingjinji City Cluster, with permanent resident population of 110 million and provincial GDP of RMB 6.65 trillion, holds 8% of the national population on the area, creates 10% of the economic aggregate. Jingjinji City Cluster, which has a vital strategic position for China's economic and social development, has become the urban gateway for promoting opening-up and international exchange of North China, the important supporting area for establishing innovation-oriented country and the area with strongest innovation ability, and the future central growth pole with greatest vitality in China and the demonstration area of new-type urbanization.

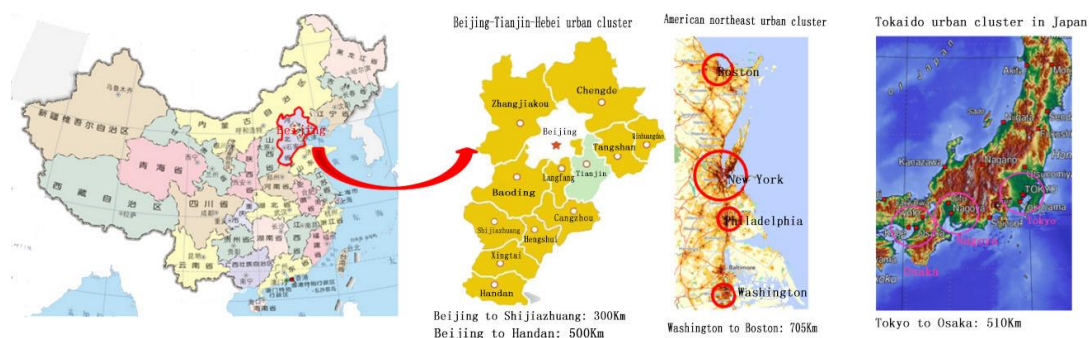


Figure 2-1 Space Scale Comparison of Jingjinji City Cluster and Foreign City cluster

2.1.2 Imbalanced spatial distribution of population

From space distribution, population distribution of Jingjinji City Cluster is imbalanced, with the population mainly concentrated in Beijing, Tianjin, Shijiazhuang and Baoding, especially in Beijing and Tianjin (as shown in Figure 2-2). Population densities in the two cities are respectively 1311 persons/square kilometer and 1306 persons/square kilometer, which are all over 3 times of Hebei Province (393.4 persons/square kilometer) and over 9 times of the national average level (142.1 persons/square kilometer).

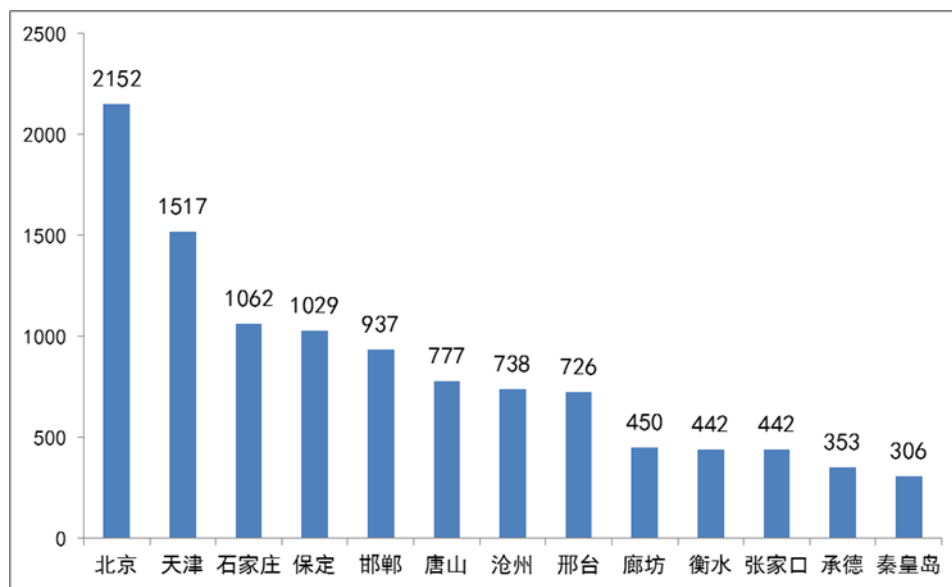


Figure 2-2 Permanent Resident Population Situation of Each City in Jingjinji City Cluster

2.1.3 Disconnected development of economic pattern

In 2014, Jingjinji City Cluster has a provincial GDP of RMB 6.7 trillion accounting for 10% of China, and GDP per capita of RMB 60,817 (USD 9,560) which is 1.3 times of the national average level. However, from spatial pattern, cities of the City Cluster present a certain unbalance. Beijing and Tianjin, having large difference of developmental level with surrounding areas, presents disconnected development.

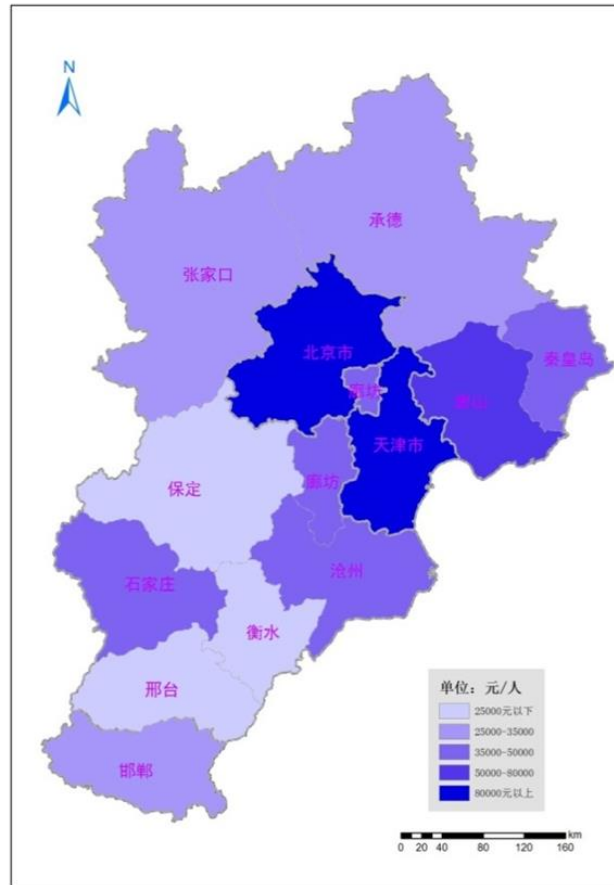


Figure 2-2 Distribution Situation of per capita GDP in Jingjinji City Cluster

2.1.4 Significant differences of urbanization level

In 2013, with the urban population of 65.61 million and urbanization rate of 60%, Jingjinji City Cluster is in the middle and later development phase of urbanization. From interior of the region, urbanization level shows significant differences. With the urbanization rate of over 80%, the two megalopolises Beijing and Tianjin enter into the phase of high urbanization. However, with the urbanization rate of only 48%, Hebei is still in the accelerated development phase of urbanization,

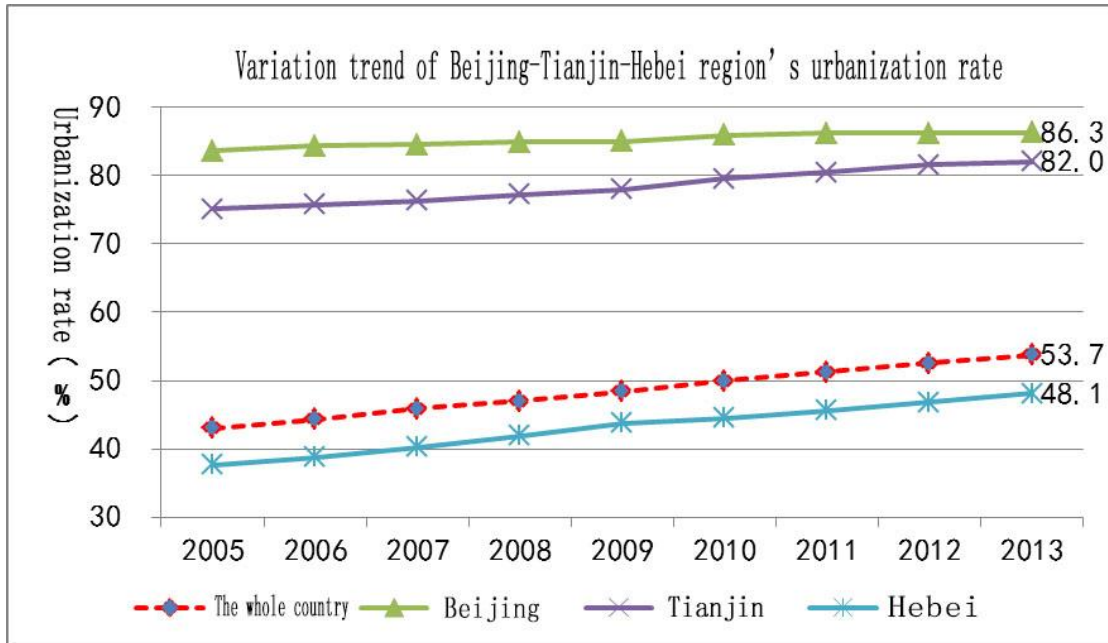


Figure 2-4 Variation Trend of Jingjinji City Cluster's Urbanization Rate

2.2 Status of comprehensive transportation

Currently, the inter-mode of transportation system has been formed in Beijing-Tianjin-Hebei region, covering railway, roadway, airway and port transportation. The capacity of transportation facility has been equivalent to the Yangtze River Delta Region and Pearl River Delta Region, leading in China and laying a solid foundation for the coordinated development in Jingjinji City Cluster.

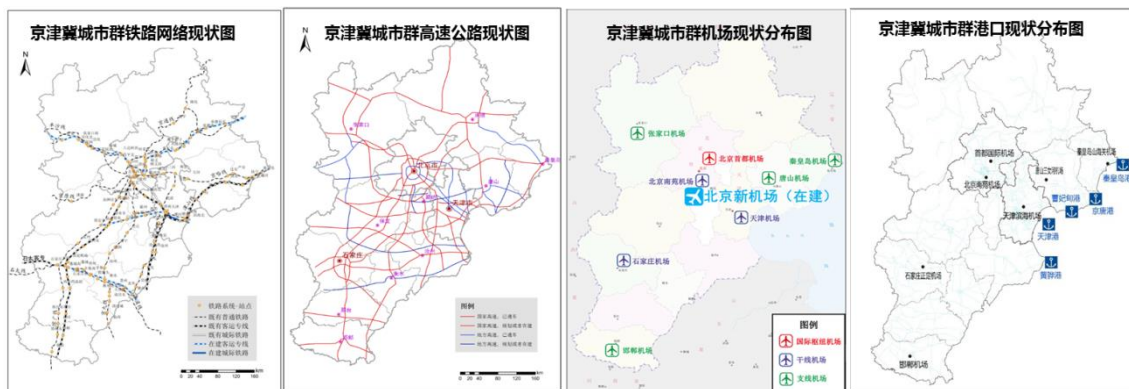


Figure 2-3 Status map of comprehensive transportation system in Jingjinji City Cluster

1. Railway

In this region, the railway network presents radial road network pattern by taking Beijing as the center, which mainly consists of radial lines of Beijing-Guangzhou line, Beijing-Kowloon line, Beijing-Shanghai line, Beijing-Harbin line, Beijing-Tongliao line, Beijing-Chengde line,

Beijing-Baotou line, Beijing-Yuanping line, etc. and longitudinal and horizontal lines and branch lines of Tianjin-Shanhaiguan line, Shijiazhuang-Dezhou line, Shijiazhuang-Taiyuan line, etc. as shown in Figure 2-7. By 2014, operation mileage of regional railway is 8,509 km, with the railway network density of 3.9km/hundreds of square kilometers, which is 3.4 times of national average level.

2. Highway

In Jingjinji City Cluster, it has formed the national expressway backbone network which takes the national highway hub Beijing as the center, and consists of 7 capital-centered radial national expressways, 2 longitudinal lines and 3 horizontal lines, By the end of 2014, the length of the expressways in Jingjinji City Cluster reaches 8005 kilometers.

3. Airport

At present, in the Jingjinji City Cluster, it has formed the airport group consisting of civil airports including Beijing Capital International Airport, Tianjin Binhai International Airport, Shijiazhuang Zhengding International Airport, Handan Airport, etc. and military and civil (dual-use) airports including Beijing Nanyuan Airport, Qinhuangdao Shanhaiguan Airport, Tangshan Sannuhe Airport, etc., as shown in Figure 2-9. Wherein, the Beijing Capital International Airport, as the most important center airport and gateway airport in China, and also the biggest international airport in Asia, has more than 200 domestic and international lines which are operated by more than 40 foreign and regional Airlines and more than 20 domestic Airlines, and can lead to 76 domestic cities and 58 international and regional cities. In 2014, passenger throughput of the Beijing Capital International Airport reached 86.13 million, which ranked first in Asia and second in the world. In addition, Beijing New Airport started its construction on December 26, 2014, and will be put into operation in 2019. Tangshan port, mainly in the transport of iron ore and coal, Qinhuangdao port is China's largest coal and other energy output port, coal shipments accounted for 87% of the total amount of transportation; Huanghua port is the second passage of combined transportation of sea and rail transport in China by coal from the north to the South China transport.

2.3 Problems of transportation system

Currently, the inter-mode of transportation system has been formed in Jingjinji City Cluster, covering railway, highway, air and port transportation. The capacity of transportation facility has been equivalent to the Yangtze River Delta Region and Pearl River Delta Region, leading in China and laying a solid foundation for the coordinated development in Jingjinji City Cluster. However, in accordance with the requirements of Jingjinji collaborative development strategy, there are still some problems in the aspects of transportation mode, infrastructure network layout and institutional mechanisms, just described as follows:

(1) Irrational transportation structure, poor coordination between transport and city, and extensive development model need to be changed

Over 80% of freight and passenger transportation in Beijing-Tianjin-Hebei region rely on road and the intensive railway transportation only takes a small proportion. On the other side, car travel occupies a large proportion in center regions in large cities: Taking Beijing as an example. Car share ratio reaches 32.7% (car travel proportion within the 2nd ring is double more than comparable regions in worldwide cities). Large comprehensive hubs such as airport and railway stations still mainly rely on cars and highways to collect and distribute traffic flows. For example, 75% of outflow passenger left Beijing South Railway Station by cars. The proportion of railway is low. Take Tianjin Port as an example, in 2013, railway only accounted for 16.7% in traffic collection and distribution, while road occupied 80.4%. In particular, 98% containers relied on road transportation. In addition, there is a serious gap between large comprehensive passenger hub layout and the urban functions, as well as poor coordination with the hub function positioning and surrounding land use, resulting in low efficient land use, but also reduces the efficiency of traffic integration services.

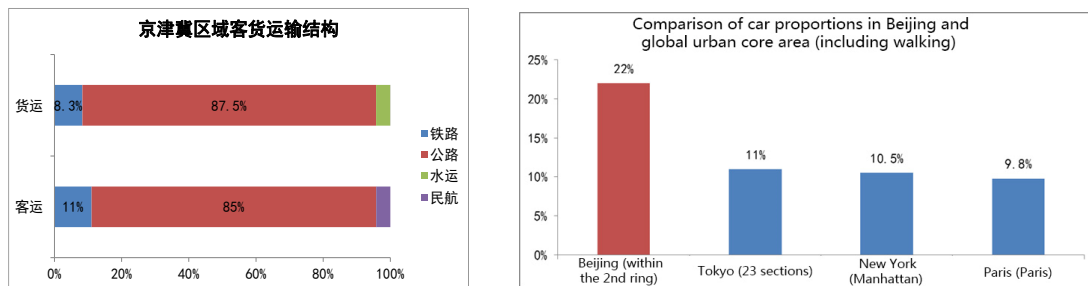


Figure 2-4 Passenger and freight transport structure in Jingjinji City Cluster (left) and Proportion of car travel in Jingjinji City Cluster (right)

(2) Irrational network spatial layout, low efficiency in integrated transportation, and network transportation system need to be changed.

