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Research on Green Development of Transportation in BRI Participating Countries (Phase II)

Research Team*

HUANG Quansheng	Deputy Director & Principal Senior Engineer, Environmental Resources Department, Transport Planning and Research Institute, MOT
TAN Xiaoyu	Senior Engineer, Environmental Resources Department, Transport Planning and Research Institute, MOT
SONG Yuanyuan	Engineer, Environmental Resources Department, Transport Planning and Research Institute, MOT
LI Xiaoyi	Engineer, Environmental Resources Department, Transport Planning and Research Institute, MOT
George A. Giannopoulos	Corresponding Member of the Academy of Athens, Honorary Professor of Aristotle University of Thessaloniki, Former Director of the Hellenic Institute of Transport (Reviewer)
LI Panwen	Senior Programme Manager, Secretariat of the BRIGC, MEE
LIU Yuying	Programme Manager, Secretariat of the BRIGC, MEE

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Executive Summary

Transportation is an important sector for Belt and Road cooperation. According to statistics, from 2013 to 2020, transport took the highest share in the completed turnover of foreign contracted project in BRI participating countries, accounting for 25.5% of the total in 2020. Meanwhile, transport is also a priority sector for addressing climate change and biodiversity conservation. As a continuation of the research project on the Green Development Path of Transportation in BRI Participating Countries (Phase I), the study report aims to propose recommendations for the development of green transport in BRI participating countries and facilitating the building of a Green Silk Road. Based on their level of economic development, geographical location, transportation infrastructure and connectivity with China, Saudi Arabia, Greece and Malaysia are chosen as the targets for case study. The report analyzes the best practices, opportunities and challenges of the three countries in developing green and low-carbon transport in terms of green infrastructure, green vehicles, clean energy, green means of transport, systems and standards, green market mechanism and green public behavior, identifies the potential and outlook of green and low-carbon transport in addressing climate change, and proposes recommendations for the green development of transport under the BRI.

According to research, the transport sector is the main contributor of pollution and carbon emission in all three countries. For example, the transport sector accounted for over 30% of the 81.76 million tons of GHG emissions in Greece in 2020. Athens, the capital city of Greece, ranked second to the last among EU capital cities in terms of the average density of NO_2 in 2021, and the main source of air pollution was automobile exhaust. Therefore, the three countries all identified green transport as a priority sector for addressing climate change and ecological and environmental protection with clear goals being set for the development of sustainable transport. For instance, Saudi Arabia proposed to increase the share of electric vehicles to 30% in Riyadh by 2030. Malaysia, in its Electric Transport Blueprint (2015-2030), proposed the target of having 100,000 electric vehicles, 100,000 electric moto-cycles and 2,000 electric buses by 2030. With efforts being made in policy support, infrastructure construction and the development of the EV industry, progress has been made in green transport. The Land Bridge Railway Network project launched by Saudi Arabia in 2020 is expected to reduce 70% to 80% of CO_2 emissions through replacing trucks with railway transport.

Considering the development strategies and edges of these countries, the report proposes a tentative roadmap for the development of green transport in BRI participating countries. Recommendations include: carrying out top-level design for green transport in reference to climate and environment goals; building green and intelligent transportation infrastructure; promoting exchanges and cooperation in the development of green transport; promoting cooperation in new energy vehicles; and optimizing the transportation structure and developing multimodal transport. It is also stressed that China enhances exchanges and cooperation with key BRI participating countries in green transport in terms of green infrastructure construction, the promotion of new energy vehicles, and the development of policies for the green development of transport.

Research Background

Transportation is not only the backbone of economic development, but also the basis for cultural exchanges. Proposed in 2013, the Belt and Road Initiative (BRI) has made remarkable achievements so far, bringing tangible benefits to BRI participating countries and making important contributions to international development and cooperation. By January 2023, China has signed more than 200 BRI cooperation documents with 151 countries and 32 international organizations. All parties have actively promoted policy coordination, connectivity of infrastructure and facilities, unimpeded trade, financial integration, and people-to-people bonds, launched many practical cooperation projects that benefit the people, established a comprehensive and compound connectivity partnership, and created a new prospect for common development. From 2013 to 2021, annual trade volume between China and countries and regions participating in the BRI expanded from $1.04 trillion to $1.8 trillion, making an increase of 73%. As the foundation for international trade and economic development, transportation plays a major role in Belt and Road economic and trade cooperation. In 2022, the Belgrade-Novi Sad section of the Hungary-Serbia railway was put into operation and the construction of all 13 tunnels on the whole line of the Jakarta-Bandung High-Speed Railway (HSR) was finished. As a forerunner in Belt and Road cooperation, the transportation sector has made huge progress in both foreign investment and project contracting, significantly benefiting local economic and social development.

The Belt and Road is not only a road of economic prosperity, but also a road of green development. In his keynote speech at the Opening Ceremony of the Second Belt and Road Forum for International Cooperation, President Xi Jinping pointed out that “we need to pursue open, green and clean cooperation. The Belt and Road aims to promote green development. We may launch green infrastructure projects, make green investment and provide green financing to protect the Earth which we all call home”. With addressing climate change and promoting green economic recovery becoming a global trend, prioritizing eco-environmental conservation, green and sustainable development has become a consensus and shared vision for countries around the world, as well as an important link for countries to build a community of shared destiny for mankind.

In April 2021, President Xi Jinping stressed in his remarks at the Leaders Summit on Climate

that "China has made ecological cooperation a key part of Belt and Road cooperation. A number of green action initiatives have been launched, covering wide-ranging efforts in green infrastructure, green energy, green transport and green finance, to bring enduring benefits to the people of all Belt and Road partner countries. Green transport was identified as one of the priority areas for green development cooperation. In June 2021, at the Asia and Pacific High-level Conference on Belt and Road Cooperation, China and other BRI participating countries jointly launched the Initiative for Belt and Road Partnership on Green Development to support green and low-carbon development, including through the implementation of the Paris Agreement and sharing of best practices. The Initiative also proposed the promotion of environment-friendly and resilient infrastructure. In October 2021, in his keynote speech at the Opening Ceremony of the Second United Nations Global Sustainable Transport Conference, President Xi Jinping stressed that China will continue to advance high-quality Belt and Road cooperation, strengthen infrastructure connectivity with other countries and develop a green Silk Road and a digital Silk Road at a faster pace. In March, 2022, the National Development and Reform Commission, the Ministry of Foreign Affairs, the Ministry of Ecology and Environment and the Ministry of Commerce jointly issued *Opinions on Jointly Promoting Green Development of the Belt and Road*, proposing to promote cooperation in green infrastructure, green energy, green transport and green finance in an integrated manner. The document also identified green transport as a priority area for green development and proposed to enhance international cooperation in green transport to facilitate BRI participating countries in developing green transport.

The transport sector is a priority area for Belt and Road cooperation. The year 2022 witnessed new breakthroughs in Belt and Road transport infrastructure connectivity. Over 20,000 sea-railway combined trains have run The New International Land-Sea Corridor; China-Laos Railway has transported 8.51 million tons of cargo in the 10 months in operation; and more than 3,000 Chang'an international cargo trains have run between China and Europe, creating new momentum for economic and trade cooperation between China and countries along the Belt and Road. According to Statistics of China's Foreign Project Contracting in 2020 published by the Ministry of Commerce, transport ranked the second among major sectors for foreign project contracting in terms of newly signed contracts and ranked the first in terms of the completed turnover of foreign project contracting, accounting a quarter of the total.

Studies on the current development and prospect of green transport cooperation with key BRI participating countries could lay the groundwork for Belt and Road cooperation in green transport

in the future. As of July 2022, 137 countries have made carbon neutrality commitments, including 100 BRI participating countries, accounting for 73% of the total and 66.2% of all 151 BRI participating countries. Most of them have identified the transport sector as a priority area for carbon emission reduction. Launched in 2021, the research project focuses on the green development of the transport sector in key BRI participating countries. The first phase of the project identified Kazakhstan, Kenya and Myanmar as the object of study, while phase II of the study will focus on Saudi Arabia, Greece and Malaysia. The report aims to design green development path for the transport sector in key BRI participating countries and identify the opportunities and potentials for building a green Silk Road from the perspective of the development of green transport.

Chapter I Country Report of Saudi Arabia

1. The Status Quo of Transportation Development in Saudi Arabia

Among West Asian countries, Saudi Arabia has relatively complete infrastructure. In order to achieve the development goal of becoming one of the top 15 economies in the world by 2030. In 2016, Saudi Arabia issued the "Vision 2030" plan, focusing on the development of key industries such as oil and gas and mining, renewable energy, digital economy and logistics, and accelerating the construction of related infrastructure. In recent years, Saudi Arabia's infrastructure construction investment accounts for a high proportion of GDP, and there is a strong demand in many fields such as roads, railways, pipeline transportation, ports and terminals, airports, telecommunications, electricity and housing. Saudi Arabia attaches great importance to the construction of inter-city roads and railway networks, and at the same time, according to the Gulf Joint Railway Project planned by the Cooperation Council for the Arab States of the Gulf (Gulf Cooperation Council for short), it has launched the Continental Bridge Railway Network Project to strengthen interconnection with the Gulf countries, which has a broad development space in the transportation field in the future. At present, there are many key cooperation projects between China and Saudi Arabia in the field of infrastructure, mainly involving pipeline transportation, port facilities, petroleum and petrochemical industry and railways. More than 100 enterprises in China have carried out investment and engineering cooperation in Saudi petrochemical industry, railways, ports, power stations and communications [1]. With the deepening of the high-quality cooperation between the two countries in building the Belt and Road Initiative, there is still much room for improvement in the future cooperation between China and Saudi Arabia in the field of infrastructure.

According to the World Competitiveness Report 2019 [2] issued by the World Economic Forum, Saudi Arabia ranks 34th among 141 countries evaluated globally in terms of transportation infrastructure. Besides, it ranks first with the United States and Spain in terms of road connectivity; ranked 26th in terms of quality of road infrastructure; ranked 25th in terms of railroad density; ranked 21st in terms of liner shipping connectivity; and ranked 40th in terms of efficiency of seaport services. Under the background of the interconnection between domestic big cities and the construction of international highway network in the Gulf region, Saudi Arabia's demand for high-level roads and railways is increasing, and there is great potential for transportation infrastructure

construction.

(1) Clear Goals of Transportation and Infrastructure Development

Saudi Arabia's "Vision 2030" interconnection urgently needs to accelerate infrastructure construction and connectivity. In 2021, the Saudi Public Investment Fund released the next five-year investment plan, which detailed and decomposed the goal of "Vision 2030" and formulated the phased clear goals of infrastructure construction. Specifically, in terms of highways, Saudi Arabia plans to build a highway with a total length of 6,400 kilometers in the next five years, transform and upgrade 49,000 kilometers of single-track highways into double-track highways, and level 144,000 kilometers of dirt roads. In terms of railways, it will continue to promote the Continental Bridge Railway Network Project, which is more than 2,000 kilometers long and includes 6 railway lines and 7 logistics centers. It plans to expand the railway network to 8080 kilometers, and the expanded railway network will be able to transport more than 3 million passengers and about 50 million tons of goods every year. In terms of air transportation, the existing airport terminal and other related facilities will be rebuilt and expanded, the number of flights will be greatly increased to reaching 250 new destinations, and the freight capacity will be increased to more than 4.5 million tons. In terms of shipping, the infrastructure and machinery and equipment of existing ports will be upgraded, and the main ports will be gradually expanded according to the actual capacity demand, with the goal of exceeding the annual throughput of 40 million containers [3]. With the implementation of the medium-and long-term plan for transportation development, the Saudi government will continue to increase investment and actively promote the construction of major projects. There will be huge room for development in the field of transportation infrastructure in Saudi Arabia in the future.

(2) Co-development of Various Modes of Transportation

1. Highway

Road traffic is the main mode of transportation in Saudi Arabia. It has a huge road network, with a total length of over 220,000 kilometers, including 66,000 kilometers highway that connects major cities and provides access to railways, ports and airports, over 5,000 kilometers expressways, and more than 12,000 kilometers two-lane highways, among which the international road network is connected with Jordan, Yemen, Kuwait, United Arab Emirates, Bahrain, Qatar and other countries. The connectivity of Saudi highways ranks first in the world, which significantly promotes the level of integrated development within and between cities. In August 2022, Saudi Arabia established the General Authority for Roads, which was authorized to supervise the implementation of highway-related projects under the *National Transportation and Logistics Strategy* and further strengthen

cooperation among different departments of the transportation system. Although Saudi Arabia's domestic transportation infrastructure focuses on road traffic to support tourism and domestic railway and aviation capabilities, roads still play a key role in the flow of people in Saudi Arabia. In 2022, Saudi Arabia implemented two new highway projects, which will bring more help to the country's tourism development [4].

In view of the fact that Saudi Arabia is located between Europe and Asia and plays a central role in the global energy market, as well as the importance of imported goods to meet the basic consumption needs at present, transportation and logistics are crucial to its domestic economic recovery and development. Transportation occupies a large share in Saudi Arabia's export mix, accounting for 26% of Saudi Arabia's service-related exports, which highlights the importance of developing infrastructure to meet future demand. In 2020, the transportation, warehousing and communication industries will account for about 6.6% of GDP. With the implementation of the *National Transformation Plan* and the *National Industrial and Logistics Development Plan*, this share may rise. Current plans show that by 2030, the government will invest more than 500 billion Saudi rials (USD 133.3 billion) to develop ports, airports, railways and other infrastructure.

The logistics industry is one of the pillars of Saudi Arabia's "Vision 2030". The planned investments include connecting the whole Gulf Cooperation Council countries with railways, enriching the existing transportation modes, building international airports and seaports, and accelerating the circulation of goods. It is estimated that by 2030, the contribution of this industry to GDP will increase to at least 10%. In the ranking of Agility Emerging Markets Logistics Index 2022 survey in Asia, Saudi Arabia ranks sixth and has maintained this position since 2020.

1. Railway

Because of the good foundation of Saudi Arabia's road network, passenger and cargo transportation has relied on road transportation for a long time. However, with the continuous improvement of the railway network, railways gradually play an important role in transportation. From 2006 to 2015, the overall passenger and freight volume of railways showed an increasing trend (Figure 1.1). In 2015, the passenger volume and freight volume of railways increased by 18.5% and 80.4% respectively compared with 2006 [5]. According to the data of Saudi Public Transport Authority (PTA), the usage of Saudi railway network has increased significantly. Saudi railway transported more than 3 million passengers in the first quarter of 2022, an increase of 208% compared with the same period in 2021; and transported more than 3 million tons of goods, a year-on-year increase of 26%, as well as more than 160,000 containers [6]. The total mileage of railways

currently in operation in Saudi Arabia is 4,130 kilometers. The main railway lines are Dammam-Riyadh Railway (449 kilometers), Mecca-Medina High-speed Railway (453 kilometers) and North-South Railway (2,750 kilometers). In 2020, the Saudi Railway Continental Bridge Project was officially launched. The Continental Bridge project is one of the largest infrastructure projects in Saudi Arabia at this stage. It is planned to build a 950-kilometer railway between Riyadh and Jeddah and a 115-kilometer railway between Dammam and Jubail to connect the Red Sea with the Persian Gulf. Three railways will also be built in the northern and southern regions, so that more cities will be included in the railway network. A proposed railway network of the GCC Railway aims to connect the GCC countries through a railway network with a total length of 2,116 kilometers in eastern Saudi Arabia.

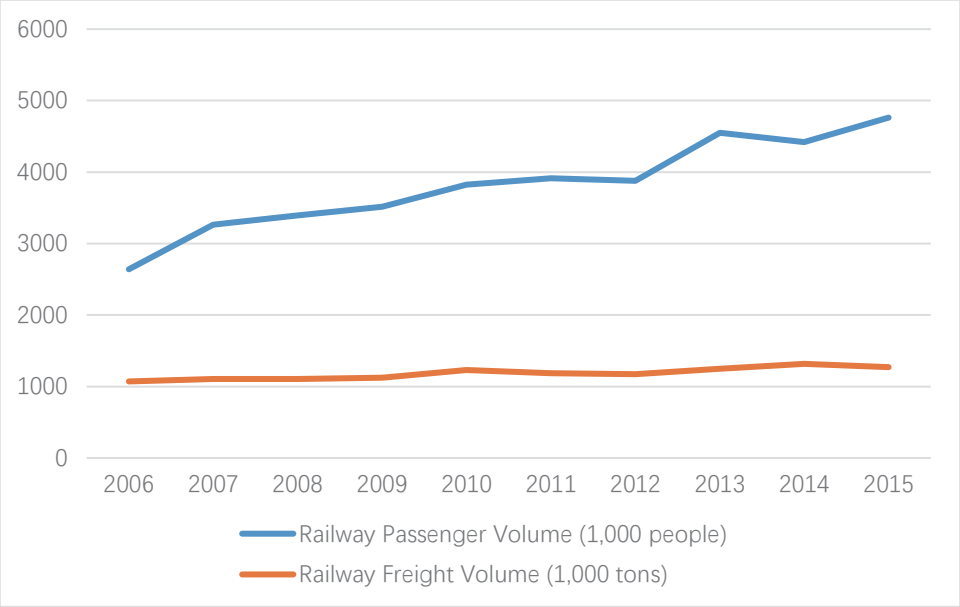


Figure 1.1 Changes of Passenger and Freight Volume of Saudi Railways from 2006 to 2015

2. Air Transportation

At present, the Civil Aviation Administration of Saudi Arabia operates a total of 29 airports, including 4 international airports, 12 domestic airports, and several regional airports and some special and military airports. The flight flow of Jeddah and Riyadh airports accounts for about 75% of the national total. Since the decoupling of the Saudi Civil Aviation Administration from the Saudi Ministry of Defense in 2011, the Civil Aviation Administration has vigorously developed the civil aviation industry as planned, expanded domestic airports, improved the infrastructure of the civil aviation industry, and vigorously improved the service level of the civil aviation industry. From 2007 to 2019, the passenger volume of Saudi civil aviation showed a significant growth trend. In

2018, it was 1.7 times that of 2007. In 2019, affected by the COVID epidemic, the passenger volume fell back to 67.1% in 2018 (Figure 1.2). The turnover of civil aviation freight showed a fluctuating upward trend. In 2019, it was 1.9 times that of 2006. In 2020, affected by the epidemic, the turnover of freight dropped to 31.8% in 2019 (Figure 1.2). The National Aviation Industry Strategy (NASS) of the Civil Aviation Administration of Saudi Arabia aims to increase the number of air routes to 250 destinations, reach the passenger throughput of 330 million, and double the air cargo handling capacity to 4.5 million tons. In May 2022, Saudi Arabia announced an ambitious development plan. In the next decade, it will realize an investment of 100 billion US dollars in the aviation industry, and at the same time, it will open a new national airline and build Saudi Arabia into one of the aviation hubs in the Gulf, the Middle East and even the world.

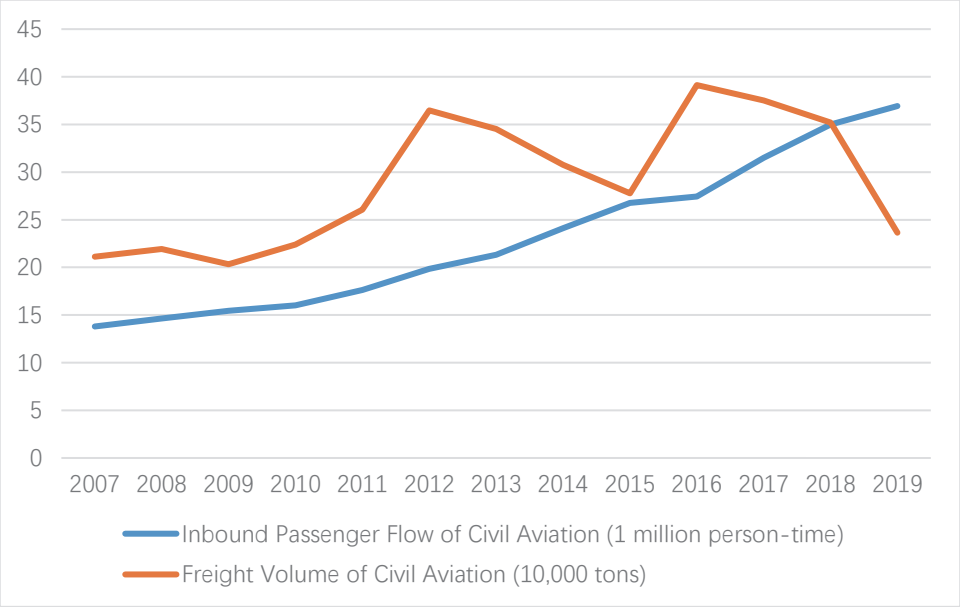


Figure 1.2 Changes of passenger volume and freight turnover of Saudi civil aviation from 2007 to 2019

3. Shipping

In order to support the transportation of petrochemical products, Saudi Arabia's maritime transportation is very developed, and the existing ports are mainly distributed along the coast of the Red Sea and the Persian Gulf [7]. According to the 2021 annual report of global container ports published by Lloyd's List, the total throughput of Saudi ports jumped to 16th place in the world, and its three ports ranked among the top 100 ports in the world, namely Jeddah Port ranked 37th, King Abdullah Port ranked 84th and Dammam Port ranked 93rd. In order to improve the operational efficiency of Jeddah Port Terminal, Saudi Arabia invested nearly 2.4 billion US dollars to expand the terminal by more than 70%. In addition, Saudi Arabia has established strategic partnerships with major international shipping companies, and four new shipping routes across the mainland will be

added in 2020, which will help strengthen the connection between Saudi ports and ports in eastern and western countries and improve port throughput [8]. From 2009 to 2020, the container throughput of Saudi ports increased rapidly, and in 2020, the container throughput of ports has reached 2.2 times that of 2009 (Figure 1.3).

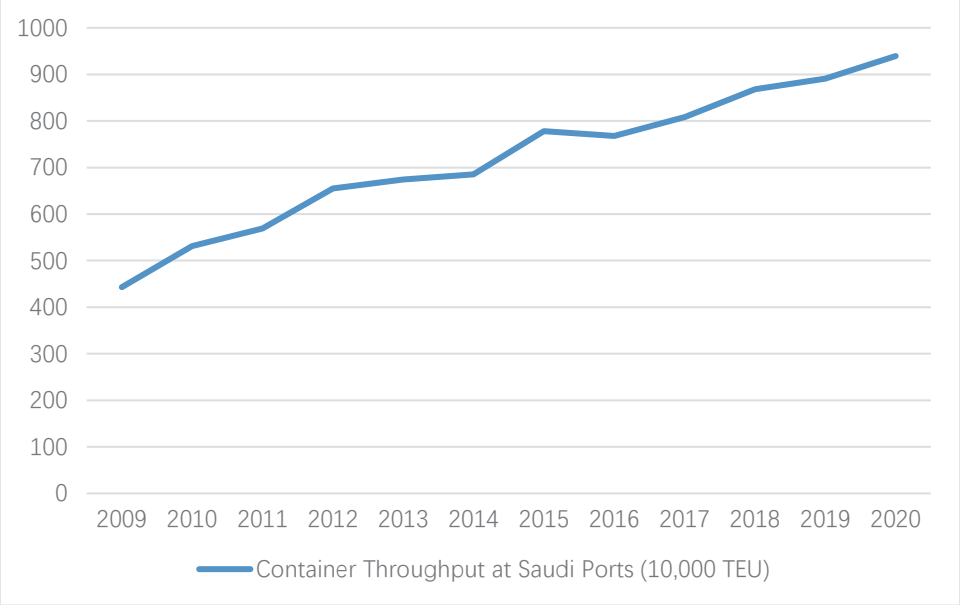


Figure 1.3 Changes of Container Throughput at Saudi Ports from 2006 to 2020

(3) Emphasis on Sustainable Modes of Development

Saudi Arabia's transport policy also pays attention to sustainable development. Saudi Arabia's per capita carbon dioxide emissions are higher than those of other countries in the Group of 20 (G20), with 19.3 tons in 2018, while the average emissions of G20 countries are 7.5 tons. However, according to a report of Climate Transparency in 2021, the rate of de-carbonization in Saudi Arabia (3.7% per year) is significantly faster than the average level of G20 countries (0.7% per year). Saudi Arabia's three main policy interventions to promote sustainable development are: shifting new car sales to electric vehicles, with the goal of the proportion of electric vehicles in Riyadh reach 30% by 2030; realizing the electrification of public transport vehicles; and using incentive plans to shift consumer behavior from gasoline vehicles to more sustainable alternatives. Lucid Group, an American electric vehicle manufacturer, has announced plans to build an electric vehicle assembly plant in Saudi Arabia, with a planned annual production of 150,000 electric vehicles. The Saudi Public Transport Authority (PTA) has stopped importing cargo transport trucks with a service life of more than 5 years since May 5, 2022. This decision will apply to all heavy transport trucks with a total weight of more than 3.5 tons, including locomotives, trailers and semi-trailers. The implementation of this decision will help to improve the efficiency and competitiveness of the

transport fleet and achieve the strategic objectives of protecting the environment and reducing carbon emissions and pollution. Compared with traditional truck transportation, the newly-launched land bridge project is expected to reduce carbon dioxide emissions by about 70% to 80%, reduce the transportation cost of containers and bulk goods by 30%, and create about 80,000 jobs.