From the point of view of the structure of the network, the highway and railway network system both showed the "single center, radial, non-equilibrium" network pattern. The organization of railway transport functions (including transit transfer function) is mainly undertaken by the Beijing hub, Tianjin, Shijiazhuang hub for regional traffic organization function has not yet been effectively, which is exacerbated by Beijing's traffic pressure, but also reduces the efficiency of passenger and freight transport.

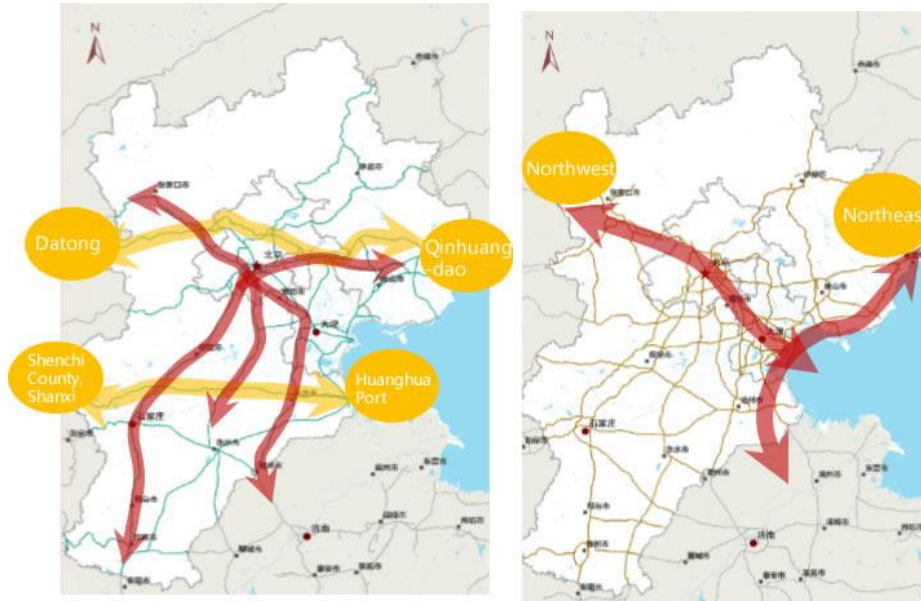


Figure 2-7 Jingjinji railway and road transit channel

From the point of view of the functional level, the rail transit network system is not perfect, lacking of a multi-level, large capacity and high efficiency of rail transit system to support the metropolitan area and urban agglomeration. First, it is lacking of commuter rail system in metropolitan area. For example, Beijing currently mainly on single subway system to support the commute travel between the suburbs and central city, with slow speed and insufficient capacity. Second, it is lacking of intercity rail transit system to contact the major cities of Jingjinji City Cluster. Currently, there are only two lines built including Beijing-Tianjin line and Tianjin-Baoding Line.

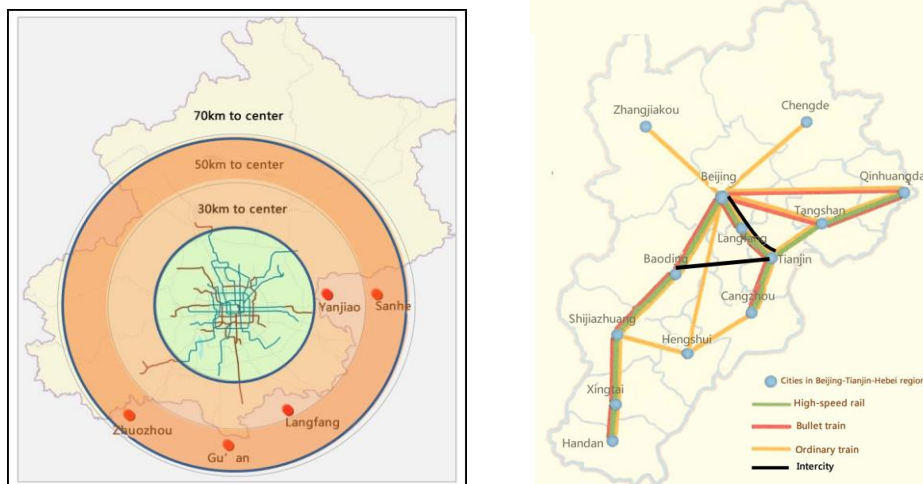


Figure 2-5 Rail Map in Beijing Metropolitan Area (left) and Rail Transit Level of Jingjinji City Cluster (right)

From the point of view of transportation efficiency, with the progress of Jingjinji coordinated development, construction of high-speed railway, intercity railway and other rapid rail systems

and urban external traffic are accelerating. However, there is lack of convenient transportation linkage between some new high-speed railway stations and intercity stations and existing ordinary-speed stations. Unsmooth link with urban transportation causes low transfer efficiency, which makes passengers feel inconvenient.

(3) The environmental impact of transportation increasingly prominent and low-carbon transportation system need to changed

Firstly, there is serious air pollution in Jingjinji City Cluster and transportation occupies a high position in energy consumption. 9 cities among Jingjinji City Cluster were included in top 15 cities with the worst air quality in air quality ranking among 74 cities released by Ministry of Environmental Protection in 2014. Since the winter of 2015, Jingjinji City Cluster and surrounding areas have witnessed three large-scope serious atmospheric pollutions. According to the relevant study data, Beijing automotive gasoline and diesel consumption accounted for 55%, and the contribution rate of the PM2.5 generated by the motor vehicle reaches 31% in Beijing, 20% in Tianjin.

Secondly, green and low-carbon transportation mode accounts for low proportion, including the carbon emission by private cars accounts for a high proportion, while public transport with lower energy consumption and low emission only takes a small proportion. The vehicle model structure is irrational (energy and power) and low-carbon infrastructure construction is insufficient.

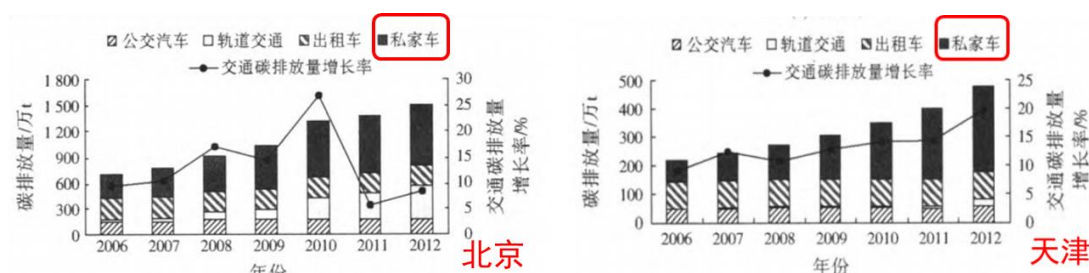


Figure 2-6 Figure 2-7 Growth situation of traffic carbon emissions in Beijing (left) and Tianjin (right)

In addition, the problems of lacking of studies and applications for energy-saving and emission reduction technology, lacking of management and supervision, unperfect examination system, low enthusiasm of enterprises of energy-saving and emission reduction, and less leading demonstration enterprises, greatly restricted the green low-carbon transportation development in Jingjinji City Cluster. So it needs to build a green and low carbon comprehensive transportation system and promote the healthy and sustainable development for Jingjinji City Cluster.

(4) Lacking regional coordination, large capital gap, institutional model and financing and investment model need to be changed.

First, there is a lacking of normalized and institutionalized discussion and decision-making mechanism: Currently, regional issues are discussed case by case. The normalized,

institutionalized and sustained meeting and decision mechanism has not established yet. At present, there is still lack of effective investment and financing mode of cross-regional transport infrastructure. Although the Jingjinji Intercity Railway Investment Co., Ltd. has been established by governments of the three places and China Railway Corporation, it does not involve in expressway, suburban rail, etc., and faces many problems in specific operational level and practical level, such as how to establish a powerful coordinated promotion system, and how to build profit model and attract social capital. Transportation Integration Planning for Beijing-Tianjin-Hebei Coordinated Development proposes key construction projects such as railway, road and other infrastructure construction. However, land (requisition-compensation balance) and capital lack policy support, leading many planned projects hardly to be progressed. In addition, it is difficult to promote the joint transport and other advanced transportation organization mode because of a series restriction factors such as the development degree of market, policies, regulations and standards, and so on.

2.4 Regional development trend

From the above analysis of the development situation of Jingjinji City Cluster, it can be seen that the phenomenon of obvious differences in regional development, unbalanced transport infrastructure network and services is very obvious. With the release of the *National “13th Five-Year” Plan*, the *Guideline of the Plan for Coordinated Development for the Jingjinji City Cluster* and the *Transportation Integration Planning for Jingjinji Coordinated Development*, there will be a new pattern of development in the aspects of industrial structure and layout, urban system structure, and transport network.

(1) Industrial distribution adjustment of Jingjinji City Cluster

According to the *Guideline for the Coordinated Development of the Jingjinji City Cluster*, core of Jingjinji coordinated development strategy is to disperse non-capital functions of Beijing, in order to adjust economic structure and spatial structure, develop a new road of connotative intensive development, explore a kind of optimal development mode in the area with dense population and intensive economy, promote regional coordinated development, and form a new growth pole. Therefore, with gradually dispersed capital functions, industrial distribution of Jingjinji City Cluster in the future will be greatly adjusted. It is mainly reflected in: Beijing will intensify high-end service functions in the aspects of politics, culture, international contact and scientific and technological innovation in central urban area, and develop service economy, knowledge-based economy, green economy and headquarters economy; central urban area of Tianjin and core area of Tianjin Binhai New Area will connect with culture, science and technology service and high-end economic service functions with Beijing; as the main function undertaking place, Hebei actively undertakes industrial function transfer of capital and science and technology achievement transformation of Beijing and Tianjin. For example, Baoding, Tangshan

and Langfang focus on undertaking enterprise and public institution for technology R&D, financial back and production service industry. It will focus on the establishment of “4+N” function undertaking platform, by taking four strategic cooperative functional zones including Caofeidian, New Airport-related Economic Zone, Zhangjiakou-Chengde Ecological Function Area and Binhai New Area as the main body, according to basic thinking of industrial distribution in Jingjinji City Cluster. The industrial structure adjustment and layout optimization will bring the change of the overall level of economic development growth and economic space pattern, and bring about changes in the distribution of passenger and freight demand growth and demand for Jingjinji City Cluster.



Figure 2-8 Layout sketch map of industrial space in Jingjinji City Cluster

(2) Optimization and adjustment of urban system and spatial organization of Jingjinji City Cluster

At present, the Jingjinji City Cluster is a relatively typical “dual-core spatial structure mode”. As the nodes of dual-core cities, Beijing and Tianjin jointly support development of the region. Annual regional spatial planning layout will be “one core, two cities, three axes, four districts and multiple nodes”. The regional spatial strategy will change from “dual-core” to “multi-center and

networked” urban spatial layout. The optimization and adjustment of regional urban system and spatial organization will change population size and population structure of Jingjinji City Cluster. Beijing will witness reducing population while improving population quality. The non-core functions are relocated from Beijing. According to the principles of increase control, redistribution of population stock and combining redistribution and control measures, city centers, in particular, old cities, will increase access requirements, including scale control of newly developed projects, increasing traffic jam fee and congestion resource fee. Population in the concentration areas will be relocated or people are encouraged to serve for service industry outside Beijing.

Tianjin will play aggregation functions. Tianjin city centers will strictly control population scale, while Binhai New District will attract more people through establishing financial trade center, public service center and regional transport hub. Thus, Tianjin’s population will witness a stable growth in the future.

Shijiazhuang will expand its capacities and functions. In the future, Shijiazhuang city center will be developed into the “Third Pole” of Jingjinji City Cluster, as the key strategic emerging industry and advanced manufacturing base, key national transport hub and regional logistics center. These efforts will greatly improve the attractiveness of Shijiazhuang City and urbanization level. In the future, the residents and migrants will increase in Shijiazhuang City. Thus, the population of Shijiazhuang City predicts a growing trend. According to the above spatial layout and functional positioning, the population in other cities will also experience a varying fast growth. For example, the population in Baoding, Langfang and Tangshan will function as a growth pole for Hebei region and the place receiving the industrial relocation from Beijing. The population will grow largely in the future.



Figure 2-9 Sketch map of space layout plan in Jingjinji City Cluster
(3) Change of Traffic network pattern of Jingjinji City Cluster

According to the Transportation Integration Planning for Jingjinji City Cluster Coordinated Development, a comprehensive transportation network channel of “Four Longitudinal Lines, Four Horizontal Lines and One Loop” will be constructed in Jingjinji City Cluster, to form a fast, convenient, efficient, safe, high-capacity and low-cost interconnected comprehensive transportation network. This kind of new integrated, multi-node and latticed regional traffic network pattern in Jingjinji City Cluster helps form the “1-hour” commuting circle among central urban area, new town and satellite town of Beijing, Tianjin and Shijiazhuang Region, and “1-hour commuting circle of Beijing, Tianjin, Baoding and Tangshan”. And it basically achieves 1.5-hour travel between adjacent cities. Different transport circles have extremely obvious promoting function to passenger transport demand of Jingjinji City Cluster. Construction of networked traffic structure will help improve maneuverability of resident trip, shorten travel time, improve travel comfort, increase demand of Jingjinji City Cluster for passenger transport, and thus increasing total passenger capacity of Jingjinji City Cluster.

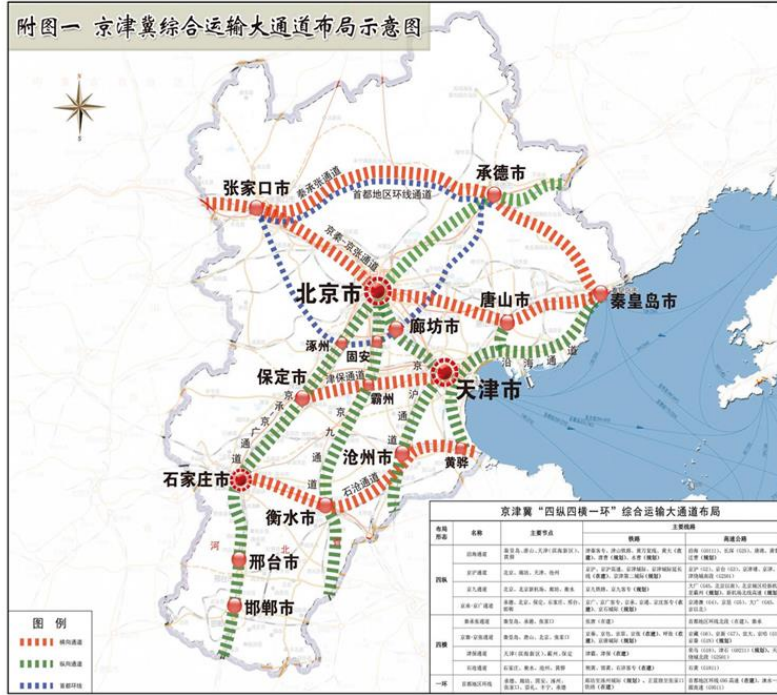


Figure 2-10 integrated transport corridor layout in Jingjinji City Cluster

3 Development focus, countermeasures and suggestions of Beijing Tianjin Hebei Urban Agglomeration passenger service system

3.1 Study the development trend of passenger transport demand

Basic thinking of passenger transport demand forecast of Jingjinji City Cluster: On the basis of collecting relevant mass development data (such as urban population, GDP and passenger capacity) of cities in Jingjinji City Cluster, and by combining development thinking of capital function dispersal, regional urban system layout and industrial structure adjustment, research and judge social and economic development trend of Jingjinji City Cluster, and construct passenger transport demand forecast model of Jingjinji City Cluster. And make the following judgments of Beijing and Tianjin city group development trend of traffic demand

(1) From external passenger transport demand of Jingjinji City Cluster, connection of Jingjinji City Cluster and other regions (Yangtze River Delta and Pearl River Delta) will be enhanced in the next year, and meanwhile flow of Beijing-Guangzhou and Beijing-Shanghai Channels will increase rapidly.

(2) From internal passenger transport demand of Jingjinji City Cluster, communication and contact between cities of Jingjinji City Cluster are further enhanced, and passenger flow transiting Beijing will be dispersed to a certain extent in the next year.

(3) From scope of commuting circles around Beijing, commuting passenger flow between center of Beijing and new town and towns (Yanjiao, Langfang, Gu'an, Zhuozhou, etc.) around Beijing will further increase. The main traffic aisles within the metropolitan area will show multi-level and compound traffic demands.

3.2 Key points and suggestions of integrated passenger transportation service system in Jingjinji City Cluster

3.2.1 Integrated development of rail transit

According to the Beijing Tianjin Hebei coordinated development of transportation planning, the national railway network (ordinary-speed railway and high-speed railway), intercity railway network, suburban (urban) railway and urban rail transit in Jingjinji City Cluster respectively support the passenger flow demand for different spatial ranges, different trip distance and different trip purposes, and provide divided and targeted functions. The efficiency of comprehensive

transportation system is mainly reflected in the time taken during the entire process of transportation from the place of departure to the destination, rather than the time taken by one kind of modes of transportation only. Especially compared with the “door-to-door” mode of transportation by cars, the rail transit is hard to provide “door-to-door” service, but can effectively attract the passenger flow preferring to this mode of transportation only by strengthening the competitive advantages in transportation efficiency, service level, etc. Therefore, there is an urgent need to promote the organic integration among rail transit systems at all levels, so as to enhance the efficiency of comprehensive transportation as well as the competitiveness and attraction of rail transit, further change the transportation structure of the entire Jingjinji City Cluster that the passenger transportation is severely relying on the mode of transportation by cars, and effectively improve the air quality in the region.

1. Build complex rail corridors in the metropolitan area

During the planning of Jingjinji transportation infrastructure, it requires forward-looking planning to reserve rail transit channels in advance. Especially, the demand for commuting transportation within the metropolitan circle shall be take into sufficient consideration. Therefore, it is recommended to increase the functions of suburban railways in the channels of existing planned intercity railways in the Jingjinji City Cluster, and reserve stations and cross-line conditions in areas with intensive passenger flow in order to build complex rail corridors in the metropolitan circle. By reference to the development experience of world-class city clusters such as New York, Tokyo and Paris, there usually are 1000~3000km of suburban railways serving large-scale commuting trip within their metropolitan circles, with station spacing at 5~10km. Take the metropolitan circle in Tokyo as an example. Most of its suburban railways are developed on the bases of original railways. In addition to trunk lines only stopping by major stations, there are also extra urgent, standard urgent, rapid and ordinary trains stopping by all stations in the same railway channel, which not only achieves the intensive utilization of land but increases the operation efficiency of transportation integration

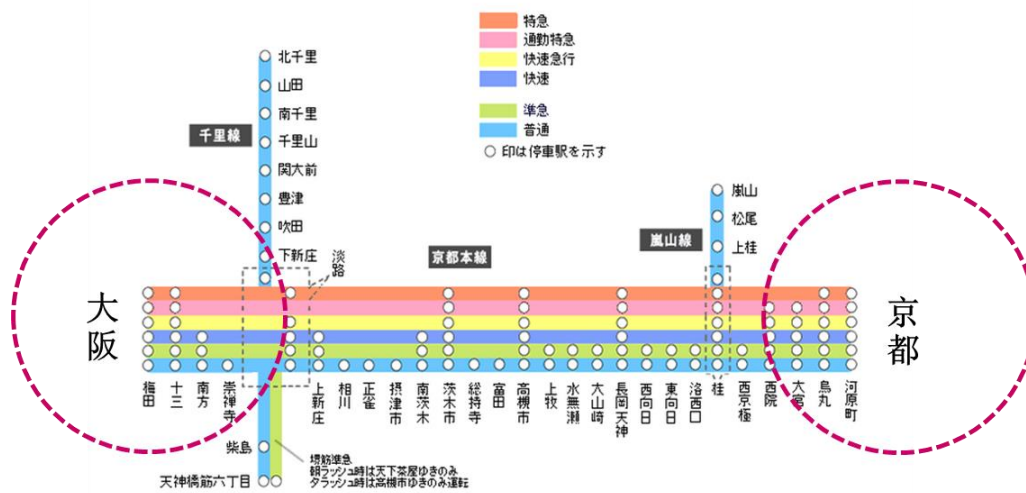


Figure 3-1 complex rail corridors from Osaka to Kyoto

2. Build “cities on the hub”

During the site selection of rail hub stations, try to set intercity railway stations in the central area of a city as far as possible, and connect the stations to important urban functional areas so that passengers can go to their destinations on foot or by other green modes of transportation as soon as they arrive at the stations, so as to relieve the stress of ground transportation at root and improve the intensive utilization of land. Take Tokyo as an example. Its integrated railway transportation hubs on the Yamanote Line represented by Shinjuku Station and Tokyo Station are not only the regions where various rail transit means are highly integrated, but also the locations of its center and sub-center of the metropolis(see as Figure 4-3).. Take Shinjuku Station as an example. There is no attractive huge buildings in this hub actually, but the hub has truly achieved the integration of transportation and building groups by fully utilizing underground space and combining shopping malls and shopping centers. More than 100 entrances and exits are distributed in an area exceeding 2km², effectively connecting the hub and surrounding buildings through underground corridors. In this way, it not only provides convenience for passengers’ shopping and business, but also facilitates rapid and efficient evacuation of passengers in the hub. According to the statistics for transportation survey data of Tokyo, 88.7% of exit passenger flows in large-scale integrated railway hubs are evacuated on foot (except in-station rail transfer), while the proportion of those by cars is lower than 3%.



Figure3-2 Schematic Diagram of Tokyo’s Railway Transportation Hubs and Layout of Urban Functions

3.2.2 Integration development of airport

At present, urban agglomeration of Beijing, Tianjin Airport showing regional airport development is not balanced, level function is not perfect, to capital airport on behalf of the major international aviation hub of international competitiveness is not strong, and the collecting and distributing pattern in car based problems

1. Strengthen the overall arrangement of airspace resources and the structural adjustment of flights and routes

Carry out integrated overall arrangement in route layout, flight scheduling, air traffic control, etc. of airports in Beijing, Tianjin and Hebei.

For the airports in Beijing, it is necessary to grasp the opportunity of Jingjinji coordinated development and non-capital functional dispersal to conduct structural adjustment to current flight schedules under the integrated consideration of factors including market requirement, match of transportation capacity, transportation support, etc. by distributing part of domestic routes to airports in Tianjin and Hebei, applying more superior schedules released to long-distance and medium-distance flights on international routes, flights of Hong Kong, Macau and Taiwan and flights on domestic trunk routes, further enlarging the proportion of international flights in Beijing Capital International Airport, increasing the proportion of international and transit passengers and enhancing the international competitiveness of hubs.

2. Encourage and promote the development of low-cost aviation and general aviation

Strive to develop low-cost aviation, encourage airports in Shijiazhuang and Tianjin to establish low-cost airlines, branch airlines and bases, improve relevant supporting facilities of low-cost operation, attract newly-increased routes and density-increased flights of low-cost airlines, and support China United Airlines to transform into low-cost airlines. Meanwhile, create conditions to accelerate the development of general aviation, improve the layout of general airports, select a site surrounding Beijing to construct a general airport used for take-off and landing of corporate aircrafts, focus on promoting the construction of emergency rescue and medical aid systems, and support the operation of various general aviation businesses.

3. Enhance the construction of rapid rail transit channels between Beijing New Airport and major node cities in the region

Aviation is the most essential support for cities participating in international competition in the future. Beijing New Airport will play a core role in the Jingjinji City Cluster owing to its advantages of location and scale. Therefore, on the one hand, actively coordinate and promote the construction of an comprehensive transportation network of main trunk highways based on “five

vertical lines and two horizontal liens” centered by Beijing New Airport; on the other hand, pay more attention to strengthening efficient and convenient connection of rapid rail transit between main node cities in the city cluster (such as Tianjin, Baoding and Shijiazhuang) and Beijing New Airport, and develop such cities to international gateways for opening up, so as to make the new airport serve as a Jingjinji airport that can significantly improve the opening-up degree of cities in Jingjinji City Cluster and accelerate the process of regional internationalization.

4. Improve coordination of systems and guidance of policies to promote the coordinated development of regional multi-airport group

Based on the functional orientation of airports in Jingjinji City Cluster, it is necessary to strengthen coordination of systems and guidance of policies so as to effectively promote the coordinated development of regional multi-airport group, especially provide certain preferential policies for the development of airports in Hebei. First, provide certain preferential policies for airports in Shijiazhuang in some aspects, such as the allocation of air traffic rights and scheduling resources of domestic hotspot cities, so as to guide Beijing Capital International Airport to distribute its part flights to Shijiazhuang Zhengding International Airport; Second, provide certain policy support for airports in Hebei in the approval of branch routes and fund subsidies for branch route transportation, take preferential measures in relevant fees, taxes, etc., and encourage the establishment and participation of base airlines or other airlines, especially low-cost airlines, so as to accelerate the development of branch route network and low-cost aviation in Hebei.

3.2.3 Integration development of intercity bus

As a mode of passenger transportation service between highway passenger transportation and urban bus, the intercity bus refers to a mode of road passenger transportation that runs on the roads between one city and another city, observes the public-transit mode of transportation organization, adjusts the density of runs according to the situation of passenger flow and operates according to the prescribed lines and stations, mainly used for satisfying the trip demand of the masses along the lines.

Currently, there are two inter-city bus models in Jingjinji City Cluster: inter-province public transport and the public transport development of inter-province passenger transportation. According to the survey results on transport authorities in three regions, inter-city bus faces many difficulties, which could be summarized in the following three aspects, including unclear functional positioning, lacking legal support and coordinated planning, etc, so we put forward with the following suggestions:

- **Define functional orientation:** As part of the regional comprehensive transportation system , it mainly undertakes the cross-region short travel within the metropolitan area range. As the supplement of inter-city railway and suburban railway and rail

backbone network, it provides diversified bus travel modes to promote the coordinated development of Beijing-Tianjin-Hebei urban-rural passenger transportation ; in recent years, as the suburban railway and inter-city railway network has not yet built , it becomes the main way for commuting travel between cities in the metropolitan area and surrounding cities and towns.

- **Strengthen the support of laws and regulations:** Issue the relevant management regulations or methods and strengthen the support of laws and regulations about definition, positioning, service scope, line approval, operation and management and service standards and regulations of inter-city buses; perfect line cross-regional administrative examination and approval mechanism. For example, the same enterprise shall be entrusted to operate and manage the cross-regional line.
- **Strengthen overall planning:** Make bus-oriented inter-provincial line and inter-provincial line and wholly consider passenger flow channel of the future inter-city railway and suburban railway. In addition, fully consider the actual demand, not limited to bus-oriented operation of adjacent counties.
- **Perfect subsidy method:** Subsidy compensation shall be based on the trip purpose. If the inter-city travel focuses on the commuting travel and compensation belongs to the range of subsidy for meeting the resident's basic travel demand , please refer to the urban bus standard in the price making and then provide the subsidy; if it focuses on the commercial trip, do not provide subsidy but adopt market-oriented operation way.

3.2.4 Intermodal passenger transportation

The connecting and intermodal passenger transportation is a transportation organization mode which provides integrated fare, information and services for multiple trips of one transportation mode or trips of different transportation modes such as highway, railway and civil aviation. It basically features “all-purpose ticket”, “seamless connection” and “whole-course service”.

By reference to development experience at home and abroad, the connecting and intermodal passenger transportation mainly have the following modes:**The first**, “All-in-one card” and “all-in-one ticket” for trippers: The “all-in-one card” is a kind of travel card that allows passengers to take various transportation modes (such as inter-city railway, suburban railway, subway and bus) in the region. The ”all-in-one ticket” means that passengers can transact various kind of passenger ticket businesses among multiple modes of transportation involving back and forth trip, connecting trip and remote transaction via electronic ticket and network ticketing, so as to achieve “one single schedule, one-off payment and one trip ticket”.**The second**, Study on connecting and intermodal passenger transportation with hubs as core: It means that large-sized comprehensive transportation hubs are built to facilitate fast and convenient interchange between different

transportation modes, so as to complete the integrated connection among different trip sections. **The third**, “Trip planning platform” based on the entire trip chain: That is, the trip planning platform is built to provide regional “one-stop” trip planning services for passengers. Passengers can get trip information only by inputting origin/destination and preferences (such as minimum fare, fewest interchanges and shortest time), so as to make better trip arrangements and make trips faster, and more convenient and comfortable.

Certain progress has been made in the connecting and intermodal passenger transportation in Jingjinji City Cluster, including “all-in-one card” for Jingjinji, and “intermodal aviation and railway” services provided by Shijiazhuang Airport and Tianjin Airport. we can do it from these aspects:

1. Complete implementation of all-in-one card for municipal public transportation

All-in-one cards of Jingjinji City Cluster are only limited to partial urban public transport lines. It is recommended to further expand its use functions so that passengers can carry only one transportation card to take the inter-city railway, suburban railway and various modes of public transport such as subway and bus in the region. In addition, ticket vendors and automatic fare gates at entrances and exits are set up to facilitate passengers’ departure and arrival.

2. Establishment of regional comprehensive transportation information service platform

Break industrial segmentation and administrative barriers, work together with civil aviation, railway and road sectors, and urban transportation management departments of Beijing, Tianjin and Hebei to promote the integration and real-time sharing of regional comprehensive transportation information, build the comprehensive transportation information service platform at the Jingjinji City Cluster level, and provide all-mode, all-link and full-coverage transportation connection information and pushing & inquiry system (such as information on flight departure from/arrival at airport, train time table and subway time table) within the comprehensive hub, so as to make passengers enjoy faster and more convenient and accurate connecting and intermodal transportation.

3. Develop integrated transport hub and improve service standards and efficiency of inter-modal transportation.

The comprehensive transportation hub is a convergence point of lines of various transportation modes, the point connecting different trips of passengers, and key point and sally port of intermodal transportation. On one hand, convenient and fast interchanges are completed between different transportation modes within the comprehensive transportation hub through convenient and fast connection facilities. For example, #2 Terminal of Hongqiao Airport to the east of Shanghai Hongqiao Hub and Hongqiao Railway Station to the west of the Hub are closely connected with each other. After getting off a train at Hongqiao Railway Station, passengers walk eastward (about 500m taking about 7 min) to B1 of #2 Terminal through the interchange hall and

then take an elevator to 3F departure floor directly. This is very convenient. On the other hand, the continuous, whole-course and all-mode traffic guiding system is provided in the comprehensive transportation hub to effectively guide passengers to make fast interchanges between different transportation modes.