2. Overview of China-Saudi Arabia Transport Connectivity

The "hard connectivity" of infrastructure is also an important pillar to jointly build a "the Belt and Road Initiative". China's infrastructure level is leading in the world, and it has independent innovation patent technology in high-speed rail and other fields. Therefore, Saudi Arabia has become an important overseas project contracting market in China. For example, China enterprises completed the construction of the Mecca-Medina high-speed railway project with high quality and high standard, which shortened the commuting time between the two cities to two hours, effectively improved the local transportation efficiency and promoted the trade and business development along the route. At present, the large-scale business of Chinese-funded enterprises in Saudi Arabia covers many infrastructure fields, such as railways, housing construction, ports, power stations, communications, etc., and has participated in the construction of a series of key projects, from the Red Sea Gateway Terminal in Jeddah, Saudi Arabia, and the "desert high-speed railway" to the Saudi traffic tunnel project, the largest transportation and public infrastructure project in Saudi Arabia, which has won the bid, providing China speed and China quality for the interconnection of Vision 2030. China-Central Asia-West Asia Economic Corridor, one of the six economic corridors in the Belt and Road Initiative, starts from China in the east and goes west to the Arabian Peninsula via Central Asia. Saudi Arabia is located in the economic corridor of China-Central Asia-West Asia. The BRI infrastructure connectivity layout of land, sea, sky and network is seamlessly connected with Saudi Arabia's interconnection pillar concept.

In June 2014, the sixth ministerial meeting of the China-Arab Cooperation Forum was held in Beijing. Chinese President Xi Jinping delivered an important speech at the opening ceremony of the conference, advocating the construction of a "1+2+3" cooperation pattern between China and Arab countries, that is, taking energy cooperation as the main axis, infrastructure construction, trade and investment facilitation as the two wings, and nuclear energy, space satellites and new energy as new breakthroughs, and comprehensively strengthening cooperation between China and Arab countries, which has created good conditions for the development of China-Arab relations and the construction of the Silk Road Economic Belt. In addition, since 2013, high-level visits between China and West

Asian countries have been frequent, which has strengthened policy coordination between China and West Asian countries [9].

In December 2022, China and Saudi Arabia signed the *Comprehensive Strategic Partnership Agreement between People's Republic of China (PRC) and the Kingdom of Saudi Arabia*. In the field of transportation and logistics services, the two sides stressed that they should strengthen cooperation, work together to develop modern transportation industries such as air transportation, sea transportation and railways, and speed up the completion of relevant research on the "Continental Bridge" railway network project. Driven by the high-quality development of the Belt and Road Initiative, the economies of China and Saudi Arabia are highly complementary and have great potential for cooperation, and they are constantly pioneering and innovating in the fields of economic and trade cooperation, energy cooperation, green economy, digital economy, silk road e-commerce, agricultural cooperation and cultural exchanges.

3. Status Quo and Trend of the Green Development of Transport in Saudi Arabia

(1) Taking Multiple Measures to Enhance Environmental Sustainability in the Transport Sector

Environmental sustainability is one of the core themes of Saudi Arabia's Vision 2030 plan. The *National Transportation and Logistics Strategy* has taken quite a few measures in the environmental aspect, including reducing fuel consumption by 25% and providing intelligent solutions to traffic challenges by adopting cutting-edge and innovative global technologies. For specific industries, the measures include: Aviation: reducing the environmental impact of aviation industry by adopting international standards, innovative technologies and renewable energy. Maritime field: make Saudi Arabia ports a leader in environmental management and compliance. Railway field: reduce carbon dioxide emissions by improving energy efficiency. Highway field: adopt clean technology and change to public transport to minimize the negative impact on the environment. Land freight: use innovative technology to limit environmental pollution and reduce energy consumption.

(2) Driving the Green Transition of Transport by New Energy Strategy

The transportation industry is closely related to the energy industry, and Saudi Arabia's energy green transformation strategy brings opportunities for the green and low-carbon development of the transportation industry. The oil and petrochemical industry is the lifeblood of Saudi Arabia's economy. In 2020, oil revenue accounted for 87% of Saudi Arabia's national fiscal revenue. Under the background that the global climate problem is becoming more and more serious and all countries have clearly put forward the goal of carbon neutrality, Saudi Arabia's determination to promote

energy transformation and develop clean energy industry is becoming increasingly firm. Saudi Arabia launched "Vision 2030" and *National Transformation Plan 2020* in 2016. In 2017, Saudi Arabia formulated the *King Salman Renewable Energy Initiative* (KSREI), the *Saudi National Atomic Energy Project* (SNA EP), and the *Localization Goal of Saudi Arabia's Renewable Energy Industry*, respectively, in order to realize economic diversification, get rid of excessive dependence on oil and develop new energy sources including nuclear energy and renewable energy [10]. In 2019, Saudi Arabia issued the *National Industrial Development and Logistics Program* (NILDP), which put forward sustainable development requirements for four industries: energy, mining, industry and logistics. One of the specific goals is to "improve the local, regional and international connectivity of trade and transportation networks". In 2021, Saudi Arabia proposed to achieve zero net carbon emissions by 2060, and put forward the "Green Saudi Arabia" initiative. It is planned that by 2030, the proportion of domestic renewable energy will reach 50%, and the carbon reduction target will be promoted by implementing energy efficiency plans, developing carbon capture technologies, improving renewable energy production capacity, and increasing public transportation. At the just-concluded COP27 Climate Conference, the Saudi Crown Prince said that the goal of Saudi sovereign wealth funds is to achieve zero net emissions by 2050. In October, 2021, Saudi Arabia submitted the first edition of national independent contribution, taking emission reduction in transportation industry as one of the key tasks, mainly including improving fuel economy of transportation fleet, phasing out inefficient light vehicles, developing urban public transportation system, etc. Expanding railway network to connect major cities and ports will also reduce ground traffic and greenhouse gas emissions, and contribute to achieving climate goals.

(3) Making Full Use of Renewable Energy Resources to Develop Electric Vehicles

At the end of 2020, the air quality in Riyadh, the capital of Saudi Arabia, was not optimistic, with an AQI index of 106. The air quality was classified as "unhealthy for sensitive people". The main pollutant is PM2.5, with a concentration of 37.6 μg/m^3, which is almost four times the guidance value of PM2.5 of the World Health Organization at that time and eight times that of the latest standard[1]. The huge fleet of gasoline vehicles is one of the main sources of air pollution in Saudi Arabia. Experts from King Abdul Aziz University in Saudi Arabia pointed out that the relationship between air and car pollution is obvious. It is estimated that 12 million cars in Saudi Arabia consume

[1] Before 2021, WTO PM2.5 guidance concentration value stood at an annual average value of 10 ug/m^3. In 2021, WTO updated *Air Quality Guidance*, reducing annual average concentration value to 5 ug/m^3.

811,000 barrels of gasoline and diesel every day. New railway and highway projects will reduce energy consumption, but it is still necessary to change the mode of travel, promote public transportation and reduce the discharge of harmful pollutants [11].

In October 2021, Saudi Arabia announced its goal of zero net emission, and set the goal of electric vehicles. It is estimated that by 2030, the number of electric vehicles in Riyadh will reach at least 30%, and other regions will follow the pace of the capital to implement electric vehicles. Electric vehicles are becoming more and more popular in Saudi Arabia. In the fourth quarter of 2021, Saudi Arabia ranked among the top 50 in automobile electrification for the first time. Increasing the proportion of electric vehicles is part of Saudi Arabia's plan to halve carbon emissions, which is one of the best ways to reduce carbon emissions [12].

Saudi Arabia plans to obtain real zero-carbon hydrogen energy by producing hydrogen from abundant renewable energy, and then vigorously promote and popularize hydrogen as a low-carbon transportation fuel by introducing hydrogen fuel automobile manufacturers. Saudi Arabia is building a $5 billion hydrogen energy plant in NEOM, a new town in the northwest. It plans to use local superior solar energy and wind energy to produce hydrogen. It is expected to be put into operation in 2025, or it will become the largest green hydrogen manufacturing plant in the world. In addition to producing green hydrogen from solar energy, Saudi Arabia's huge natural gas reserves can also produce blue hydrogen. Saudi Arabia plans to invest 110 billion US dollars to develop blue hydrogen and other fuels that are crucial for the transformation of green energy. Saudi Aramco has established a partnership with Gaussin, a hydrogen power solution provider, in the field of hydrogen fuel vehicles, and signed an agreement to establish a modern manufacturing facility for hydrogen fuel vehicles in Saudi Arabia. Saudi Aramco Advanced Innovation Center (LAB7) will closely participate in the development of hydrogen-powered vehicles in Gaussin, aiming at integrating Saudi Aramco's composite materials into Gaussin's existing product series to reduce the weight, energy consumption and cost of these vehicles [13]. In addition, the Saudi sovereign wealth fund has invested in Lucid Motors, an emerging giant of electric vehicles listed in the US stock market, and plans to build an electric vehicle factory near Jeddah, marking Saudi Arabia's formal integration into the global new energy vehicle wave and industrial chain.

(4) Building a Comprehensive Transportation Network of Zero-carbon Cities

In January 2021, Saudi Arabia put forward the "THE LINE" future urban development plan, envisaging the construction of a 170-kilometer-long linear city, which is built around nature, does not build automobile roads, and relies entirely on renewable energy. This "linear new city" is the

cornerstone of Saudi Arabia's "Vision 2030" plan and Saudi Arabia's new economic engine. China enterprises and China technology are helping the construction of the new city traffic tunnel project. The whole city will be divided into three different levels of structure: the ground area is a complete pedestrian area, without any roads and cars, and there are green parks everywhere to encourage walking and leisure activities. The second floor serves as a service floor to accommodate shops and other commercial spaces. The third floor is the area for transporting goods and people. The planning of the ultra-high-speed transportation system allows people to reach any place along the city within 20 minutes, creating a comprehensive urban transportation network with zero carbon emissions. This "straight-line city" tries to build a model of future urban sustainable development with zero cars, zero streets and zero carbon emissions [14], reducing the public demand for private cars, and will be powered entirely by electricity made from new energy sources such as solar energy, wind energy and hydrogen.

4. Recommendations for the Green Development of Transport in Saudi Arabia

The National Renewable Energy Project ad plan as well as of the 2020 National Transformation Plan and the National Transportation and Logistics Strategy, are all pointing clearly in the direction of creating a future green transportation system in the country which will aim to minimize the carbon emissions from the field of transport. These plans contain provisions for projects and policies which, when implemented, will contribute greatly towards a greener transport system for Saudi Arabia. We give below, some added suggestions and recommendations that aim at reinforcing the above strategies and giving a measure of the priorities that are recommended to be followed.

(1) Promoting the Green and Low-carbon Operation of Ports

The container throughput of Saudi ports has grown rapidly, and there are also large-scale growth expectations in the future. It is suggested that in the current stage of large-scale construction and improvement of railway network, the railway network of collection and distribution in major ports should be well constructed to strongly support the development of container-iron-water combined transport in ports. It is possible to carry out actions related to the green development of ports in the following three aspects.

a. In the current stage of large-scale construction and improvement of the railway network, sufficient provision should be made for the construction of a number of freight collection and distribution hubs (or improvement of existing ones) at major ports that are connected to the railway network. Such hubs will effectively support the development of Rail-Water intermodal transport at Port Container Terminals in both sides of the country (red sea and Arabic gulf).

b. It will be necessary for ports to make full use of Saudi Arabia's abundant renewable energy resources (such as solar and wind energy) to build a national port energy integration system and encourage the full electrification of operating machinery, equipment and vehicles in the port areas.

c. Utilize all possible energy-saving technologies in the operation of the ports such as, full use of information technology applications in all aspects of the port operation including artificial intelligence, utilization of "smart" port construction minimizing the energy required, and make full use of automation such as in fully automated container terminals and container yards.

(2) Promoting New Energy Vehicles

It is suggested to study and introduce the promotion plan of new energy vehicles in Saudi Arabia, further clarify the promotion objectives and main means of new energy vehicles in different regions of the country, and put forward the development plan of the whole industry chain including renewable energy supply, industrial development of electric vehicles and hydrogen fuel vehicles, promotion of terminal new energy vehicles, relevant policy requirements, industrial layout planning, technical development requirements, etc., so as to strive to achieve zero emission of new energy vehicles throughout their life cycle.

(3) Promoting the New Model of Urban Construction Featuring Low-Carbon Transportation

In parallel to the decarbonized new energy vehicles for road and rail transport, the operation of the transport system especially in the congested urban areas should also be decarbonized gradually with a view to achieving net-zero carbon intensity by a given target year e.g., 2050 or 2060. This will require to adopt policies that will favor the use of low-carbon transport modes in urban areas such as (primarily) public transport systems of all kinds (new energy buses, metro, suburban rail, high-speed rail), various micro mobility modes (bicycles, e-scooter), or walking. Such policies will materialize via the formulation of specific urban development plans for the development of sustainable urban mobility. The recent announcement of THE LINE city is an example of such plan at its extreme magnitude that is unique in the world. It is recommended to summarize the experience of "THE LINE" in the future urban construction, learn from it in other regions, and build an urban green transportation system with high-speed rail as the backbone transportation line, pure electric and hydrogen-fueled vehicles as the main means of medium and long-distance motorized and personalized transportation, supplemented by bicycles and walking. By building a new urban transportation model with multi-level three-dimensional development and vertical machine separation, public transportation will be promoted to achieve zero emission.

(4) Carrying out China-Saudi Arabia Cooperation in Sustainable Transport

In December 2022, China and Saudi Arabia signed the *Comprehensive Strategic Partnership Agreement between People's Republic of China (PRC) and the Kingdom of Saudi Arabia*, which laid a solid political foundation for future in-depth cooperation between the two countries in energy, green infrastructure, finance, carbon neutrality and other fields. Saudi Arabia has a vast demand in the field of transportation infrastructure construction. Taking advantage of the east wind of cooperation between the two sides, the technology and experience of China enterprises in design and construction will play a greater role, for example, learning from the experience of green railway construction such as China-Laos Railway and Inner Mongolia Railway to support the green and sustainable development of the railway network project of the continental bridge; Learn from the experience of building green ports such as Piraeus Port in Greece and Mombasa Port in Kenya to help Saudi Arabia build a green shipping system; Relying on the advantages of China's new energy vehicles to help Saudi Arabia's new energy vehicle industry to develop.

Chapter II Country Report of Greece

The Status Quo of Transportation Development in Greece

Greece has always attached great importance to infrastructure construction. Taking advantage of the favorable opportunity of preparing for the 2004 Olympic Games, the Greek government increased its investment in infrastructure construction, accelerated the construction of expressways, airports, bridges and other transportation hub facilities, and the construction of subways, light rails and urban trunk roads around Olympic venues increased greatly, which significantly improved the urban traffic situation. After 2008, affected by the sovereign debt crisis, the infrastructure situation in Greece experienced a long period of decline. From 2009 to 2018, Greece's investment in infrastructure decreased by 54% on average compared with 2000-2008. From 2014 to 2018, Greece completed 35 infrastructure projects with a total project amount of 8.3 billion euros, of which more than 85% of the investment went to expressway projects [15]. In May 2020, the European Commission proposed to set up a "recovery fund" with a total amount of 750 billion euros to help EU member countries rebuild their economies after the COVID-19 outbreak, from which Greece received about 32 billion euros. In June 2020, the Greek Prime Minister's Office formulated a three-year economic recovery plan, which will be based on six pillars: regional development, digital transformation, green growth, strengthening infrastructure, ensuring employment and intelligent enterprises. It can be seen that Greece's transportation infrastructure has broad prospects for development.

Domestic transportation in Greece is mainly by road and sea, supplemented by railway. Greece has a vast sea area and many islands, and the sea ferry is an indispensable means of transportation. Foreign trade mainly depends on shipping, so the shipping industry has become an important part of the national economy. At the same time, air transport between Greece and the islands is also developing rapidly. China and Greece have close cooperation in the construction of transportation infrastructure connectivity. According to UNCTAD data, in the first quarter of 2021, the Liner shipping bilateral connectivity index of the two countries was 0.428 [16], which was the highest among the liner shipping connectivity indexes between China and Central and Eastern European countries.

According to the World Economic Forum's *Global Competitiveness Report 2019* [2], Greece

ranks 39th among 141 countries evaluated globally in terms of transportation infrastructure; ranked 73rd in terms of road connectivity; ranked 44th in terms of quality of road infrastructure; ranked 46th in terms of railroad density; ranked 28th in terms of liner shipping connectivity; and ranked 43rd in terms of efficiency of seaport services. It can be seen that the overall ranking level of Greece's transportation infrastructure is lower than that of Saudi Arabia.

(1) Continuous Improvement of Transportation Infrastructure

1. Highway

In 2020, the total length of Greece's expressway network is about 2320 kilometers, which is the largest expressway network in Southeast Europe and one of the most advanced expressway networks in Europe [17]. The total length of national and provincial highways is close to 50,000 kilometers. In recent years, with the support of the European Union, the Greek government has made great efforts to develop infrastructure, the construction of highways, airports, bridges and other transportation hub facilities, the construction of high-grade highways and urban trunk roads has increased a lot, and the urban traffic situation has improved significantly. According to the plan, Greece will build a highway network with a total length of 2700 kilometers by 2030. Greece's road network is interconnected with the road networks of neighboring countries, mainly entering Central Europe through northern Macedonia and Serbia in the north, and entering Turkey, Bulgaria and Romania in the east or northeast.

1. Railway

The Greek railway network is mainly connected to the European railway main network through the north-south trunk line, and realizes railway interconnection with European countries. The utilization rate of railway infrastructure in Greece is low, and it is seriously aging and has poor economic benefits. In 2019, the total length of Greek railways was about 2,764 kilometers, the annual freight volume was 1.358 million tons, and the annual passenger traffic was 16.795 million passengers [18]. The connectivity of Greek railways is poor. For example, the port of Thessaloniki, as the second largest port in Greece, has no railway connection, which shows that the development of Greek railway network is lagging behind. In addition, the running speed of Greek railways is relatively low, among which: 19% of railway lines run below 79 km/h, 39% run at 80-119 km/h, 23% run at 120-159 km/h and 19% run at more than 160 km/h.

In recent years, the Greek government, with the support of European Union funds, is working on upgrading the railway infrastructure, such as electrification, among which improving the railway bed and laying new rails are the key tasks. In February 2018, the railway from Piraeus Port to Athens

International Airport was officially opened, and the commuting time from Piraeus to Athens Airport was greatly shortened to one hour. In January 2019, the electrification project of the railway from Athens to Thessaloniki was completed, with a design speed of 200 kilometers per hour, which greatly improved the capacity and efficiency of the trunk line.

In December 2021, the Ministry of Infrastructure and Transport of Greece launched a 4 billion-euro railway infrastructure construction project, which is said to be the largest infrastructure project in Greece's history, including the application of ETCS, electrification of existing tracks and construction of new tracks, striving to build Greece into a transportation hub in Southeast Europe. After the project is completed, it will change the traffic map and enhance Greece's international status. Among them, connecting major small ports with railways and enhancing the connectivity of ports is one of the key points of the infrastructure upgrading project in Greece. For example, two regional ports, Lavrio and Rafina, will have new railway lines to strengthen their inland connections. In addition, the project will further improve the railway connection between northern Greece and the border with Bulgaria.

The Greek government will also increase investment in subway and light rail construction in the city. Athens will build a subway line 4 with a total length of 13 kilometers and a cost of 1.6 billion euros. The project will start in 2022 and will be the largest public infrastructure project in Greece in the next decade. It is estimated that the daily number of passengers will reach 34,000, reducing the circulation of nearly 53,000 private cars.

Relying on Piraeus Port, China enterprises fully tap the advantages of the Greek railway system, and adopt the mode of sea-rail combined transport to connect the goods from Asia and other regions to the Greek railway network through Piraeus Port, which shortens the transportation time and achieves good benefits.

2. Air Transportation

Air transport is a main driving force of economic activities in Greece, providing 450,000 jobs and contributing 10% of GDP to the Greek economy. There are 44 airports in Greece, including 15 international airports (including Athens Airport, Thessaloniki Airport, Crete Airport and Heraklion Airport in Rhode Island, etc.), 25 domestic airports and 4 regional airports in Greece. In 2020, a total of 10.10 million ton-kilometers (total mass transported in tons multiplied by kilometers travelled) of cargo was moved by air in Greece.

3. Shipping

Greece is the largest shipping country in the world and plays a decisive role in the international

shipping market. At its peak, Greece supported one-fifth of the world's shipping scale with a population of about 0.14% of the world. Shipping industry is the pillar of Greek national economy and the most competitive industry. Greece's maritime industry has contributed over 11 billion euros to the economy, accounting for 6.6% of GDP and contributing over 3% to the employment rate. Greece has more than 150 passenger ports and more than 40 freight ports. Piraeus, located in the southwest of Athens, is the most important port in Greece since ancient times and is regarded as the "southern gate" of Europe. In 2019, the container throughput of Hong Kong reached 5.65 million TEUs, making it the largest port in the Mediterranean and among the top four ports in Europe, and the world ranking further jumped to 25th place. At present, the Greek government has made efforts to upgrade and rebuild entry points to enhance connectivity and make Greece an intercontinental hub and an energy exporter. In February, 2022, the Ministry of Infrastructure and Transport of Greece indicated that there were plans to transform the above-ground rail transit connecting Piraeus Port into an underground railway, so that the port could truly become a transportation hub.

According to the report of UNCTAD, by the end of 2021, the Greek fleet accounted for 17.63% of the world's total tonnage, ranking first in the world for many years. The annual report issued by the Greek Ship Owners' Union in May 2022 pointed out that Greece is the largest shipping country and the largest cross-border cargo carrier in the world. Greek ship owners continue to invest in new energy-saving ships and environmental protection equipment. At present, the average age of Greek fleet is 9.9 years, which is lower than the global average of 10.3 years. In addition, with the increasing global demand for clean energy such as natural gas, the trade prospect of liquefied natural gas (LNG) is improving, and Greek ship owners have also accelerated the pace of investment in LNG carriers and actively laid out the construction of LNG carriers. According to the data of British shipping consulting company VV, the total value of Greek LNG fleet (including under construction) reached 19.5 billion US dollars, ranking first in the world. In 2021, just before Europe fell into the energy crisis, Greek ship owners ordered 18 LNG carriers with a total value of $3.63 billion and 14 LPG carriers with a total value of $823 million. Greek ship owners have been steadily investing in large ships, which not only have scale advantages, but also show higher efficiency and environmental benefits.

(2) Vehicle Cleanliness Level to be Improved

Due to the economic recession that started in 2009 the number of private cars in Greece remained almost steady for most of the part of the decade 2010-2020. Starting in 2019 the number of private cars increased by 1,6% over 2028 and more than 2,8% over 2015. According to the

statistics of Eurostat, the number of cars per thousand people in Greece in 2019 was 575. In 2019, the number of passenger cars reached 5.247 million, an increase of 2.8% compared with that of 2015. Light commercial vehicles and medium and heavy commercial vehicles account for a relatively small proportion, taking 2019 as an example, accounting for only 14.1% and 3.5% respectively [19] (Figure 2.1).

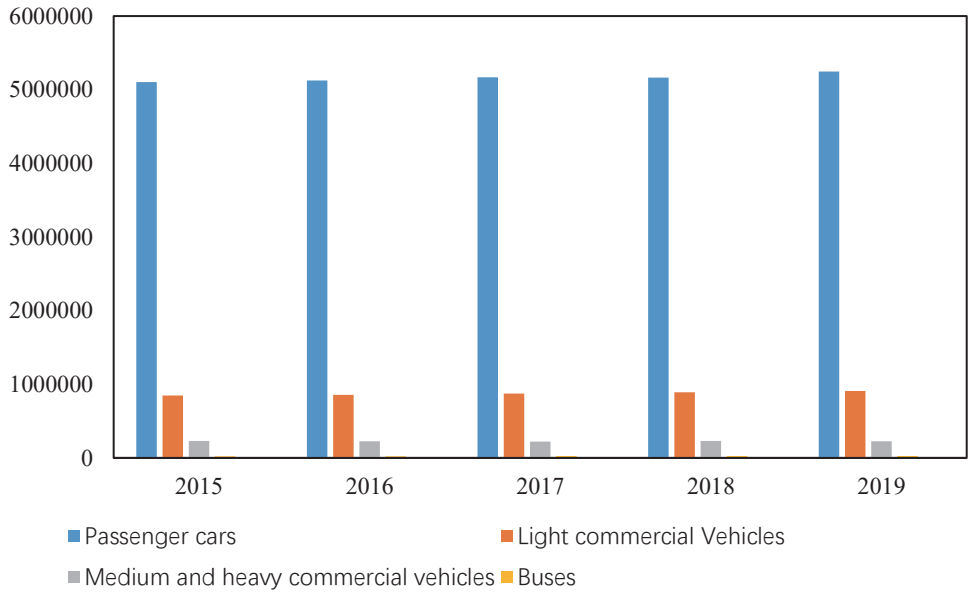


Figure 2.1 Vehicle ownership in Greece in 2015-2019

In Greece, gasoline and diesel are the main vehicle fuels, while new energy and clean energy take up a smaller share (Figure 2.2). In the statistics of 2019, passenger cars used the most gasoline, accounting for 91.1%. Among light commercial vehicles, diesel vehicles are about 1.6 times that of gasoline vehicles, accounting for 61.9% and 37.9% respectively. Almost all medium and heavy commercial vehicles use diesel, accounting for 99%. Most buses use diesel, and only 3.9% buses use clean energy natural gas.