4. Establishment of all-link trip planning information service platform

Based on experience of international metropolises (such as London and New York) and the comprehensive transportation information service platform at the Jingjinji City Cluster level, the whole trip chain based trip planning information service platform is provided for passengers. The platform can fulfill the following functions: OD “point-to-point” trip planning and ticket sales. This is a real one-stop service mode, making passengers enjoy faster and more convenient cross-regional trips.

4 Key points and suggestions of City Cluster integrated freight transportation system planning

4.1 Freight transport demand forecast and analysis

In this research, judge the freight development trend over the annual total freight volume in Jingjinji. Adopting freight traffic of major hubs such as the ports and airports, as well as road and rail freight survey data, analyzes the current situation of demand. According to the national industrial structure and economic development policy, regional collaborative industrial planning, combined with necessary experience and horizontal comparison, make judgments of freight transport development trend. Technical methods and ideas of Freight Transport Demand Forecast is shown in the figure below in detail:

(1) From the feature of goods, the density of goods is reduced, the value increased, and the timeliness increased;

(2) From the aspect of freight spatial distribution: Beijing cargo accounted for lower, freight volumes of Tianjin and Hebei grow rapidly.

(3) From the aspect of freight organization mode: The proportion of rail transport increases, the demand for advanced freight organization mode enhances.

(4) From the aspect of transportation mode: Aviation freight volume in 2020 doubled compared to 2013, while the volume in 2030 doubled compared to 2020, regional air cargo throughput capacity will basically meet the demand; Port throughput influenced by multiple factors, such as the energy structure adjustment, economic slowdown, the proportion of goods suitable for container increasing, has a slow growth. Bulk cargos accounted for a lower proportion of port throughput and container's ratio further increase; Railway transport demand for traditional bulk cargo (coal, oil, ore, grain, etc.) decreases, goods transport services for the high-tech manufacturing and urban life will have a rapid increase; The average distance of highway transportation will further reduce, the radial transport network taking the core city and the hub as a dot was further enhanced. Because of the regional rail transport network improved and coal transport demand decreased, coal transport needs relying on highway further reduced.

4.2 Key points and suggestion of City Cluster integrated freight transportation system planning

4.2.1 Integrated logistics service network

4.2.1.1 Construction of the capital transit diversion channel and hub

Railway lines: Construct the capital railway circle and ease the pressure of passing rail-freight traffic. Prior establishment of Sanhe-Guan-Huailai Southern circle, which is convenience for Shuangqiao. Fengtai west marshalling station relocation. In the process of new corridor construction, reserve interflow condition for existing corridor intersect node, create room for establishment of inter-corridor freight train. For freight trains in capital ring, it is important to focus on energy corridors (Daqin etc.), national trunk corridors' (Jingguang, Jingjiu, Jinghu, etc.) interchange.

As far as the construction of capital railway circle is finished, massive transit traffic passing round the circle, Beijing-centered radial channels will release some freight capacity. It is suggested that surplus train capacity in the ring will play a role in urban delivery services and suburban railway.

Logistic hubs: Make the layout of Beijing, Tianjin city group logistics hub reasonable, and the difference between the logistics hub serving Jingjinji City Cluster and serving Beijing, Tianjin and other central cities should be cleared.

Logistic bases in Beijing which serve Jingjinji City Cluster should be relocated to capital circle region, in order to ease Beijing's non capital function and relieve the pressure of traffic in Beijing. The railway network in Jingjinji cluster take Beijing as the center, leading to 90% of the amount of freight operations for transit traffic in the Beijing Shuangqiao, Fengtai West Marshalling Station, which doesn't conform to capital function. It is suggested to study relocating the Shuangqiao station, Fengtai West marshalling station to Guan West Railway Station, Sanhe station, making the layout of Beijing Tianjin Hebei City Cluster of railway hub reasonable, transferring the center position of railway freight to Tianjin and Hebei. Reinforce the logistics function of freight central station, such as Pinggu, Xianghe, Langfang, Tunzhou South, Huailai, provide service for industry belt around the capital.

In the future, Beijing new airport will be an important logistic hub and provide radial service for Tianjin and middle-south part of Hebei, reinforce intersection between new airport and capital freight ring line, create a seamless intermodal hub and logistic base which includes aviation, railway and road transport.



Figure 5-1 Capital through distributional corridor and hub construction

4.2.1.2 Enhance the transport capacity and efficiency of coal channel

Affected by China's economy entered a new norm, the adjustment of economic structure, the shift of industrial space, the energy structure optimization, the coal industry entered in demand growth suspended period, excess production capacity and inventory digestion period, environmental constraints strengthening and structural adjustment crucial period, which is called "four phase coexistence" development stage. At the same time, with the implementation of coal and electricity integration project in traditional coal output regions (western inner Mongolia, Shanxi and Shaanxi), coal transport demand will shrink further. According to the demand forecast, coal throughput in ports of Tianjin and Hebei is 579 million tons in 2020, 523 million tons in 2030, which means coal transport demand will shrink.

Future years railway coal corridor could not only cover the demand for outward coal transit in “Shanxi, Shaanxi, Inner Mongolia” (Three west zones), but also has surplus capacity.

Suggestion:

(1)Strengthen the construction of terminal connection line of the trunk channel. Constructing the branch line of coal channel and connecting branch line and mining area. Optimizing the project layout, promoting the coordination of points and lines, increasing utilization efficiency of energy channel, effectively reducing the costs from the pit to cargo port (closing price minus price at the mining site).

(2) Increase counter-utility of energy corridor. Currently, energy corridors are mainly based on one way transport, which is transfer from mining site to port and port to mining site without workload. It is necessary to further use the railway transport capacity, enhance the division of labor cooperation between coastal areas of industry and cities in the Midwest, also further marketization of rail transport services, and actively carry out intermodal services with other modes of transport, reduce the railway freight price, improve competitiveness of the railway in the comprehensive transport market, improve the utilization ratio of the reverse transport.

(3) Promote the interaction between the urban industrial and energy channel. Enhance extroverted degree of economy in the node cities along Shuohuang Railway, Daqin Railway, Zhang Tang railway, in order to improve the non-coal transport demand. And research the interconnection of energy channel and intersect truck railway lines, and transfer the Daqin Railway, Shuohuang Railway from coal transport to integrated transportation.



Figure 4-2 The optimization of Jingjinji port-railway collection and distribution system

4.2.2 Constructing modern port group in City Cluster

Selection of competition and cooperation strategies for coordinated development of Beijing-Tianjin-Hebei port group

The competition and cooperation strategies for port group mainly include three types: Port integration mode (such as American New York-New Jersey port), port association mode (such as European Port Organization) and enterprise capital penetration mode (such as American Seattle-Tacoma port), take “government withdraws, association enters and enterprises are the

subject” as the principle. The specific meaning is as follows:

Government withdraws: Beijing-Tianjin-Hebei local governments play an important role in port competition, causing that the essence of competition is competition among port cities, port operation guided by governments is insensitive to the market and has low operation consciousness, and repeated construction and vicious competition among ports are adverse in realizing the overall interests of the region. Local governments shall focus on coordination to ensure independence of port operation, create a favorable market environment through legislation and also try to adopt a mode similar to “TOD” to enlarging the operation authority of port enterprises.

Association enters: Learn successful experience from European Sea Ports Organization, establish a Jingjinji City Clusteral Port Shipping Association, and promote integration of clearance formalities, market management, administrative law enforcement and government systems.

Enterprise are the subject: To further exert market mechanism and interest mechanism, establish a cross-industrial cross-regional new port operation mode taking enterprises as the subject, capital as the tie and projects as the carrier, encourage Beijing-Tianjin-Hebei port enterprises to carry out capital operation, off-site investment and cooperative operation and even merge or organize enterprise alliance, and meanwhile, encourage various capitals outside this region to enter Beijing-Tianjin-Hebei ports for construction and operation.

4.2.3 Development and application of advanced transportation organization mode

4.2.3.1 strengthen the planning of multimodal transport

Traditional, single, partitioned transportation organization mode has not been enough to support the Jingjinji City Cluster Coordinated development strategy, and the state has taken intermodal transport as a significant breakthrough to enhance the comprehensive transportation service during the 13th Five-year. At present, Jingjinji City Cluster has a plurality of demonstration project. Intermodal transportation plays an important role in developing green freight, reducing logistics costs, optimizing the transport structure and supporting The Belt and Road national strategy.

1 Take intermodal scheduled train as the starting point to promote the development of Jingjinji freight intermodal. Construct four levels of intermodal network in the Jingjinji City Cluster.

(1) International connection (sea-railway intermodal)

According to National Development and Reform Commission, the Ministry of foreign affairs, the Ministry of Commerce jointly issued < Promote the construction of the Silk Road Economic Zone and the twenty-first Century Maritime Silk Road vision and action > (The Belt and Road), regards to opening trend of gradually increasing number of areas in China, it is proposed to

construct Beijing-Moscow Eurasian high-speed transport corridor, and building an important window to the North. Jingjinji City Cluster should strengthen connection of regional freight corridor and “The Belt and Road” core external hub cities, and play a role that Tianjin port as an international aviation shipping center in northern China.

There are three Eurasian Continental Bridge trains within Jingjinji City Cluster, with all starting points in Tianjin port, as Tianjin-Alashankou, Tianjin-Erenhot and Tianjin-Manchuria. As a hub port, Tianjin port could attract the suppliers from Japan and South Korea, and transit goods to Central Asian region by using Tianjin port’s rail-water intermodal transport. Recommendations for improving crossing lines in the future:

Optimize the line to improve the efficiency of the scheduled train. The current itinerary of Tianjin-Alashankou is described as Tianjin port, Fengtai, Datong, and exit from Erenhot to Jining station, with opening of railway between Hami to Kanawha (open operation in December 1, 2015), which is in the national long-term railway network planning, and make corresponding adjustment for change of route, avoid detour Yinchuan and Wuwei direction by using newly built lines, and compare with Lanxin, Ganwu (Gantang to Wuwei), Baolan railway, operation distance to shorten about 410 km, this will be a substantial saving of operation time between Tianjin port and Alashankou port, and save transport costs, improve transport efficiency, increase the attractiveness of the intermodal train.

Use capital shunt corridor for passing freight transport. The corridor between Tianjin port and Erenhot and the corridor between Tianjin port and Alashankou are currently calling at Beijing Fengtai Marshalling station, this increase the workload of capital railway freight system. In the future years, establishment of the capital railway circle could provide the condition, which is cargo train from Tianjin port to Erenhot and Alashankou could bypassing Beijing railway hub by using the capital railway circle, and improve the operational efficiency of the railway, also accordance with the requirements in "Outline of coordinated development of Jingjinji", which is the ease of non-capital function.



Figure4-4 Current condition and plan of Jingjinji cross-border train

(2) Coverage of domestic City Clusters (road-rail intermodal)

Use “Trunk railway transport among City Cluster + internal road transport of City Cluster” intermodal, to establish the intermodal train between Tianjin port and domestic major City Clusters. Achieve branch-trunk based intermodal transport system among Jingjinji, Yangtze River Delta, Pearl River Delta, Chengdu Chongqing City Clusters, and connected with Shanghai, Wuhan, Chengdu, Guangzhou and other core cities in the City Clusters, support the exchange of goods between the major City Clusters, accord with the overall pattern of traffic demand between regions. To achieve express links between City Clusters, freight intermodal transport network could guide that major City Clusters display joint effort, participate in global competition.

Intermodal train integrated with trunk transport and branch transport, to achieve connection between domestic City Clusters, complete intermodal transport of railway-water, road-railway and other modes of transport. Railway undertakes trunk transport , road transport plays a role of City Cluster internal transport and “door to door” delivery service. Enter core cities in the City Clusters by trunk railway, container transfer is completed in railway container central station of core cities or railway based intermodal logistic industrial zone, and process for freight delivery among City Clusters by using road transport.

With Tianjin functional ease of Beijing and industrial quality and efficiency of Tianjin improved, Tianjin freight demand is further enhanced. According to the demand, study the possibility of opening intermodal trains, such as Tianjin to Chengdu and Chongqing, Kunming, Wuhan, Guangzhou, Shanghai. The specific train line diagram is shown in Figure 4-5:



Figure4-5 Jingjinji current external intermodal and planned train layout

(3) Regional connection of port and hinterland (marine-rail intermodal)

External coverage of the port: With respect to construction of intermodal train of Tianjin port and its economic hinterland, open the marine-rail intermodal network to Yinchuan, Baotou, Urumqi, etc., primarily form water port as a point, scheduled train as a line, ensure a developed marine-rail intermodal network’s full coverage of hinterland. Among them, the trunk rail transport is based on marine-rail intermodal train, “door to door” delivery service is based on road transport, to create a “combination of trunk and branch, seamless connection” intermodal transport system. Train route as following figure below:



Figure 4-6 Planned intermodal train of Jingjinji City Cluster regional ports and economic hinterland

(4) Internal connection within Jingjinji City Cluster

Tianjin port arranges 10 land ports in Beijing Chaoyang, Hebei, Shijiazhuang, Baoding, Pinggu, Handan, Zhangjiakou, Xingtai, Tangshan, Hengshui and Shengfang, Bazhou, currently, 8 of them are in operation. Suggestions for further improvement:

"Land port" enables integration of customs clearance. Proposed to achieve the integration of customs clearance of 10 land port in Jingjinji City Cluster, is advantageous to make full use of the resources of the port and promote the development of regional economy in the inland area of Beijing, Tianjin and Hebei.

Promote the transformation and upgrading of land port to comprehensive logistics park. To explore the new model of transformation of logistics industrial park, develop an intermodal hub node, give muscle to form a multi-level inland logistics network system, and to provide hardware and software supports for the connection of Jingjinji and international, domestic, regional intermodal logistic network.

Open regional container circulation trains. Further improve the role of railway transport in gathering and distributing transportation of port. Embark on creating Jingjinji regional "point to point" massive container circulation fleet, and open container trunk train from Tianjin port to Shijiazhuang, Zhangjiakou, Handan, etc.



Figure4-7 Jingjinji City Cluster intermodal planned train route and land port layout

2.strengthen the construction of the integration of multimodal transport station facilities

Intermodal transport infrastructure include intermodal transport hub (station), supportive collective and distributional transport network and express transfer facilities. The principle of choosing location for a large intermodal hub (station) should be cross regional and sharing within City Clusters, maintain a reasonable distance from the densely populated areas, and ensure accessible transport for gathering and distributing transportation, avoid conflict with the living area. Three-levels of intermodal transport station system will be established, which includes City Cluster level, metropolitan level and urban level, construct a hub-centered, trunk-branch integrated intermodal transport system, according to the regional corridor and hub layout, focus on developing the following hubs. Wherein, City Cluster level and Jingjinji, core cities in metropolitan level and surrounding counties, capital logistic industrial ring serve for non-capital function logistic.



Figure 5-1 the plan and construction of regional integrated intermodal station

Table4-1 Jingjinji regional intermodal hub

Coverage	Name of the hub	Mode of gathering and distributing transportation
City Cluster	Tianjin port	Water, railways, highways
	Tangshan port	Water, railways, highways

	Beijing new airport	Aviation, railways, highways
metropolitan	Capital airport	Aviation, highways
	Tianjin Binhai airport	Aviation, highways
	Shijiazhuang Zhengding airport	Aviation, railways, highways
	Huanghua port	Water, railways, highways
	Qinghuangdao port	Water, railways, highways
	Shijiazhuang southern freight yard (relocated to the south)	Railways, highways
	capital logistic industrial ring	Huailai logistic industrial zone
Sanhe logistic industrial zone		Railways, highways
Xianghe logistic industrial zone		Railways, highways
Langfang logistic industrial zone		Railways, highways
Tunzhou logistic industrial zone		Railways, highways

4.2.3.2 promote the application of the drop and pull transport mode of Beijing, Tianjin and Hebei network

1. Increase fund investment and promote the construction of facilities such as stations

Government shall gradually construct station node systems with clear layers, complete functions and smooth connection, and also formulate construction standards of highway drop and pull transport stations to support the healthy development of drop and pull transport in Jingjinji City Cluster. In addition, government shall sufficiently exert the leverage action of fiscal fund and guide enterprises to increase investment to station construction.

Enterprises shall accelerate the construction of new freight transportation stations according to drop and pull transport station construction standards and also upgrade and transform the traditional freight transportation stations to have complete functions, smooth connection, corresponding matching facilities, transfer, loading and unloading, storage and tallying functions for drop and pull transport, freight transportation agency function, information service function and matched auxiliary service function.

2. Cultivate leading enterprises and encourage transport enterprises to enhance cooperation

Government shall accelerate supporting the logistics alliance development of large specialized transport enterprises and middle and small-sized enterprises. Make every effort to enhance industrial consolidation through various policies and means, create environment and conditions good for enterprises to become bigger and stronger, and accelerate cultivating a batch of leading transport enterprises and backbone enterprises. Focus on cultivating large-scale specialized logistics enterprises having national logistics network, formulate bulk freight goods

source bidding transport regulations, and provide support policy to return a part of freight transportation additional charges.

Enterprises shall enhance collaboration through joint operation, shareholding and cooperation, integrate transport capacity with goods source resources, increase the degree of intensification, large-scale development, networking and organization, and increase the operation quality and overall efficiency of drop and pull transport.

3. Increase the management level and guide enterprises to innovate in management mode

Government shall give active guidance to enterprises in the aspects of technical transformation and information construction, enhance training in enterprise business and management, increase the fine management level of enterprises, and promote enterprises to transform into large-scale, intensive and networked operation mode.

Enterprises shall enhance goods source organization, optimize network layout, and actively explore new modes of transportation organization and operation management; meanwhile, increase the technical level of transport vehicles and loading and unloading machinery, and accelerate the construction of information system.

4. Break through system obstacles, and create favorable environment for industrial development

Standardized vehicle equipment. The standardization of vehicle equipment technology is an essential condition for developing drop and pull transport. Government needs to organize formulating, popularizing and applying relevant technical standards on tractor and trailer connection, guide manufacturing enterprises to closely execute national unified standards to produce tractors and trailers, and provide technical support for developing drop and pull transport.

Certificate management of trailers. Government shall perfect the carrying, safeguarding and handover management of trailer certificates in the principle of simplicity, practicability and easy supervision. Trailer road transport certificate and vehicle registration certificate shall circulate along with the trailer.

Regional integrated transport. Government shall eliminate local protection in Jingjinji City Cluster and relevant system and policy obstacles restricting the development of transportation integration, and encourage and support qualified road transport enterprises to set up business outlets (branches) in other places and gradually form regional or national drop and pull transport network.

5 Development ideas and effect evaluation of green and low carbon integrated transport in Beijing, Tianjin and Hebei Urban Agglomeration

5.1 Development strategy for green and low-carbon comprehensive transportation in Beijing-Tianjin-Hebei City Cluster

Through investigation and analysis, the main problems of green and low carbon transport include that the proportion of green and low transport is low in regional transportation mode; the green transportation infrastructure is lack of construction, passenger and freight transport rail network construction is not perfect; the organization efficiency is relatively low, multimodal transport and transport are not fully carried out; the proportion of clean energy equipment is low, energy saving technology is of inadequate application ; management and supervision is weak. For the development of the current situation, we summed up the development requirements including in clean air, energy saving and emission reduction, ship and port pollution prevention in Jingjinji. From traffic and air quality which in line with the institution in the United States and the carbon budget system in UK, we can put forward the green planning constraints as preconditions, perfect the system based on the green traffic planning method, on the reference of the green transportation in East Kyoto City Circle, we proposed the construction of multi-level rail network, the development of green freight, etc., in terms of structure, organization, technology and management, the paper puts forward the development thought of comprehensive transportation with green low carbon in Jingjinji City Cluster.

5.1.1 Options of green and low-carbon transportation structure

Researches on the energy consumption and emissions of different transportation modes show that railway transportation has relatively low energy consumption and emission, in 2013, the total energy consumption of road transportation accounted for 96.7% that of combined road and rail transportation, but road transportation only accounted for 55.5% of combined road and rail freight transportation turnover volumes and 61.7% of combined road and rail passenger transportation turnover volumes. Therefore, it is imperative to improve the passenger/freight share ratio in green transportation modes.

In terms of freight transportation, Beijing-Tianjin-Hebei needs to improve the share ratio of rail transportation. It can improve the attractiveness of rail transportation by lifting the construction level of rail network, strengthening the capacity of freight transportation trunk lines,

deepen market-oriented reform in rail transportation, improving the service efficiency and level of rail transportation services, vigorously developing multimodal transport and promoting sea-rail multimodal transport. In terms of passenger transportation, Beijing-Tianjin-Hebei needs to increase the share ratio of railway and urban rail transport. It can rely on building multi-level rail transport network, lifting the service level of public transport, and improving the construction of urban non-motorized transportation system to improve the attractiveness of green transportation. It can also rely on purchasing and driving limits on cars, congestion charge policies to decrease the proportion of trips by cars. In this way, it can optimize passenger transportation structure, and promote energy conservation and emission reduction.

5.1.2 Multi-level planning of green and low-carbon transportation infrastructure

The construction of green transportation infrastructure in Beijing-Tianjin-Hebei City Cluster is key and foundation of increasing the share ratio of green transport. According to the advantageous distances of different transport modes and the trip distribution of Beijing-Tianjin-Hebei City Cluster, it still lacks two rail transport systems: one is the suburban rail transport system serving the purpose of commuting in the metropolitan circle; the other is the inter-city rail transport system connecting major cities in the city cluster. Besides, the construction of intra-city rail network and non-motorized systems will also help decreasing the proportion of road trips and achieving the purpose of energy conservation and emission reduction. While making multi-level plans, Beijing-Tianjin-Hebei City Cluster also needs to consider adjusting the structure of road network, to avoid too many transit passenger/freight flows.

5.1.3 Optimization of green and low-carbon passenger/freight transportation organizations

(1) Passenger organizations.

Give play to the advantages of multi-level rail network, emphasize the “seamless connection” of comprehensive hubs , At the same time, strengthen the internal integration of rail network, “seamless connection” between rail network and external transportation and improve public transport attractiveness. Improve the transfer planning and design for various transportation modes inside cities. Establish a green trip system with “urban public transport + bicycle + walking” as mainstay and taxis as supplement, drive the construction of public transport transfer hubs, and improve transfer conditions. Study on the promotion of multimodal transport. Beijing-Tianjin-Hebei City Cluster may improve the service level and real-load rate of passenger transportation by promoting multimodal transport, so as to improve energy utilization efficiency. Besides, it can drive the construction of transportation organization platform among passenger transportation enterprises, guide enterprise resource sharing.

(2) Freight organizations.

In 2013, the energy consumption of road freight transportation was 35.7 that of rail freight transportation in Beijing-Tianjin-Hebei City Cluster. Reducing the share rate of road transportation and improving the efficiency of the organization of highway transportation are the main way.

Vigorous development of multimodal transport .we should start from improving the connection level of infrastructure, establish pilot zones, drive the construction of multimodal transport facilities and equipment at major ports, railway stations and freight yards, encourage rail freight transportation enterprises to rapidly adapt to container-based development, and accelerate the updating and upgrading of equipment. Vigorous development of drop and pull transportation. Drop and pull transportation will greatly improve the efficiency of transportation vehicles, increase transportation capacity and reduce costs, greatly reduce the number of trips for empty vehicles, cutting energy consumption and emission. Create a unified logistics network in the region, vigorously develop low-carbon logistics. Based on a new round of super ministry system reform, Beijing-Tianjin-Hebei City Cluster needs to plan the development of various transportation modes in an unified manner, drive the integrated development of logistics, promote the development of third-party logistics. Governments need to strengthen supervision over third-party logistics enterprises, achieve efficient, green, low-carbon.

5.1.4 Selection of green and low-carbon transportation equipment

The various transportation modes in Beijing-Tianjin-Hebei City Cluster need to select green and low-carbon transportation equipment, which may help effectively adjust the energy utilization structure, optimize the energy utilization modes, and lower energy consumption. Specifically, green and low-carbon transportation equipment may consist three categories: first, transportation equipment using clean energy, such as motor vehicles, railway units and ships powered by electricity, natural gas and other clean energy sources; second, selection of large-capacity ships, heavy-duty trucks, large-capacity passenger transportation equipment that with comparatively low unit energy consumption; and three, selection of vehicles with higher emission standards and elimination of older ones. Besides, making transportation equipment more professional and standardized can promote the development of green and low-carbon transportation, lower energy consumption and reduce pollutant emissions.

5.1.5 Research and application of transportation energy conservation and emission reduction technologies

Improving fuel quality and unifying emission standards. Taking Beijing as an example to accelerate the upgrading of emission standards and improve fuel quality in Tianjin municipality and Hebei Province as well as to unify the emission standards and improve fuel quality in Beijing-Tianjin-Hebei City Cluster. Promote the application of clean energy technologies in ports and ships, improve the use proportion of onshore electricity in ports and on inland-river ships, encourage ships to use low-sulfur fuel in mooring, drive the renovation from oil to electricity or to

clean fuels for large terminal bridge equipment as well as the renovation from oil to gas. Expand the application scope of transportation energy conservation and emission reduction technologies, encourage innovative studies on energy conservation and emission reduction technologies. Strengthen applying energy conservation and emission reduction technologies in the construction and maintenance of transportation infrastructure, Leverage the scientific study capacity of universities to step up the study and promotion of advanced and applicable energy-conserving and low-carbon technologies and products, Such as New energy vehicles. Improve the service level of public transport and the efficiency of freight transportation with information technology. Strengthen IT application and smart construction, vigorously promote smart transportation technologies, research on traffic congestion alleviation and green driving technologies. Analyze emission sources and establish full-caliber energy consumption and emission lists. So far, analysis and models have been conducted in Beijing and Tianjin for the proportion of motor vehicle emissions in air pollution; but such work has not yet been conducted in other cities and transportation fields. Water transport ports, in particular, have not yet establish emission lists, When establishing emission lists, attention should be given to full-caliber energy consumption and emission lists.

5.1.6 Integration and sharing of green and low-carbon transportation resources, information and technologies

Integration and sharing of resource. Utilize the route and location resources of comprehensive transportation channels and the resources of transportation hubs to increase the use frequency of mobile equipment.

Resource integration and sharing. In terms of freight transportation, accelerate the application of Internet-of-Things technology in the field of transport, and promote the construction of Internet of Vehicles as well as the container railway-waterway combined transport information system; accelerate the construction of the Beijing-Tianjin-Hebei public logistics information service platform. In terms of passenger transportation, sharing of analysis of the passenger flow characteristics of different timetable information and different transportation modes is conducive to the development of multimodal transport. As for ports, integrate the production and management information systems of ports, accelerate constructing comprehensive information service platforms for port logistics, and form a multi-industry and inter-regional intelligent logistics information service platform. It is also very necessary to establish a cross-functional green and low-carbon transportation information sharing platform. Integration and sharing of technologies. It includes sharing of advantageous technologies and unifying technical standards. For example, when developing multimodal transport, railway system may draw on the comprehensive information system of water way system. Besides, there are also differences in the technological levels of different regions. For example, Beijing tops Chinese cities in terms of vehicle emission control and test technologies; Tianjin municipality and Hebei Province may

leverage Beijing's technological advantages to improve their respective technological management level. Consistent of technical standards is the foundation for different transportation modes to connect with one another; it is also conducive to forming a unified and open transportation market.

Management measures for green and low-carbon transportation

Implement total number control and structural adjustment for motor vehicles. This mainly include purchasing limit for cars and driving limit according to license plate numbers to reduce the use intensity of cars; differentiated parking charges to squeeze the use space of cars; elimination of yellow label vehicles and older vehicles and ships. Promote the establishment of three-locality coordination mechanism. First, cities of Beijing-Tianjin-Hebei City Cluster perfect green and low-carbon transportation development organizations, define each department's responsibilities in developing green transportation, establish an inter-regional and inter-departmental green transportation institutional system which is intact, feasible and effective with inter-system coordination to form a green transportation development long-term mechanism. Secondly, perfect green recycling and low-carbon transportation strategy planning; Promote building of supervision capacity. Improve the responsibility system and evaluation system of environmental supervision and law enforcement for various departments in the three localities; improve performance evaluation methods, and strive to improve the capacity of supervising industries' energy conservation and emission reduction efforts; establish an all-field, full-caliber energy conservation and emission reduction monitoring system for transportation fields; and establish a transportation environment monitoring network.

5.2 Evaluation of the energy conservation and emissions reduction effect of integration planning of comprehensive transportation in Beijing-Tianjin-Hebei City Cluster

5.2.1 Evaluation methods

(1) Scenario design

Three scenarios are divided by time. They are the development status in 2013, the intermediate-term planning for 2020, and the long-term planning for 2030. The contents of estimation mainly include the energy consumption and carbon dioxide emissions of rail and road passenger/freight transportation, as well as the emission of pollutants in road passenger/freight transportation. The said pollutants include CO, HC, NOX, PM10 and PM2.5 emitted from motor vehicle exhaust. The scenarios presume that the emission standards of motor vehicle are unified in Beijing-Tianjin-Hebei City Cluster by 2020, and that all motor vehicles in Beijing-Tianjin-Hebei

City Cluster are up to China V emission standards by 2030. And the ratios of driving mileages of different vehicle types on road are presumed to be unchanged.

(2) Calculation method

For dynamic characteristics analysis of energy consumption and emissions of Beijing-Tianjin-Hebei, the bottom-up methods to measure are used to estimate energy consumption, carbon emissions and pollutants. The methods are shown in Figure5-1.

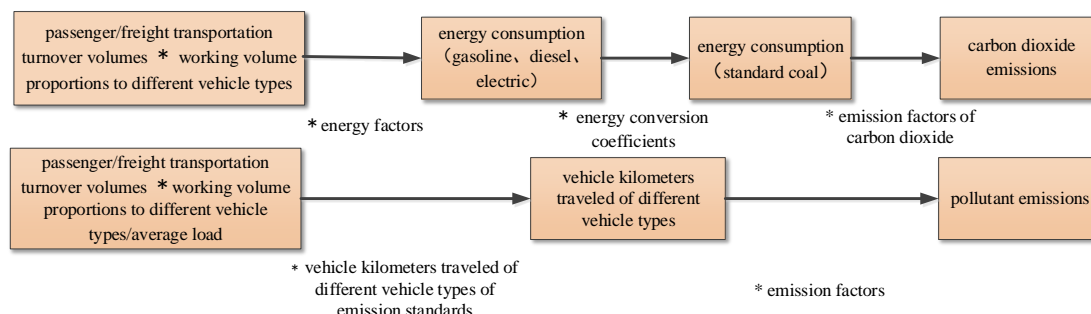


Figure5-1 Methods for Estimating Energy Consumption and Carbon Dioxide Emissions

(3) Data preparation

According to the scenario design, methods for evaluation and the requirement of evaluation of energy conservation and emissions reduction, the data requirements are determined, including turnover volumes, energy consumption emission factor, energy conversion factor and the types of vehicles proportion. The types of vehicles need to clearly identified, Railway vehicles include internal combustion units and electric units. The types of vehicles on road need to be clearly identified according to the road engineering and technical standards released by the Department of Highway Networks of the Ministry of Transport, as shown in Table, When estimating the pollutant emissions of road motor vehicle, the proportions of traffic volumes with different emission standards are needed. Figure 5-2.