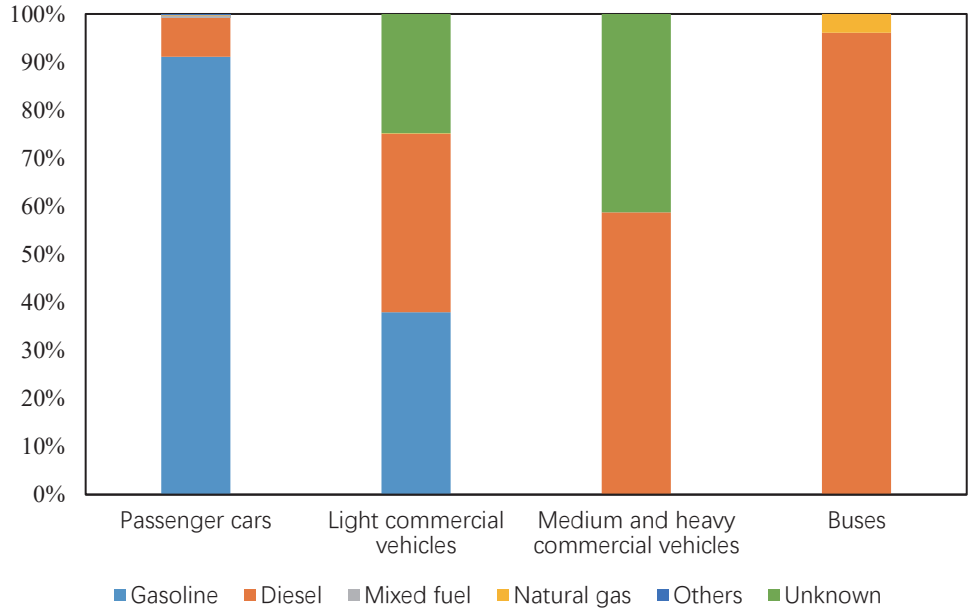


Figure 2.2 Vehicle ownership by fuel type in Greece in 2019

In terms of electric vehicles and infrastructure, Greece is one of the countries with the least number of electric vehicles in Europe. In 2021, the application of new energy vehicles improved. A total of 6,967 electric vehicles were registered, compared with 480 in 2019. The market share of electric vehicles increased from 0.4% in 2019 to nearly 7% in 2021. In 2022 the numbers of electric cars have increased more rapidly and are expected to increase even more so in the coming years due to new incentives introduced by the government in July 2022 for the purchase of electric cars. These incentives include among others a subsidy for the purchase of electric cars of 30% of its value with a maximum of 8000 Euros. Subsidies are given for the installation of charging stations. In 2019, there are about 115 public charging points in operation in Greece, of which only 10 are fast charging stations. But these numbers also increase rapidly. In 2021 the Public Power Corporation (DEI) installed more than 300 new charging stations in 31 prefectures of Greece while the same company plans to install around 10.000 new charging stations in the next 5 years in the whole of the country. In order to meet the future development needs of electric vehicles, it is estimated that at least 3,000 charging points are needed at major highways in Greece, and the total number of charging stations installed in Greece is expected to exceed 30,000 by 2030.

(3) Transport is a Key Emission Sector

Within the EU, the air quality in urban areas in Greece is at a countdown level. in 2019, the annual average of PM2.5 in EU urban areas was 12.6 μg/m^3, and that in Greece was 14.1 μg/m^3, making it the ninth highest in the EU. The annual average value of PM10 in urban areas of the EU

was 20.5 μg/m^3, while that in Greece was 27.5 μg/m^3, which was the third highest in the EU. Combining the two indicators of PM2.5 and PM10, the five EU countries with the worst air quality in urban areas include Greece. According to the data of nitrogen dioxide concentration of European Union Environment Agency (EEA), in 2021, the average concentration of nitrogen dioxide in Athens, Greece was about 35 μg/m^3, only slightly lower than that of Bucharest, Romania among all EU capital cities. The air quality in Athens is the second lowest among the capitals of European Union countries. Automobile exhaust emission is one of the main reasons for poor air quality in Athens. Most of the cars in operation in Athens are gasoline cars that are over ten years old and have serious pollution. In terms of carbon emissions, EEA data show that the total greenhouse gas emissions of Greece in 2020 are 81.76 million tons. As shown in Figure 2.3, the greenhouse gas emissions of transportation industry account for more than 30%, of which domestic transportation accounts for 19.74%, international shipping accounts for 7.47% and international aviation accounts for 7.18%.

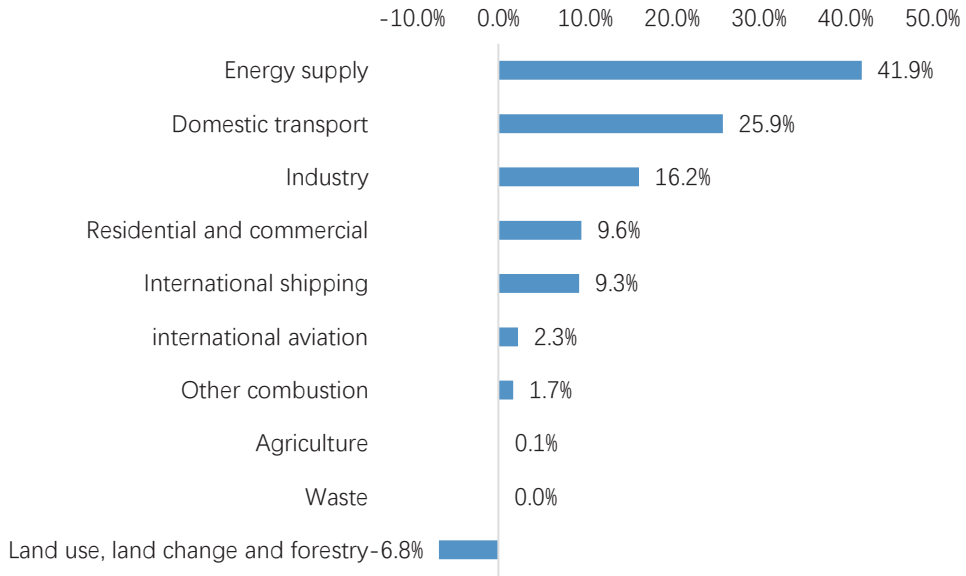


Figure 2.3 Total GHG emission and sectoral shares in Greece in 2020

In recent years, the carbon emissions of domestic transportation in Greece have generally shown a gradual increase trend (Figure 2.4). EEA data shows that from 2015 to 2019, the average annual growth rate of greenhouse gas emissions in the transportation industry (including domestic transportation, international shipping and international aviation) was 4.0%. In 2020, affected by the global COVID-19 epidemic, the greenhouse gas emissions of domestic transportation industry decreased by 26.6% compared with 2019 [20].

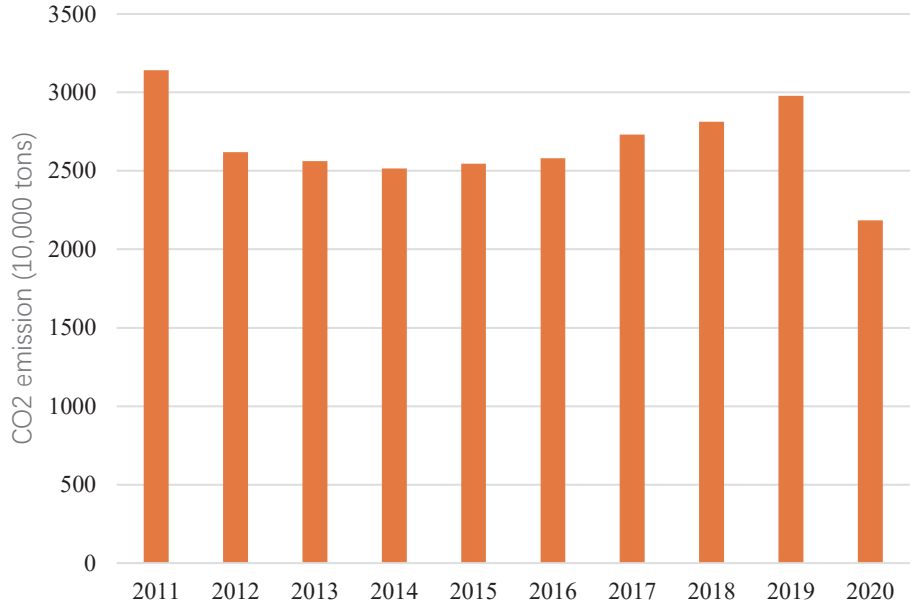


Figure 2.4 GHG emissions of the transport sector in Greece from 2011 to 2020

2. Overview of China-Greece Transport Connectivity

Greece is the intersection of the Silk Road on land and the Silk Road on the sea, and it is an important link for economic and trade exchanges and cooperation between China and Europe. In April 2019, Greece officially joined the "China-Central and Eastern European Countries Cooperation" mechanism, and by virtue of its unique advantages in maritime transportation, it has played an important role in connecting with China's transportation infrastructure in Piraeus Port, China-Europe land and sea express line and other projects [21]. The year 2022 marks the 50th anniversary of the establishment of diplomatic relations between China and Greece. The two countries have seized the historical opportunity of the high-quality development of "the Belt and Road Initiative", actively expanded pragmatic cooperation in various fields such as transportation, energy, tourism, infrastructure, green and digital economy, and helped the development of China-EU interconnection platform.

(1) Port of Piraeus

In the construction of communication infrastructure between China and Greece, Piraeus Port project is a successful example of communication infrastructure cooperation between the two sides, which has great economic benefits and political significance, and will have a huge radiation effect in the field of communication between Europe and Asia. Piraeus Port is the largest port in Greece, the top 50 container ports in the world and one of the largest container ports in the eastern Mediterranean. It is located in the southeast of Europe and the southern tip of the Balkan Peninsula,

and has played an important role in the interconnection between East and West since ancient times. In 2008, COSCO obtained the 35-year franchise rights of No.2 and No.3 container terminals in Port of Piraeus; In January 2016, COSCO Shipping Group successfully won the bid for the privatization project of Port of Piraeus Port Authority [22]; In 2019, the container throughput of Port of Piraeus exceeded 5.65 million containers, making it the first container port in the Mediterranean and the fourth largest container port in Europe.

Sino-Greek cooperation in the construction of Port of Piraeus started from the investment, construction and operation management of container terminals, and gradually expanded to the fields of logistics and shipbuilding repair. At present, Port of Piraeus is the largest ferry port in Europe, an important transit port for automobiles and ships and a ship repair center, and the land and sea express line goes directly to the hinterland of Central and Eastern Europe. The successful connection of the transport corridor of Port of Piraeus + China-Europe land and sea express has reduced the freight time by 7 to 11 days, further strengthened the interconnection between China and Central and Eastern European countries, and thus Port of Piraeus has become another important fulcrum for connecting land and sea in the construction of "the Belt and Road Initiative". By the end of 2019, Port of Piraeus has directly created 3,000 jobs for Greece and indirectly created 10,000 jobs, and the logistics output value has increased from 400 million euros to 2.5 billion euros. According to the prediction of the Greek think tank Economic and Industrial Development Research Foundation, the Port of Piraeus project will boost the GDP growth of Greece by about 0.8 percentage points in 2025 [23], contributing to regional trade connectivity and local social economy.

(2) China-Europe Land-Sea Express Line

China-Europe Land-Sea Express Line is an extension and upgraded version based on the construction of Hungarian-Serbian railway. It starts from Piraeus port in Greece in the south, reaches Budapest in Hungary in the north, passes through northern Macedonia and Serbia, and directly radiates more than 32 million people. It is the "third trade channel" besides the traditional maritime route and the onshore China-Europe train, and provides a faster logistics channel for the supply of goods from the Far East to the hinterland of Central Europe.

The construction of China-Europe Land-Sea Express Line will expand the scale of China-EU trade, promote the development of countries along the route and the whole Central and Eastern European countries, thus narrowing the regional gap and promoting the balanced development within Europe. At the same time, it is conducive to the smooth logistics of land and sea, forming a new type of fast and heavy-duty comprehensive transportation corridor that enterprises from all over

the world can deeply participate in. In addition, the completion of the China-Europe Land-Sea Express Line will greatly reduce the logistics cost between China and Europe, strengthen the economic ties between the two places, promote cultural exchanges, strengthen interconnection, and open up a convenient route for China to export to Europe and European goods to China.

(3) New Energy Vehicles

In order to achieve the national carbon emission target and promote sustainable development, the Greek government has vigorously promoted the development of green economy in recent years, especially by gradually replacing fuel vehicles with new energy vehicles to promote the "greening" of people's travel modes. The rapid development of green transportation in Greece has also attracted outstanding China enterprises to cooperate with new energy vehicles in Greece. Yutong, BYD and other car companies have actively explored the Greek electric bus market in recent years. In October, 2020, Yutong Bus's electric bus made for Greek road transport company was put into trial operation in Athens, becoming the first passenger electric bus in Greece. In January and February, 2021, BYD K9 electric bus was put into trial operation before bidding on the road in Athens, Greece. In the future, China and Greece will cooperate more closely in electric vehicles.

3. Status Quo and Trend of the Green Development of Transport in Greece

(1) Emission Reduction Policies in the Transportation Sector have been Continuously Introduced

1. EU Sustainable and Intelligent Transportation Strategy

As a member of the European Union, Greece needs to implement the climate mitigation policy introduced by the European Union. The EU strives to reduce the carbon emissions of the transportation industry by 90% by 2050. In order to achieve this goal, the EU has issued a series of policy measures to promote the green and digital transformation in the transportation field, and strive to build a sustainable and intelligent transportation system. In December 2020, the European Commission adopted the Sustainable and Intelligent Transportation Strategy, and put forward an action plan consisting of 82 initiatives, which set clear and quantitative development goals for land transportation, sea transportation, air transportation and other sub-fields, effectively promoted the construction of green and intelligent transportation, and boosted the green growth of European economy.

Road transport: By 2030, at least 30 million zero-emission cars and 80,000 zero-emission trucks will be driven on European roads. In 2030 and 2035, the average carbon dioxide emissions of cars and light trucks will decrease by 55% and 100% respectively compared with 2021. In 2035,

the sale of internal combustion engines will be completely banned, and by 2050, almost all cars, trucks, buses and new heavy vehicles will achieve zero emissions.

Railway transport: Railway transport is expected to become the pillar of the future EU transportation system. The EU will promote travel below 500 km to achieve carbon neutrality, and guide road and civil aviation transport to shift to railway transport with lower carbon emissions. It will strive to double the traffic volume of high-speed rail by 2030 and double the freight volume of railway by 2050. It is expected that by 2030, 75% of inland freight volume will be transferred to railway and inland water transport. By 2050, 95% of passenger services and nearly 90% of freight trains should be electrified.

Shipping: According to the strategy, in the future, the shipping industry in the EU will strive to achieve zero air and water pollution, and at the same time establish clean ports and emission control zones to connect inland river shipping with railway transportation. By 2030, zero-emission ships will enter the market. In addition, according to the preliminary agreement reached between the European Parliament and the Council of the European Union on the reform of the EU carbon market "Fit for 55" in December 2022, the shipping industry within the EU and entering and leaving EU ports will be controlled by the EU carbon market from 2024, which means that shipping companies involved in EU routes will pay the performance cost for their ship carbon emissions [24].

Air transportation: EU will increase the proportion of sustainable aviation fuel, reaching 2% in 2025, 5% in 2030, 20% in 2035, 32% in 2040, 38% in 2045 and 63% in 2050. Meanwhile, it will reduce the free carbon emission quotas issued to airlines, and strive to put zero-emission large aircraft into the market in 2035.

Supporting infrastructure construction: EU will expand the charging infrastructure. Before 2030, 3 million public charging stations and 1,000 hydrogen filling stations will be installed in the European Union to ensure that vehicles can be charged every 60 kilometers and hydrogenated every 150 kilometers on major highways.

In order to ensure the goal of reducing emissions by 55% in 2030, in July 2021, the EU announced the legislative proposal of "Fit for 55", and the eight of its 12 plans involved the transportation industry. Besides, it further tightened the climate target. The proposal of "Fit for 55" plan will further promote the low-carbon development of the whole European society, the transformation of energy structure, and strengthen the low-carbon competitiveness of EU countries.

2. Greek Climate Act

The Greek government passed the first *National Climate Law* in May 2022. The law sets

specific targets to deal with climate change, that is, to reduce greenhouse gas emissions by at least 55% by 2030, 80% by 2040, and achieve zero net emissions by 2050 [25]. It also requires Greece to reduce its dependence on fossil fuels, including phasing out lignite in power production from 2028. At the same time, the bill formulated a series of measures and policies to optimize Greece's adaptability to climate change and ensure the realization of a zero-carbon path by 2050. The bill points out that Greece will ban the sale of new fossil fuel vehicles from 2030, and the ban date will be changed according to the EU guidelines and the re-evaluation of its energy policy. The bill also stipulates that from January 1, 2026, all new taxis and one-third of new rental cars in Athens and Thessaloniki, two major cities in Greece, should be hybrid or electric vehicles. From 2024, the proportion of pure electric or hybrid vehicles for new private cars will reach 25%, and the carbon dioxide emission limit per kilometer needs to be 50 grams.

3. Greece 2.0 Recovery Plan

How to transition to green and sustainable transportation is still the main challenge facing Greece. Greece 2.0 Recovery Plan aims to transform Greece's economic growth model into an export-oriented, competitive, eco-friendly and digital growth model through ambitious reforms and investments. The plan puts forward four pillars, namely: the digital transformation of the country and economy, the development of green economy, the increase of employment and social cohesion, and the rapid growth of production activities. It is pointed out that Greece needs to make green transition a priority in order to effectively adapt to climate change and mitigate its impact.

Under “Developing Green Economy”, one of the four pillars of the plan, the Greek government put forward the charging and refueling plan, aiming at promoting cleaner, smarter and more economical transportation. The National Plan for Energy launched in 2021 proposed to reform the charging infrastructure of electric vehicles and establish a road map to achieve the goal that electric vehicles will account for 30% of the domestic market in 2030 proposed in the Greek national energy plan. The plan will support the installation of more than 8,000 charging stations in major cities and suburbs of Greece, and will also replace high-emission old buses with electric buses, and promote the use of electric taxis to promote the electrification of public transportation. In addition, it will support the development of innovative technologies and carbon capture and storage technologies related to electric vehicles, and promote digital transformation by introducing new technologies.

4. The National Plan for Energy and the Climate (ESEK)

This plan provides a roadmap for the achievement of specific targets for energy consumption and climate change mitigation measures including the greening of the national transportation system.

It has been formulated by the Ministry of the Environment and approved by the parliament and is updated regularly. The plan contains quantified targets and provisions for the necessary financing for their achievement. The target year for the measures is 2030, i.e., short term. For example, it sets as national target the reduction of GHG emissions by 2030 by 42% in relation to 1990 and by 55% in relation to 2005. Furthermore, the plan specifies that by 2030 at least 35% of the total energy consumption in the country will come from renewable sources and more than 60% renewables in the electricity production (a target that seems already very close to achieving). The ESEK plan specifies measures and actions to be taken distinguished in seven fields or areas one of which is Maritime transport and transport in general.

4. The study by the Bank of Greece of the Impacts of Climate Change in the Transport System (EMEKA Study)

The Bank of Greece in cooperation with the Academy of Athens has supported (since 2010) a study (by the so-called Committee for the study of the impacts of climate change - EMEKA) to examine the necessary actions and policies in preparation of the country to face the climate change implications both as regards mitigation as well as adaptation. The study examined 11 sectors of the economy one of which is the transport sector. It then proposed specific measures for the mitigation and adaptation of each sector to climate change. It also estimated the necessary financial requirements for the measures suggested in relation to the economic impacts and consequences of "doing nothing". The chapter on Transport, of this study, has been used by government and other relevant organizations as input for the formulation of several of the plans and policy documents mentioned earlier.

(2) The National Electric Vehicle Plan Began to Make Initial Progress

For a long time, the number of electric vehicles in Greece ranks at the bottom of the European Union. In order to achieve its carbon emission targets and promote sustainable development, the Greek government has made great efforts to promote the development of its green economy in recent years. In addition to the gradual transformation of energy consumption to green and clean, it has also accelerated the development of its green transportation to catch up and make up for the long-term backwardness in this field.

In June 2020, the Greek government announced a new national electric vehicle plan, which is committed to reducing carbon dioxide emissions and achieving a smooth transition to a climate-neutral economy by 2050. This new clean traffic initiative is in line with the growth strategy of the EU Green Agreement, and the goal is that by 2030, one in every three cars will be an electric vehicle.

The Greek government launched the initial national subsidy program for "electric travel" totaling 100 million euros in 2021, which was updated later to provide large-scale subsidies for consumers and enterprises preparing to buy electric vehicles, including electric cars, electric motorcycles and electric bicycles. Consumers who buy electric cars and light commercial vehicles can get a 30% price subsidy, and consumers who buy electric taxis can get a 25% price subsidy. The maximum subsidy is 8,000 euros, and with tax relief, purchasing an electric vehicle can save about 10,000 euros, and the subsidy plan will last for at least two years. In addition, in the next two years, electric vehicles can also enjoy free parking, discount and zero circulation cost. In June 2021, the Greek Ministry of Environment and Energy announced that it would allocate 40 million euros from the EU Economic Recovery Fund to encourage taxi owners to replace electric vehicles. Thanks to the subsidy plan of the Greek government, the number of electric vehicles in Greece has increased significantly. In 2019, the number of electric vehicles in Greece was only 1,345, while in 2020, there were 2,135 newly registered electric vehicles in Greece, including motorcycles, passenger cars, buses, trucks and other models, and the sales volume was almost twice that of the past five years. At present, the increasing trend of electric vehicles continues, and it is estimated that 3,795 electric vehicles will be registered in 2022.

The development of electric vehicles is inseparable from the large-scale popularization of supporting facilities, especially charging piles. The serious shortage of supporting facilities for electric vehicles in Greece is one of the main reasons for the slow development of the electric vehicle market. According to the data recently released by the European Automobile Manufacturers Association, Greece and Lithuania are the countries with the least charging piles per 100 kilometers in the EU, with only 0.2, while the Netherlands, the first place, has 47.5 charging piles per 100 kilometers. In March, 2021, the Greek government issued a new bill "Sustainable Urban Transportation Plan", which stipulated the sustainable development plan of urban transportation from the legal level, covering technical objectives, facility construction, policy measures and other aspects. The most important goal is to reduce urban noise and air pollution, greenhouse gas emissions and energy consumption, accelerate the sustainable and green development of urban transportation, and require municipal authorities and regions to develop support networks to promote the development of electric vehicles, such as large-scale construction of charging pile facilities. The number of charging piles in Greece has increased from 100 in 2019 to 950 at present, covering almost all national highways in Greece by 2020. In the next two to three years, Greece will install 1,000 charging stations in various places, and its long-term plan is to build 10,000 charging

stations by 2030. The plan also regulates the electric vehicle charging service market and the operation of charging infrastructure, and plans to make every new building have the infrastructure for charging electric vehicles. Thanks to the multi-party incentive measures adopted by Greece, a perfect replacement scheme has been established for used cars and high-emission vehicles. At present, Greece has ranked among the top 8 countries in the European Union for environmental protection and energy conservation [26].

(3) Promoting the Demonstration of Climate-Neutral Transport Systems

In November, 2020, the Greek government signed a memorandum of cooperation with Volkswagen to implement a pilot project of electric vehicles and green energy in Astypalea Island, Greece, in order to build the island into a "green island" with independent energy, increase the use of electric vehicles and promote the development of green energy in Greece. At present, the public transport service in Astypalea Island is very limited, with only two buses operating in a small area of the island, and the energy demand is almost completely met by fossil fuel sources.