Table5-1 Categories of Vehicle Types

Vehicle Type	Description
Light- and medium-duty passenger vehicles	Passenger vehicle with no more than 19 seats
Heavy-duty passenger vehicles	Passenger vehicle with more than 19 seats
Light-duty trucks	Truck with a payload of no more than 7 tons
Medium-duty trucks	Truck with a payload of between 7 and 14 tons
Heavy-duty trucks	Truck with a payload of more than 14 tons

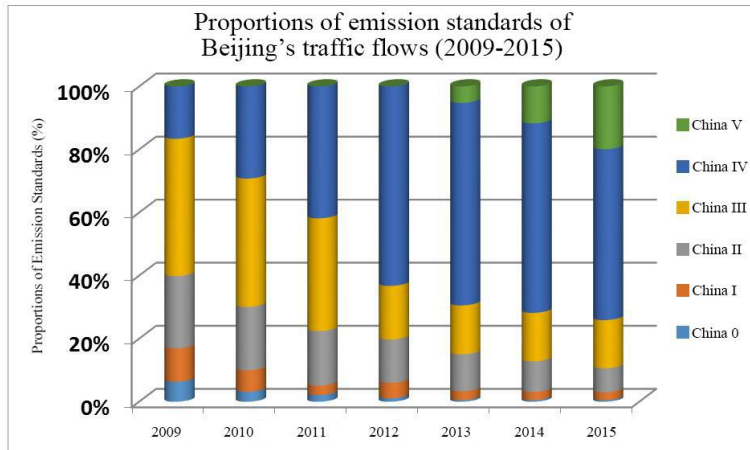


Figure 5-2 Proportions of Emission Standards of Beijing's Traffic Flow

5.2.2 Evaluation results

➤ Evaluation of energy consumption

As shown in 错误!未找到引用源。 , The total energy consumption of freight and passenger transportation is increasing, and the railway transportation energy consumption is far less than road transportation energy consumption, especially in terms of the freight. The energy consumption of unit transportation volume turnover (comprehensive energy consumption factors) are declining, as shown in Figure 5-3, energy consumption of unit freight/passenger transportation volume turnover in 2030 are 16% and 52% lower respectively than those in 2013. especially so in terms of freight transportation(Figure5-5), Implementation of integrated planning to make energy consumption significantly decreased, Energy consumption in 2020 fell by 35% in 2030, down 58%, which in 2020 decreased by 16% passenger, cargo decreased by 37%, passenger transport in 2030 decreased by 27%, freight transport fell 60%.

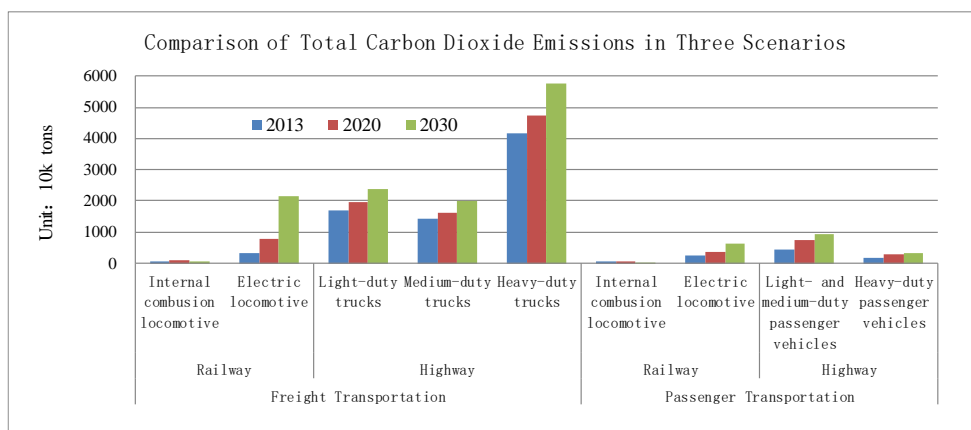


Figure5-3 Comparison of Total Carbon Dioxide Emissions in Three Scenarios

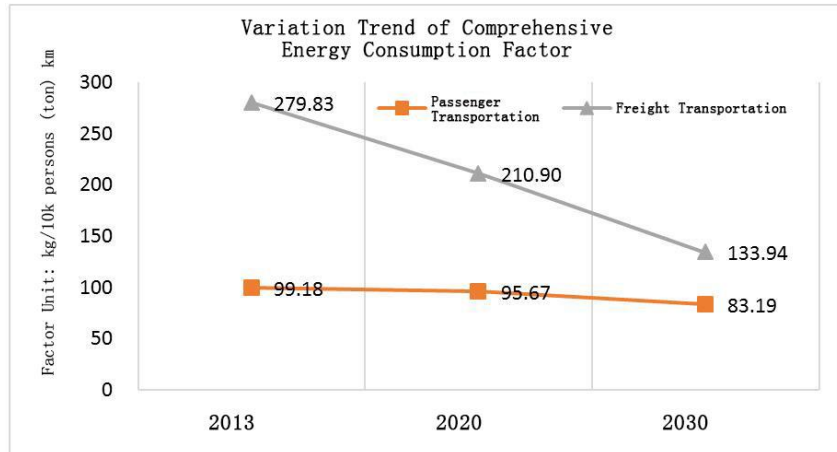


Figure 5-3 Variation Trends of Comprehensive Energy Consumption Factors

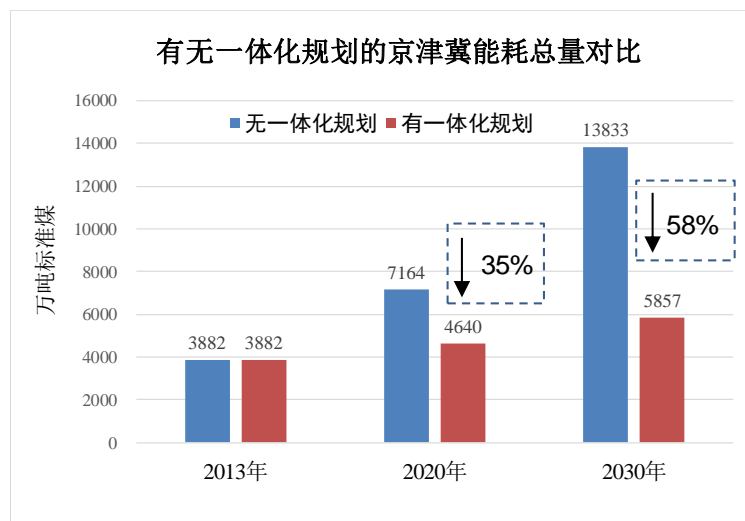


Figure 5-1 Comparison of total energy consumption in Three Scenarios

➤ Evaluation of effect of carbon dioxide emissions reduction

Carbon dioxide emissions are closely related to energy consumption. The total carbon dioxide emissions is increasing (see Figure). The year of 2013, 2020 and 2030, the total CO₂ emissions are, respectively 86.23 million tons, 106.051 million tons, and 143.157 million tons.

The CO₂ emissions of unit freight/passenger transportation volume turnover (comprehensive CO₂ emissions factors) are declining, This means that the integrated planning of passenger transportation has a good effect of CO₂ emissions reduction, especially so in terms of freight transportation. as shown in Figure. Implementation of integrated planning to make carbon emissions significantly decreased, the total energy consumption in 2020 decreased by 33%, In 2030 down 53%; In 2020, passenger, freight transportation were respectively down 20%, 35%, 2030 passenger, freight transportation were respectively down 29%, 56%.

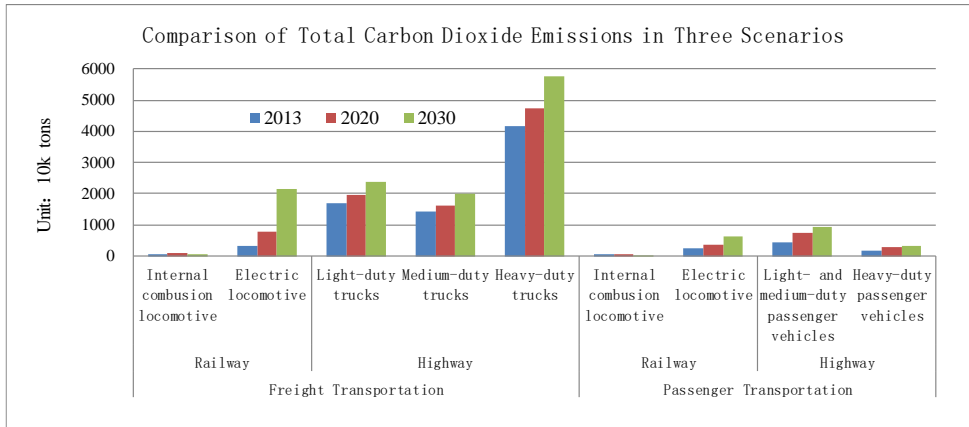


Figure5-6 Comparison of total Carbon Dioxide Emissions in Three Scenarios

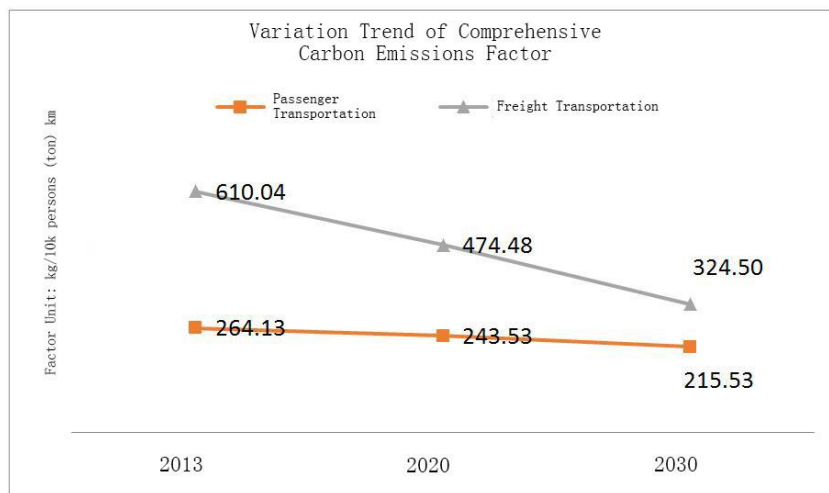


Figure5-7 Variation Trends of Comprehensive Carbon Dioxide Emission Factors

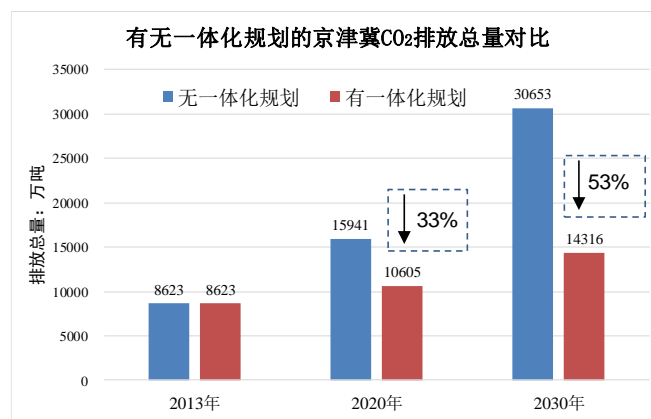


Figure 5-2 Comparison of total Carbon Dioxide emission in two Scenarios

➤ Evaluation of pollutant emissions reduction

The pollutant emissions decline as the road passenger/freight transportation turnover volumes increase. Various pollutant emissions decline about 20% - 60% in 2020, decline about 30% to 90% in 2030, though the road transportation turnover volumes are increasing. The emission volume of

unit passenger/freight transportation turnover volume is also declining, and its proportion is greater than that of total decline. The planning, therefore, has a significant effect in reducing the pollutant emissions. The pollutant emissions in three scenarios, as well as the decline percentages of pollutants in 2020 and 2030 are shown in Table and Figure.

Table5-2 Pollutant Emissions in Three Scenarios

(Unit: 10k tons)

Beijing-Tianjin-Hebei	Pollutant Emissions				
	CO	HC	NOx	PM2.5	PM10
2013	70.93	9.05	59.80	2.84	3.14
2020	42.45	3.96	52.11	1.53	1.69
2030	33.01	2.18	49.05	0.35	0.39

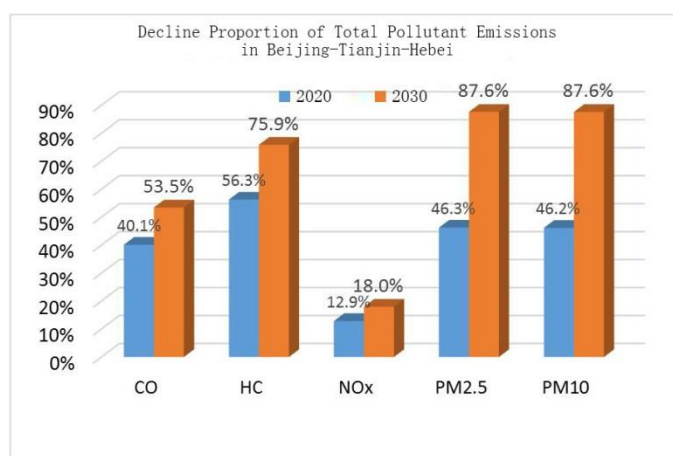


Figure5-9 Decline Proportions of Pollutant Emissions in Beijing-Tianjin-Hebei City Cluster

6 Suggestions on Jingjinji transportation integration system and mechanism

6.1 Perfect regional planning, decision and industrial integrated management mechanism

6.1.1 Establish the regional planning organization

Borrowing the American MPO model in regional coordination, guided by the Jingjinji coordinated development leading group, the planning organization with government association functions is established to provide a platform for systematic planning and coordination in the region. The specific functions include: providing a consulting platform for regional affairs,

technological support for regional planning, drafting and revising regional transport planning, supporting multi-party participation through wide discussion. The specific core functions of regional planning are listed in Table 6-1.

Table6-1 Core MPO functions and specific suggestions in Jingjinji City Cluster

No.	Core function	Specific suggestions
1	Providing a consulting platform for cross-regional affairs	<ul style="list-style-type: none"> • Consult for solutions and decisions of key regional issues • Have discussions on investment and construction priorities of regional transport projects
2	Provide technological support for regional planning	<ul style="list-style-type: none"> • Comprehensively consider regional planning and land use, economic development and environmental protection, and make comprehensive, cooperative and continuous planning • Provide technological support for assessing planning schemes, so as to prioritize construction projects and improve schemes of planning schemes.
3	Drafting and revising regional transport planning	<ul style="list-style-type: none"> • Draft and revise long-term regional transport planning • Draft and revise recent regional construction planning • Draft annual regional implementation scheme
4	Realize multi-participation	<ul style="list-style-type: none"> • Realize the wide participation and discussion of general public and all stakeholders under the influence of planning • Improve public attention to regional transport planning and demand response

6.1.2 Intensify consultative dialogue mechanism of three regions

The current “case-by-case” non-institutional cooperation mechanism will be changed. The dialogue mechanism that features as normalization and balanced interests will be established, so as to strengthen the stability, closeness and binding effect of regional cooperation.

Third, improve the linking mechanism for related government departments. Under the framework of Jingjinji coordinated development leading group, the coordination mechanism will be explored for daily communication, decision-making and execution, with the participation of central government departments, three local governments and their functional departments in transport, industry, ecology, public service and other sectors.