The project aims to replace the current 1,500 internal combustion engine vehicles (including 900 motorcycles) with electric cars, electric taxis, electric scooters, public electric buses and necessary charging and electronic grid infrastructure. Commercial vehicles of local enterprises and multi-purpose vehicles on the island, such as police cars, emergency service transportation and public sector fleets, will also be electrified. Introduce new mobile services such as car sharing or carpooling to optimize the traffic on the island. Volkswagen will install its Elli charger all over the island to ensure the provision of comprehensive charging infrastructure of about 230 private and public charging points, and build a large interconnected charging network for electric vehicles. The energy supply will also come from local green energy sources, such as solar energy and wind energy. Greek Prime Minister Mitsotakis said that Astypalea Island will become the first green smart island in the Mediterranean, and this pilot project will provide experience for the larger-scale green development in other parts of Greece.

4. Recommendations for the Green Development of Transport in Greece

Greece is already following a rigorous program of decarbonization in the field of transport with priorities and measures that have been outlined in a number of policy documents like the National Plan for Energy and the Climate (ESEK), The Greek Climate Act, The “Greece 2.0” Recovery Plan, the National Electric Vehicle Plan, and others. These are mainly referring to urban and interurban land transportation within the country. We therefore focus in the following on suggestions that concern the further strengthening of green transport development in areas that may need further

attention.

(1) Developing Port-Railway-Shipping Combined Transportation

The Greek port shipping industry is developed, but the railway connectivity needs to be improved, which hinders the efficiency of the overall traffic operation. In the past two years, Greece began to focus on the development of port-rail combined transport, speeding up the promotion of railway connection with major ports and enhancing port connectivity. Combined with the development status and future planning of green transportation in Greece, it is suggested to encourage railway, port and shipping enterprises to strengthen cooperation, speed up the improvement of port railway collection and distribution system, promote the construction of Greece's main port collection and distribution railways, enhance the railway transportation capacity of main logistics channels and open up links with international railway networks. It can learn from China's experience in carrying out multimodal transport, speed up the construction of intermodal transport hub and upgrade its equipment, and improve the current situation of Greece's lack of multimodal transport freight stations for cargo transshipment. It is suggested to promote the construction of logistics parks with multimodal transport functions, accelerate the planning, construction and upgrading of railway logistics bases, railway container handling stations, port logistics hubs, air transshipment centers and express logistics parks, and strengthen the effective connection between different modes of transportation; promote the construction of multimodal transport logistics transportation platform, and realize the information sharing of enterprises such as railways, ports and logistics.

(2) Building Green and Low-Carbon Ports

Greece is forward-looking in the development of clean ports and green shipping, especially in the world of environmentally friendly ships. It is suggested to speed up the diversified substitution of clean energy for port machinery and vehicles in the port, encourage all newly added or updated port machinery vehicles to use pure electric or other clean energy, actively promote the change of oil to gas and oil to electricity for port machinery vehicles, comprehensively promote energy-saving and emission-reduction technologies, and improve the energy efficiency level of working machinery; encourage the construction and renovation of shore power facilities in major ports in Greece to improve the utilization rate of shore power; accelerate the intelligent construction of port information, develop energy management system, and regularly monitor energy consumption and carbon emissions.

(3) Promoting the Development of New Energy Vehicles

Combined with the existing promotion plan of new energy vehicles in Greece, it is recommended to give priority to promoting the electrification, new energy and clean substitution of vehicles in public transportation, and guiding the development of private vehicles with new energy; implement subsidy measures for new energy vehicles, and study and introduce incentive policies such as preferential electricity price for electric vehicle charging, right of way priority and parking priority; promote the elimination of old vehicles with high energy consumption, high emissions and low efficiency; accelerate the layout of public charging network, improve the construction of charging infrastructure, and focus on promoting the construction of charging facilities such as urban bus hub stations, parking lots, first and last stations, expressway service areas and highway passenger hub stations.

4. Implementing the Sustainable Urban Mobility Plans (SUMPS)

As of now, many Greek urban areas have formed the so called sustainable urban mobility plans or SUMPS. These plans, provide specific suggestions and measures for the greening of transport in urban areas. These plans need to be implemented by way of priority. They contain specific suggestions for infrastructural and traffic organization measures that aim at reducing emissions from the transport sector in each area. They need to be implemented by way of priority as this will improve the greening of urban transport in the cities and reduce overall greenhouse emissions of the urban transport system of the country.

(5) Accelerating China-Greece Cooperation in Green Transport

2022 is the 50th anniversary of the establishment of diplomatic relations between China and Greece, and Greece is the first EU member to join the Belt and Road Initiative. The two sides agreed to strengthen pragmatic cooperation in various fields such as transportation, energy, tourism, infrastructure, green and digital economy, and open up new prospects for mutually beneficial cooperation between the two countries. Chinese enterprises have been actively participating in Greek energy transformation and green development. The investment, construction, modernization and upgrading of Piraeus Port (hereinafter referred to as Piraeus Port) are based on environmental protection and ecological environment monitoring and evaluation. All projects are in full compliance with environmental laws and standards, and thus it was awarded the title of "European Green Port" in 2020. Looking forward to the broad prospects of cooperation between the two countries in the field of green transportation in the future, in terms of infrastructure construction, we can learn from the construction mode and experience of Belgium, reach more cooperation in green

transportation infrastructure, and promote China's green project management experience to benefit the local area. In terms of green travel, we should give full play to the advantages of China's world-leading technology and complete industrial chain of new energy vehicles, encourage China enterprises to "go global", develop a complete industrial chain of manufacturing, assembly, sales and research and development of new energy vehicles in Greece, and promote the development of local new energy vehicle industry and green employment.

Chapter III Country Report of Malaysia

1. The Status Quo of Transportation Development in Malaysia

The contribution rate of Malaysia's transportation sector to the national economy and employment is 3-3.5% and 3.5% respectively. In recent years, the Malaysian government has launched a number of infrastructure construction plans in the transportation field, paying special attention to promoting transportation construction projects in underdeveloped areas to improve transportation infrastructure conditions, and is committed to turning Malaysia into a regional air cargo distribution center and a maritime cargo transshipment center. It is expected that the transportation infrastructure field will maintain strong growth in the next decade. According to Fitch Solutions, an information consultancy, it is estimated that the output value of Malaysia's transportation infrastructure industry will increase by 9.4% in 2022, and will continue to grow at an average annual rate of 4.6% in the future.

Malaysia has always been committed to building sustainable and high-quality infrastructure, attaching importance to the interconnection between various regions in China and with other countries, and vigorously developing various modes of transportation such as aviation, ports and railways. In the past 40 years, Malaysia has adopted various innovative ways to develop infrastructure to ensure that the infrastructure is of high quality, reliable and sustainable in economy and environment, so the overall level of transportation infrastructure is relatively high in the ASEAN region. Malaysia's ports are world-famous for their high efficiency, and many other infrastructure and economic projects have been carried out around them. At the same time, Malaysia is committed to building a wide range of domestic railway networks, including the East Coast Railway Network and the Singapore-Malaysia Transnational Line, with a view to changing from relying more on roads to relying on railways. At present, Malaysia's road dependence rate is 98.4%, and its logistics efficiency and environmental protection level are far less than that of railway transportation.

According to the World Economic Forum's *Global Competitiveness Report 2019* [2], Malaysia ranks 133rd among 141 countries evaluated globally in terms of transportation infrastructure. Ranked 73rd in terms of road connectivity; Ranked 19th in terms of quality of road infrastructure; Ranked 63rd in terms of railroad density; Ranked fifth in terms of liner shipping connectivity; and ranked 19th in terms of efficiency of seaport services. It can be seen that among the three countries studied in this report, although Malaysia's overall ranking of transportation

infrastructure is low, its maritime transportation is at the forefront level in the world.

(1) Favorable Development Policies for the Transport Sector

In 2016, Malaysia launched the *Eleventh Malaysia Plan (2016-2020)*, which involved many measures such as economic and social development, including the construction of expressway networks in Sabah and Sarawak, which played a positive role in improving the infrastructure conditions in these areas and injecting vitality into economic development. In 2019, Malaysia announced the National Transportation Policy for 2019-2030, proposing to develop a more effective, comprehensive and safe transportation system, enhance the capacity of sustainable development in the transportation field, promote the development of Malaysia's logistics industry by accelerating the development of land, railway, aviation and shipping systems, and turn Malaysia into a regional logistics center.

In September 2021, Malaysia issued the *Twelfth Malaysia Plan (2021-2025)*, focusing on reviving the economy affected by the epidemic, enhancing social welfare, security and inclusiveness, and promoting environmental sustainable development, with a view to achieving the goal of building a "prosperous, inclusive and sustainable Malaysia". From the perspective of infrastructure, connectivity and sustainability have become the key directions of infrastructure investment in Malaysia, and the development potential in transportation, renewable energy, water infrastructure and other fields is huge. The *Twelfth Malaysia Plan (2021-2025)* emphasizes that it will continue to strengthen the construction of road and railway networks and improve interconnection, and plans to provide more financial support to encourage investment in transportation infrastructure. Specifically, on the one hand, it emphasizes the need to strengthen the construction of highway and railway networks connecting airports, ports, industrial areas and major urban centers. On the other hand, 50% of the government's expenditure will be given priority to road and railway construction in underdeveloped areas such as Sabah and Sarawak. According to the database of key infrastructure projects of Fitch Solutions, transportation infrastructure projects in Malaysia account for more than half of all planning and construction projects [27].

At present, Malaysia is in a critical period of infrastructure development and economic transformation, and infrastructure construction is one of the important starting points for economic development, and railway and port facilities have good development prospects. At the beginning of 2023, the Ministry of Public Works of Malaysia once again announced a budget of 625.6 million US dollars to strengthen the construction of transportation infrastructure, which has great room

for future development.

(2) Regional-leading Transport Infrastructure

1. Highway

By 2021, Malaysia's road network covers more than 290,000 kilometers, including 288,000 kilometers of paved/unpaved roads and 2,000 kilometers of expressways. The longest expressway is the North-South Expressway (NSE), which connects from the Singapore-Malaysia border to the Malaysia-Thailand border, with a total length of about 772 kilometers. Compared with the highway facilities in West Malaysia, the mileage of Sabah and Sarawak roads in East Malaysia is less and the quality is poor. Malaysia's expressway network is relatively developed, with expressways connecting major urban centers, ports and important industrial areas, but the level of road maintenance is not satisfactory. Although the government has allocated a large budget for road maintenance, the quality of roads still needs to be improved.

1. Railway

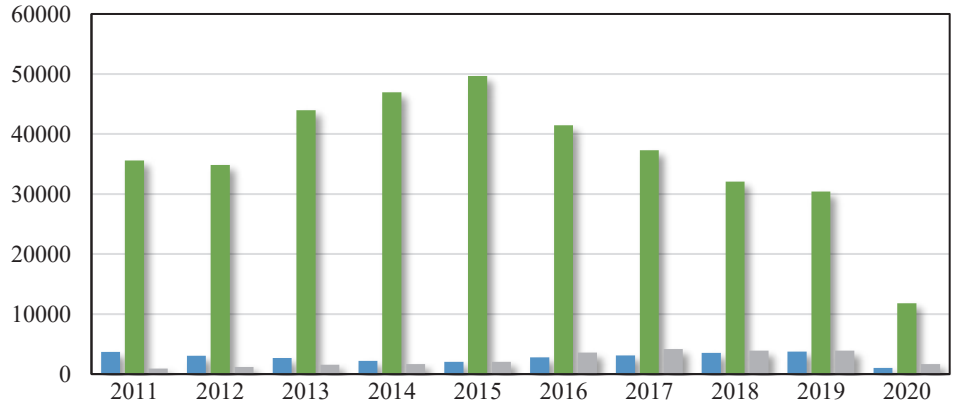
Malaysia's railway network runs through the north and south of the peninsula, with Thailand Railway in the north and Singapore in the south. KTM is responsible for the operation. Because Malaysia's transportation is highly dependent on highways, especially after the opening of the NSE, highway transportation has become the main mode of transportation, and most railways are idle, and even some lines have been demolished. For a period of time, Malaysia hardly made any investment in railway infrastructure construction and modernization. It was not until the end of 1990s that the railway was gradually brought back to the public's sight through the transformation of double-track railway and electrification. Nevertheless, compared with the perfect road network and the convenient and low-priced air transportation by long-distance bus, the railway has not yet become an important passenger and cargo transportation mode in Malaysia.

At present, the main railways in Malaysia include Malaysia East Coast Rail link and ASEAN Express. Ten years ago, Kelantan, which was located at the northernmost part of the east coast from Kuala Lumpur, Malaysia, could only pass through the expressway, and it took about eight hours. Therefore, it is the practical demand of the local people to build a railway running through the east coast. In October, 2022, ASEAN Express, which connects Malaysia, Thailand and Laos, officially opened freight service, which can transport 80 TEUs in one direction. After the ASEAN Express arrives in Laos, the goods will be transported to many cities in China by the China-Laos railway.