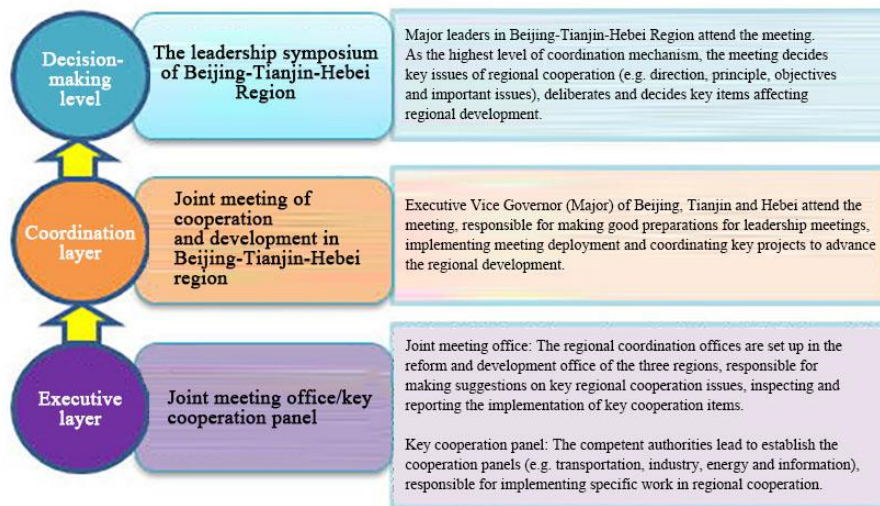


Figure 6-1 :Organizational Framework of Jingjinji Coordination Agency

6.1.3 Establish the special transportation zone and realize the integrated management of key industries in the region

Learning from experience from the special region or specific area set by America, it shall establish corresponding management organization in cross-regional ports, public transport, comprehensive transportation hub, rail transit, etc. For management of airport and port, establish a Jingjinji City Cluster integration port affairs management agency (United Port Administration) to be responsible for overall development and operation management of airports and ports in Jingjinji City Cluster. For example, New York and New Jersey of US founded a cross-state management agency which is authorized by state legislation – New York & New Jersey Port Administration in 1921 to be responsible for operation management of railway transportation system, multiple tunnels, bridges, airport system, ports, wharfs, etc. connecting New York to New Jersey, promoting development of transportation and economy in New York Metropolitan Area greatly. For inter-regional public transportation, set up a transportation alliance composed of different transportation enterprises in the region by referring to management experience of metropolitan area of Germany to be responsible for formulating public transportation standards, supervising service quality, unifying operating modes, ticket styles and ticket prices, etc. In regional transportation alliance of Germany, state-level governments can directly transfer funds to regional transportation alliance for coordinating inter-regional transportation affairs. For example, Rhine-Ruhr transportation alliance of Germany is the largest regional transportation alliance in Europe. It includes 24 cities and regions, is operated by 28 units jointly and operates 800 bus and train lines (including high-speed rail, regional express bus, suburban railway, subway, etc.) with a passenger transport capacity of 4 million people per day, providing efficient and convenient intercity public transportation service.

6.2 Innovate investment and financing system and explore to build multiple sustainable traffic investment and financing model

The creation of “Jingjinji City Cluster on the track” in the Jingjinji City Cluster in the future will involve in construction of large-scale infrastructures of rail transit, including inter-city railway, suburban railway, etc. In 2013 and 2014, the State Council respectively issued the Suggestions for Reforming Railway Investment and Financing System and Accelerating Advancing Railway Construction (GF [2013] No. 33) and Suggestions for Supporting Railway Construction and Implementing Comprehensive Land Development (GBF [2014] No. 37), to require reforming railway investment and financing system, accelerating advancing railway construction, implementing policies relevant to comprehensive development and utilization of railway land use and land adjacent to station yard. Therefore, it is suggested to focus on the mode of jointly developing tracks and land, and achieve reasonable optimal configuration of resources and sustainable development of rail transit through combination of comprehensive development of tracks and land. The specific measures include: Take overall consideration of track and comprehensive land development and utilization together with overall planning of land use and urban planning; issue corresponding implementing rules in the aspects of comprehensive development land supply pattern, land use index support, land use intensity, etc.; sign contract with legal basis, and define responsibilities of the government, rail enterprises and developers; give play to the supervision and coordination functions of the government in comprehensive development of rail land. In addition, encourage and attract social capital to participate in construction and operation of transportation infrastructure, and perfect PPP institutional framework and legal system, to establish excellent credit restraint and risk sharing mechanism, perfect market access and launch mechanism, accelerate organization and talent team construction and other measures, and exploit diversified transportation investment and financing channels.

6.3 Strengthen special policy support of the central government about land and capital

For land policy, it shall save intensively used land, intensify overall planning and annual plan management and control of land use, and implement strict land saving system, to solve the problems of insufficient agglomeration degree and low efficiency of land development in Jingjinji City Cluster; and meanwhile for the situation of shortage of land indexes or even no land in partial prefecture-level cities, it shall further promote the policy of cultivated land requisition-compensation balance, and establish the unified trading platform of cultivated land requisition-compensation balance index.

Research to explore cross-regional remote cultivated land requisition-compensation balance policy attaching equal importance to quantity and quality in the whole Jingjinji City Cluster or even national scope, through marketization trading of cultivated land requisition-compensation balance index, negotiation and cooperation of local governments, and innovation of incentive mechanism of cultivated land development.

6.4 Strengthen guarantee to relevant policy, regulation and standard of integrated transport service

It needs to strengthen the construction of integrated transportation service system in the area, and attach special importance to the improvement of relevant standard and system of connecting flight and combined transport of passengers and multimodal transport of goods, to fully play combined effect of transportation system resources in Beijing, Tianjin and Hebei, form optimum configuration of traffic resources in the three places, improve passenger and cargo transportation service level, and meet the requirements of passenger and cargo for convenience, high efficiency, low cost, etc., so as to achieve coordinated development, close link and safe operation of regional transportation, and fully meet the demand of passenger transport.

Strengthening the formulation and application of relevant standards for connecting and intermodal passenger transportation Include concept of connecting flight and combined transport of passengers and definition of relevant terms, formulation (revision) of standards such as connecting flight and combined transport service specification and service quality evaluation of comprehensive passenger transport hub, etc. Taking intermodal aviation and railway transportation as an example, it is necessary to study and formulate basic principles of intermodal aviation and railway passenger transportation services, basic requirements of ticket, luggage consignment and information services, and standards of service quality of service sites and carriers, so as to provide reference for the implementation of connecting and intermodal passenger transportation.

Unify multimodal transport service specifications. Unify regulatory requirements of railway, highway and water way transport in market opening and admission, safety control (including loading weight limit and definition of dangerous goods), freight transportation agency, freight price formation mechanism, insurance claim settlement standards and carrier responsibility and right, research and formulate multimodal transport rules, unify regulations on multimodal transport tickets and receipts, carrier recognition, duty division and insurance compensation, and eliminate regulatory barriers for whole-process transport organizations. Enhance market supervision, and unify and perfect market admission and exit mechanism. Formulate and perfect multimodal transport operation behavior and service specifications, define service procedures and evaluation standards, establish and perfect transport enterprise credit assurance system, perfect the quality reputation assessment system, and promote normalized and orderly development of multimodal transport market.

6.5 Perfect system and mechanism of regional freight logistics development

Perfect the management systems and mechanisms of logistics industry. Promote the reform of logistics systems and mechanisms. For a new round of super ministry system reform, the Ministry of Transport is defined as the responsibility subject to “plan railway, highway, water way and aviation development as a whole and accelerate promoting the construction of comprehensive traffic transport system”. Beijing, Tianjin and Hebei need to accelerate establishing management system good for development of logistics industrial development, unify the development of various transportation modes and promote the construction of logistics integration. Perfect the coordinated mechanism among all departments. Establish and perfect information exchange and sharing mechanism, policy research and evaluation mechanism, major event review and decision-making discussion mechanism, etc., and promote coordinated interaction among all departments to form policy resultant force. Establish an information sharing platform for all departments. Deepen e-government affairs, establish a logistics government affair information platform, realize sharing of approval license information, policy information, industrial statistics and regulatory and enforcement information among all related departments, and accelerate the formation of fair, transparent and unified logistics policy and management environment.

Accelerate logistics system standardization .In the aspect of standardization construction, strengthen the work on establishing logistics information classification and coding standards, logistics information acquisition standards, and logistics information transmission and electronic data exchange standards. Specifically, unify equipment specifications, information standards and technical performance, and accelerate the formulation of basic standards such as logistics terms, technical standards, measurement standards, logistics operation and service standards, and data transmission standards. At the same time, cancel those standards falling behind the level of economic and technical development, formulate detailed standards in line with international counterparts based on national standards, and strengthen the applied organization and coordination. Based on that, rely on urban or regional information centers to promote the connection between regional logistics information networks.

Improve the policy of trans-regional convenient logistics service. Accelerate the implementation of regional “Big Customs Clearance” policy, and form a coordination mechanism of customs clearance including online declaration, verification and operation; explore achieving a coordination mechanism integrating declaration, approval and clearance across custom districts and inspection areas, and implementing the regional customs clearance mode of “local declaration and port clearance ” to reputable enterprises, so as to provide convenient service for import and export of goods in the three regions; explore implementing remote application for declaration, carrying forward innovation of regional customs clearance mode, standardizing and simplifying supervision of customs transit in Jingjinji City Cluster.

Establish the green channel in an available form of “One-Card for customs clearance” that can be issued for emergency supplies, fresh agricultural products, container cars of reputable enterprises, etc. within Jingjinji City Cluster, so as to simplify inspection procedures, and give priority to inspection and clearance; reform the method of charging for highways within the region, carry out interregional one-standard-charge system and reduce toll stations and gates.

Guide the sound development of “Internet + Freight Transportation” It is recommended to conduct positive coordination integrating leading of the government, promotion of enterprises, participation of logistics enterprises, support of operators and manufacturers, etc., so as to gather all forces to accelerate the comprehensive improvement of logistics informatization level. Take Jingjinji City Cluster as a pilot to achieve integration and sharing of information resources. **Accelerate advancing construction of public information platform of national transportation logistics** Encourage enterprises to set up logistics information service platforms. Promote the efficient match of information involving source of goods, source of cars and logistics services, so as to effectively reduce the unloaded ratio of freight cars.

6.6 Strengthen construction of green and low carbon comprehensive transportation system and mechanism guarantee

Strengthen legal safeguard of green and low carbon transportation Using legislation to promote the implementation of green and low-carbon management measures, such as driving limitation according to odd and even license plate numbers and congestion charges. Strengthen legislation to improve supervision capacity with stringent law enforcement. Strengthen construction of law enforcement team for pollution control, and improve enforcement equipment level. Establish traffic environment standard specification system of Jingjinji City Cluster, unify traffic environment standard of Jingjinji City Cluster, and unify the planning, standard and evaluation, to achieve improvement of environment quality in Jingjinji City Cluster.

Construct incentive and restriction mechanism of energy conservation and emission reduction in the transportation industry. On the one hand, further adjust fiscal expenditure structure, and increase basic fiscal construction investment orienting transportation energy conservation and emission reduction projects. For example, increase investment of special funds for projects in the aspects of transportation energy conservation and emissions reduction statistics and monitoring system construction and transportation energy conservation and emissions reduction information technology innovation, etc., and encourage capacity building and technical innovation. On the other hand, it may reward the transport enterprises or organizations undertaking the projects who complete energy conservation and emission reductions target; and collect environmental additional tax or raise tax rate for transport enterprises causing waste of resources, environmental pollution

and health hazard, so as to form effective restriction mechanism and arouse the enthusiasm of energy conservation and emission reduction of transportation enterprises.

Cultivate transportation energy conservation and emission reduction service market. On one hand, implement key technology and major technical equipment industrialization demonstration project of transportation energy conservation and emission reduction, and conduct application and promotion, to accelerate process of industrialization of transportation energy conservation and emission reduction technology. On the other hand, promote transportation enterprises to participate in carbon emission permit trading, and encourage transportation enterprises to adopt energy contract management and lease and purchasing agent modes, to expand energy conservation and emission reduction financing channels.

Strengthen propaganda and communication of green and low carbon transportation. Include propaganda of green and low carbon transportation into propaganda activities of important theme. Propagandize typical enterprise or project of green transportation, actively develop green cycle based low carbon transportation culture, and continuously enhance the consciousness of industry-wide green cycle based low carbon development and transformation and upgrade development. Mobilize road transportation industries to widely participate in the propaganda, advocate the public to take public transportation and bicycles, walk, and adopt other green trip modes, to create the good atmosphere of wide participation of the whole society in green and low carbon trip.

Appendix :

7 Experience and revelation of inter-regional comprehensive transport cooperation mechanism in foreign metropolitan area (City Cluster)

7.1 Metropolitan Planning Organizations (MPO) in U.S.

7.1.1 The introduction of MPO

Metropolitan Planning Organization (MPO) in U.S. is responsible for the programming and coordination of metropolitan transportation planning and related fund application. At present, there are more than three hundred Metropolitan Planning Organizations in the United States. For example, “New York Metropolitan Area” in US is also called as “across-three states metropolitan area”, which refers to an integrated social and economic area including New York and surrounding 31 counties. This area involves nearly 20 million populations in Connecticut, New Jersey and New York of US, covering 33,484 sq.km. There are nearly 800 cities, towns and villages in this area.

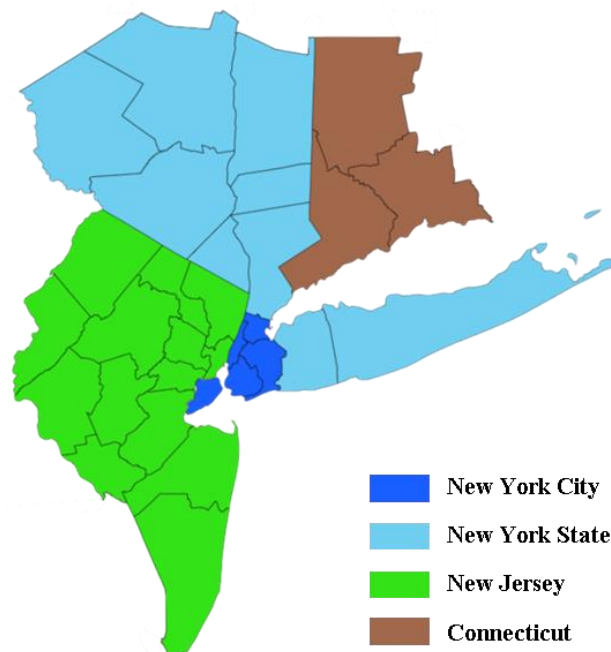


Figure7-1 New York Metropolitan Area in US

7.1.2 Core functions of MPO

MPO has six core functions as a planning organization for metropolitan area, see Table below.

Table 1 Core Functions of MPO

No.	Core function	Remarks
1	Provide a regional planning and consultation platform	Provide a consultation platform for public agencies and private organizations related to transportation system within the area, and create a fair environment for efficient planning and decision making.
2	Provide technical supporting for regional planning	Provide technical supporting for evaluation on planning program to judge according to complexity degree, constraints and realistic feasibility of regional transportation.
3	Draw up and revise long-range metropolitan transportation plan (LRTP) regularly	LRTP is mainly drawn up to confirm regional transportation demand in the next 20 years and above, and predict future transportation development tendency and put forward long-term transportation strategy and investment emphasis through revision every 5 years to ensure efficient operation of system and improvement of quality of residence life within the area.
4	Draw up a medium-term transportation improvement plan (TIP) which meets metropolitan long-term transportation planning and financial budget conditions	TIP is mainly drawn up to determine all items which can ensure investment in the next 6 years, including technical design program, fund budget and definite sources. TIP is revised every two years to accurately reflect federal funded projects' changes in time arrangement, investment amount, fund source, etc.
5	Draw up annual uniform planning work program (UPWP)	UPWP is mainly drawn up to ensure planning projects included in work program can be completed smoothly, and meanwhile ensure relevant air quality affection of all projects expected to commence in the next year meet national standards strictly.

6	Realize public multi-participation	Try to realize wide participation of general public and all organizations affected by planning when performing above 5 core functions.
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7.1.3 The organization structure of MPO

The MPO of the United States has no fixed organization, but as a decision-making organization, MPO generally includes: Policy or Executive Board, Technical and Citizen Advisory Committees and Directors or Staff.

Policy or Executive Board is the highest decision-making body of MPO and will call a meeting (a year 2-3 times) to discuss the important issues of MPO in a fixed cycle. In principle, policy or the executive director should include all stakeholders.

Technical advisory committee is responsible for providing specific strategic and project proposal for the highest decision-making body (such as the board of directors). Advisory Committee can be a professional third party agency to provide technical analysis and professional knowledge. Subcommittee could also be established to discuss the questions public concern, such as the environment, bicycles, travel demand model.

The standing body of MPO consists of the directors and staff, responsible for convening the board, document preparation, promoting inter agency coordination, listening to public opinion and feedback, and managing planning process. MPO employees can also provide direct traffic project, technology assessment and planning evaluation suggestion for the committee. MPO's employees can also hire the third party consultant to collect and analyze the data needed.

7.1.4 The Regional coordination mechanism of MPO

The main policy tools of metropolitan area planning and coordination in U.S. include:

(1) Regional coordination based on the legislation guarantee

The relevant legislation in the U.S. play an important role in the good operation of regional coordination mechanism. On the one hand, the legitimacy of the interstate agreement could be ensured by legislation, enabling the individual states to maintain more effective cooperation and coordination in the social economic development. On the other hand, ISTEA(Intermodal Surface Transportation Efficiency Act) and TEA-21(Transportation Equity Act for the 21st Century) provides for the drawing up methodology of metropolitan area transportation planning and fund application process, determines how the MPO and the state government can get a long-term transportation planning and infrastructure construction fund, leading to the legislation about the regional coordination mechanism of MPO. From the formation of MPO, the ISTEA and TEA - 21 contributes greatly to the implementation of MPO.

(2) Through the relevant provisions on allocation and application of transportation

funds, clear the status and role of MPO in regional coordination

Transportation funds are the main source of funding for the construction of large infrastructure in the United States, which comes from the tolls, bonds, as well as state, local and federal various fuel consumption tax, etc. Although the source of funding for different projects may vary, the usage procedure is unified. To some extent the use and distribution of the transportation fund has become an important means to coordinate the metropolitan areas in the United States. MPO plays an important role in the allocation of funds. In the application of transportation funds, the bill states that MPO should draw up three levels of planning and programming, including transportation planning for a period of 20 years, transportation improvement plan(TIP) for 3 years and unified planning work program(UPWP) for 1-2 years. Among these, TIP is necessary materials in the application of transportation funds. Basic process of federal transportation funds grant is shown in Figure below.

TEA-21 act also provides planning funds allocated to the state and MPO, including state government planning and research funding, planning funds. The planning funds usually will compose most of MPO’s budget, which is use for necessary research and preparation of traffic planning and traffic improvement plan. There exists specific organization responsible for the allocation and implement program of U.S. federal transportation funds. And the number of funds are so huge that each local government couldn’t stay out of MPO’s planning, which virtually enhanced the influence of MPO.

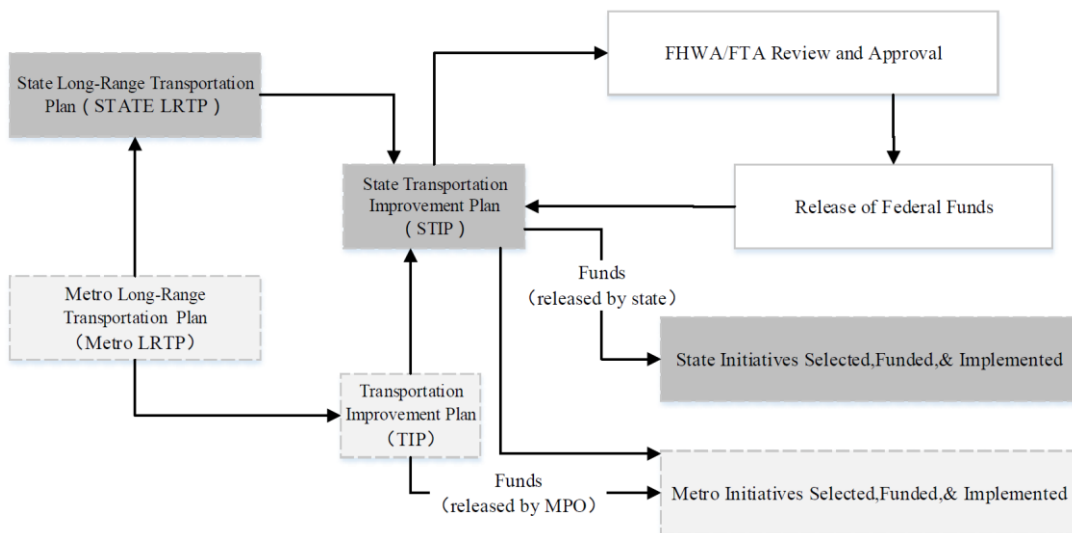


Figure 2 Basic process of federal transportation funds grant

(3) By emphasizing the integration of transportation planning, guide MPO to play a role in comprehensive regional coordination while coordinate the construction of transportation infrastructure

The ISTEA in 1990 required the integration of transportation, which largely prompted the change of transportation planning from a relative single subject planning to the regional comprehensive planning and greatly promotes the regional comprehensive coordination in infrastructure investment oriented. In some level, transportation planning includes the municipal construction, industrial development, social undertakings, real estate development, living environment, the community construction and public services and so on, which are almost all-inclusive. Therefore, the role MPO played in the comprehensive coordination of regional development could be realized.

7.1.5 Summary

Essence of MPO is to solve problems during urban transportation planning (for example, planning needed to go across administrative division and functional boundary of department, and needed comprehensive strategic perspective and coordination ability). It is the embodiment of US autonomy system in 3C principles needed by transportation planning, and also is a kind of approach by which federal government tries to guide and affect local transportation development effectively.

MPO has become an inter-governmental cooperation institution which aims at metropolitan long-term transportation planning and has the substantial power to distribute fund through decades of continuous evolution. The U.S. government institutionalize and legalize the related behavior by legislation, and organize government officials from different regions and departments to coordinate transportation planning and infrastructure investment by founding MPO, and give these institutions certain rights and obligations in regional transportation planning and application of traffic funds so that a coordination mutually, restricts mutually and feedback mechanism are formed among the state governments. Meanwhile, the government expand the field of transportation planning and infrastructure investment plan by legislation, integrating environmental improvement, economic development and social justice into the transportation planning and investment project. In this way, regional coordination could be fully realized during the use of funds.

7.2 Berlin-Brandenburg metropolitan planning organization in Germany

7.2.1 Regional overview

Berlin is the capital of the unified Germany, and Brandenburg is a state around Berlin. Both of them are independent federal states. Berlin has population of about 3.4 million, covers 889 sq.km., and includes 23 regions and municipalities as the capital of Germany. However, only about 2.55 million persons live within the 2,9000 sq.km. broad area of Brandenburg which encircles Berlin closely.

High-density urban space and surrounding areas composed of a large area of agricultural land and sporadic settlements show great economic, geographical and structural differences between Berlin and its hinterland – Brandenburg. These two closely associated states form a Berlin-centered metropolitan whole which with a population of about 6 million and total area of 3,0000 sq.km..



Figure3 Geographical Locations of Berlin and Brandenburg and Administrative Relation between them

2 Planning and coordination mechanism of cross-state cooperating agency

(1) Setting and members of cooperating agency

9 offices are set under the United Regional Planning Department. Brandenburg is responsible for 7 offices and Berlin is responsible for 2 offices. There are 100 members of the united agency, of which 16 members come from Berlin and 84 members came from Brandenburg. There are two actual leaders in the United Regional Planning Department, One is the minister of Brandenburg’s Planning Department (AL) and the other is the minister representative of Berlin’s Planning Department (SAL) who shall counterbalance with the minister from Brandenburg. “State planning conference” which both state governors (mayors) attend is the supreme committee of the agency, and basic framework and principles of united regional planning are decided on this conference.

Besides, “partner principles” for offices specified that the principal and other employees of each office shall come from different states. For example, the leader of “European space planning/metropolitan planning” office come from Berlin, so other members working here shall

come from Brandenburg. This kind of interactive combination in special form contributes to place Berlin and Brandenburg on equal important status to ensure balance between planning course and results.

(2) Conflict coordination mechanism of cooperating agency

Important premise for cross-state united planning department to generate and survive is: Two states own totally equal right and status in planning agency. Therefore all planning and decisions made by United Planning Department must be based on common agreement of both parties. In case of opinion conflict between two states, “Conflict Stairs” ensures the final resolution of conflict in system. Practice shows that more than 90% cross-state planning issues can be solved through the united planning agency, only a small part of issues need both political leaders to decide, and some controversial issues have been solved through political negotiation between both parties.

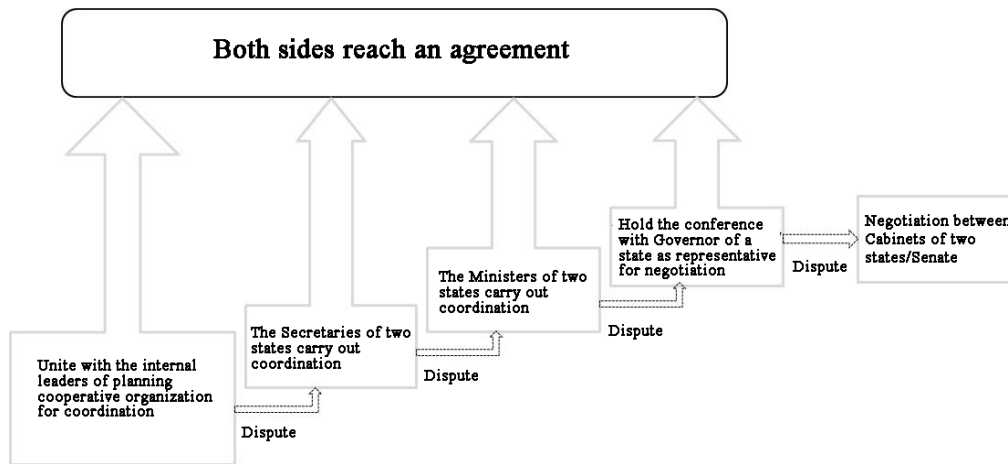


Figure4 Berlin-Brandenburg United Planning Department’s “Conflict Stairs” System for Solving Planning Conflict

(3) Public participation of cooperating agency

United Planning Department is composed of a great variety of multiple objects, including government-level staff, the public, scholars, private enterprise owners, etc. of various levels within the region. The purpose of department is to construct a network which can promote joint coordination. This network is not an official administrative organization, and includes a large number of social forces and social participation rules. Therefore the unofficial planning cooperation except official planning cooperation ways — especially the “forum” which can promote public participation and communication with social sectors, also is an important means for United Planning Department to strengthen communication, reach a consensus and establish trust. For example, respective “urban/state forum” of Berlin and Brandenburg, eastern, southern, western and northern “neighborhood forums” established between local political powers at the

border of two states, local “self-help development plan” for outer suburb of Brandenburg, etc. these multiple local communication platforms play an important role for promoting cross-administrative division cooperation in different levels.

(4) Legal basis of cooperating agency

Germany’s federal system is based on three levels: Nation, state and autonomous city. The constitution specifies that all three levels own autonomous legislative power. Federal legislation framework allows each state to perform administrative responsibilities through its own legislative procedure in many fields, including secondary education, nature reserve, landscape protection, land utilization, regional planning and water source management. Autonomous cities and autonomous towns have the responsibility to draw up overall planning and local budget to ensure supply and management of public utility according to requirements of laws.

United Planning Bureau of Berlin-Brandenburg Metropolitan Area is a kind of horizontal government system. Signed Metropolitan United Planning Agreement is considered as the legal basis of foundation of United Planning Bureau.

7.2.2 Summary

Experience of Berlin-Brandenburg United Planning Department shows that successful regional cooperation mechanism shall be based on full equality, we shall define responsibilities and obligations of cooperating parties, establish the system of coordination and conflict solving, and promote communication among social sectors as far as possible. The key of harmonious operation of United Planning Department is mainly embodied in the following aspects: status equality between planning subjects, equivalent powers and obligations, balanced power and internal supervision, settlement mechanism for conflict between both parties, multi-stakeholder collective consultation.

From another point of view, Berlin-Brandenburg United Planning Department is also faced with problems and challenges as follows: Emphasizing equality of planning group means that decision only can be made on the basis of mutual agreement, which lowers decision-making and strategic response speeds; Because different political and economic interests exist between two state governments and the planning agency is lack of legal right to carry out policy, each state shall modify agreement according to its own interests in practice; Other technical departments of state government do not establish an official or unofficial cooperation mechanism parallel with the United Planning Department.

7.3 US's and Germany's inter-regional cooperation experience's revelation

7.3.1 Establish authoritative planning organization

US and Germany established authoritative administrative coordination organizations in experience of comprehensive transportation inter-regional cooperation.

Table 1 Metropolitan Planning Organization of US and Germany

Nation	Administrative system	Authoritative planning organization	Institutional power
New York Metropolitan Area in US	Federalism	Metropolitan Planning Committee: MPO	Determine its status and executive power through a whole set of relevant procedures around fund application
Berlin-Brandenburg Metropolitan Area in Germany	Federalism	Berlin-Brandenburg United Planning Department	This agency has direct political power to make and implement federal state-level planning decision

The reason why MPO, an unofficial government department, is successful in US is that MPO has become an inter-governmental cooperation organization which has substantial power to distribute funds for metropolitan long-term transportation planning.

The key to success of Berlin-Brandenburg metropolitan inter-regional cooperating agency is that it guarantees status equality between planning subjects. Rights and statuses of two states are equal in organization of United Planning Department. Therefore all planning decisions made by the United Planning Department must be carried out after obtaining agreement of both parties. This kind of organization form can optimize resource allocation effectively, and coordinate interests of interest subjects well. These situations are greatly different from China. China has strict grade division in administration. Cooperation means superior mandatory assignment for subordinate in regional planning, making regional planning cannot guarantee interests of some regions.

For Jingjinji City Cluster in China, reference significance of foreign inter-regional cooperating agency experience lies in how to guarantee compelling force and executive power of planning organizations, relative equality between subjects and subjects' interests when establishing administrative planning coordination agency.

7.3.2 Make full use of authority of laws

Establishment of inter-regional planning organization was guaranteed by laws to a certain extent from the view of US's and Germany's experience in comprehensive transportation inter-regional cooperation. There were 9 items of legal bases related to MPO in US.

Metropolitan area of US establishes MPO and defines its powers and obligations to ensure integration of comprehensive transportation management in local level through federal legislation. Berlin-Brandenburg Metropolitan Area of Germany takes the united planning agreement signed by two states as the foundation basis of Berlin-Brandenburg United Planning Department.

For Jingjinji City Cluster in China, reference significance of foreign inter-regional cooperating agency experience lies in that relevant legal and policy guarantees must be provided to ensure reasonable exercise of powers and obligations of the organization if we want to break administrative boundary in local level to found a regional transportation planning organization.