Malaysia is advancing the plan to upgrade the railway industry, and the railways in the

ASEAN region are developing rapidly, so Malaysia needs to seize this opportunity to be more integrated into the ASEAN market. At the same time, Malaysia's railway industry began to pay attention to training railway talents, improving railway standards and developing railway technology. With the international railway industry beginning to implement measures to reduce its carbon footprint, Malaysian railway industry participants also turned their attention to low-carbon life railway construction.

At present, Malaysia's railway facilities mainly include commuter railway KTM Komuter, intercity passenger service (non-electrified) KTM Intercity, electric passenger service KTM Electric Train Service (ETS), freight KTM Cargo and ancillary businesses (such as advertising, parking lot and so on) (Figure 3.1).



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Train service	3685	3056	2703	2223	2015	2791	3092	3527	3746	1041
Commuter	35599	34847	43942	46957	49690	41469	37274	32078	30404	11796
Electric Train Service (ETS)	912	1180	1563	1692	2060	3565	4148	3933	3902	1647

Figure 3.1 Railway Passenger Volume by Type in Malaysia

2. Air Transportation

Malaysia's aviation industry has developed rapidly due to its geographical advantages. It is located on the route connecting Europe and Asia with Australia, China and Japan, and is one of the most important transportation hubs in Southeast Asia. There are 62 airports in Malaysia, 38 of which are paved airports. Malaysia implements a government-led tourism development model, and tourism is a pillar industry in Malaysia. In 2018, Malaysia received a total of 189.3 million tourists, accounting for 15.2% of Malaysia's GDP. Foreign tourists travel to Malaysia mostly by air, so tourism promotes the development of Malaysia's civil aviation industry. From 2015, the annual passenger traffic of Malaysian aviation industry showed an upward trend, and it exceeded 100 million passengers in 2019. Affected by the COVID-19 epidemic, the passenger traffic dropped sharply in 2020 (Figure 3.2). Air cargo volume maintained stable growth. Domestic cargo volume increased from 170,000 tons in 2010 to 190,000 tons in 2020, while international cargo volume had been fluctuating around 700,000 before dropping to about 600,000 tons in 2020 due to the impact of the COVID-19 pandemic.

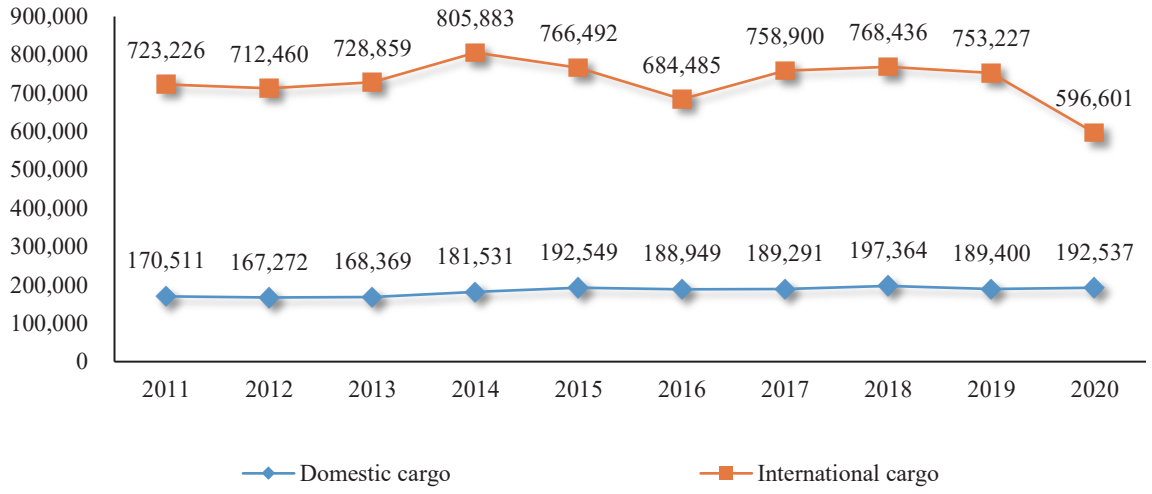


Figure 3.2 Annual Passenger Traffic of Malaysian Aviation Industry from 2016 to 2020

3. Shipping

There are 22 ports in Malaysia and 7 major ports. Inland river transportation in Malaysia is underdeveloped, and 95% of the trade is completed by sea. In November 2015, the Ministry of Transport of China and the Ministry of Transport of Malaysia jointly signed the Memorandum of Understanding on Establishing Port Alliance Relations, and nine Malaysian ports and 12 China ports along the Maritime Silk Road established the *China-Malaysia Port Alliance*. The two sides have carried out in-depth cooperation in port research, staff training, technical assistance, transportation development and service promotion.

In the list of the world's top 100 container ports published by *Lloyd's Daily* in 2019, Port Klang and Port Tanjung Parapas in Malaysia ranked 12th and 18th respectively. Port Klang, located in the northeast of Malacca Strait, has an excellent location advantage, and is an important port in Southeast Asia, as well as the maritime gateway and the largest port in Malaysia. The investment and construction of Port Klang has developed rapidly, and the cargo handling capacity alone has accounted for half of the total import and export cargo in Malaysia. The North Port of Klang Port is an important gateway for the import and export trade of ASEAN countries, and there are routes with the main ports of ASEAN countries, and there are more frequent ships going to the ports of various countries every week. With good berths for deep-water terminals, Port Klang West Container Terminal has developed into the second place in Southeast Asia in providing import and export container services. As a new port in Malaysia, Tanjung Parapas Port has attracted a large number of shipping companies because of its convenient entry procedures and low cost. Today, Tanjong

Parapas Port has become a powerful container transshipment hub port in Southeast Asia.

The cargo throughput of Malaysia by port in 2020 is shown in Figure 3.3 and the trend of cargo throughput of ports in Malaysia between 2011-2020 is shown in Figure 3.4.

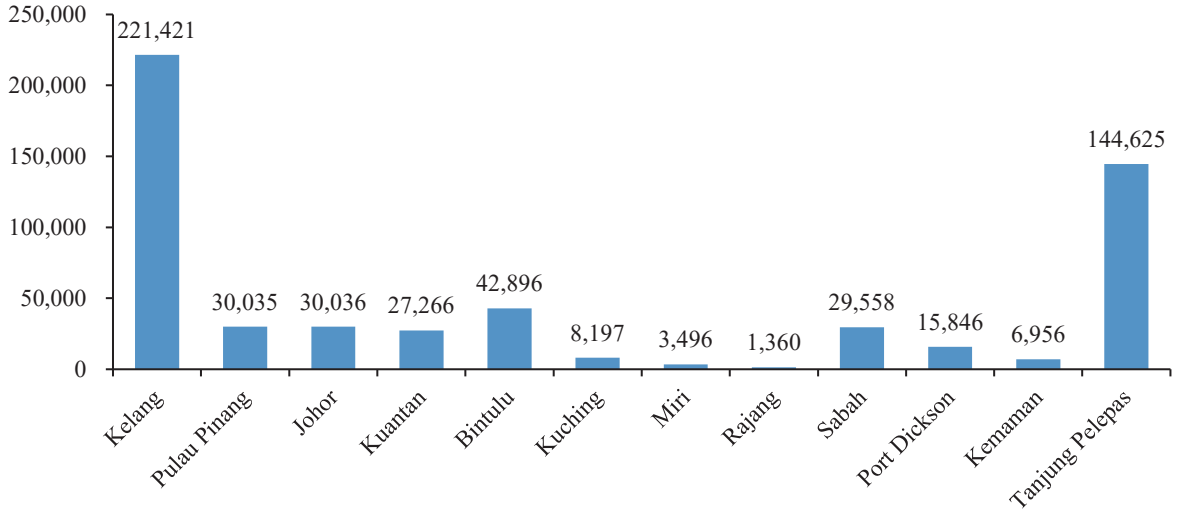
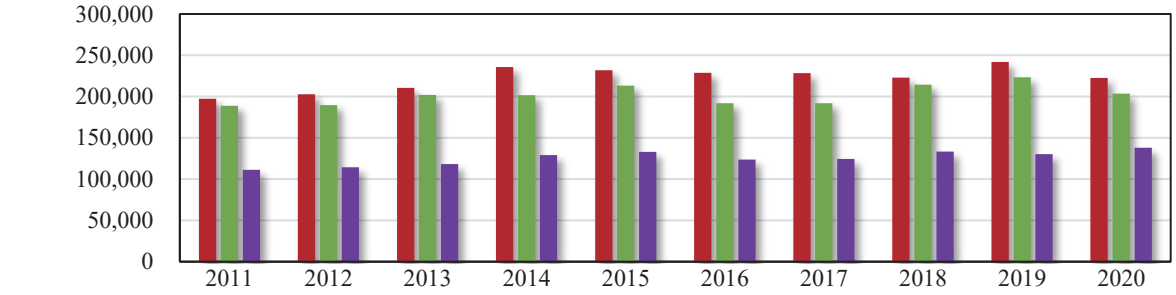


Figure 3.3 Total cargo throughput of Malaysia by port in 2020



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Export	197,238	202,835	210,495	235,831	232,022	228,783	228,459	222,937	241,792	222,703
Import	188,696	189,686	202,011	201,641	213,117	191,722	191,810	214,285	223,453	203,503
Transshipment	111,125	114,371	118,268	128,889	133,052	123,596	124,441	133,479	130,233	138,123

Figure 3.4 Trend of Port Throughput in Malaysia (2011-2020)

(3) Rapid Growth of Vehicles

By 2020, there are 377,353 public transport vehicles and trucks registered in Malaysia, including 42,434 buses, 377,353 taxis and 265,069 trucks. In the past 10 years, the number of buses has increased steadily, the number of taxis has remained basically stable, and the number of trucks has increased rapidly, with an increase of 76% in 2020 compared with 2011 (Table 3.1 and Figure 3.5).

Table 3.1 Number of public transport vehicles and trucks for road transport

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Bus	34758	36312	37950	39445	40545	41436	42550	43471	44282	42434
Truck	150996	159711	170721	182755	194543	205652	218877	236958	254102	265069
Taxi	66177	71694	73182	75032	75733	75035	74418	75453	76031	69850
Total	251931	267717	281853	297232	310821	322123	335845	355882	374415	377353

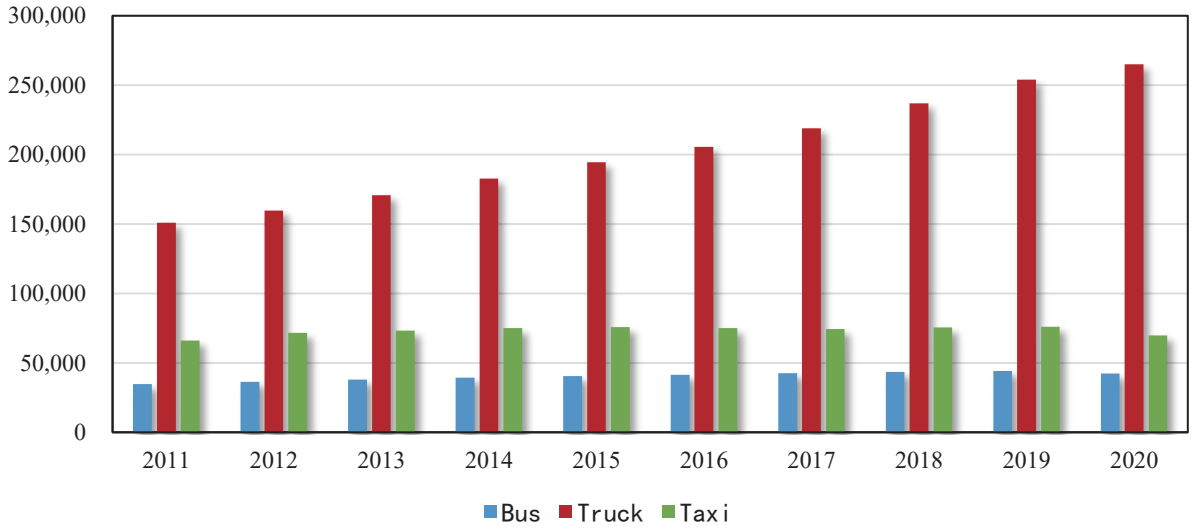


Figure 3.5 Trend of public road transport vehicles (2011-2020)

2. Overview of China-Malaysia Transport Connectivity

Although Malaysia is a middle-income country, its infrastructure construction capacity is relatively weak, and the basic manufacturing industries such as building materials supporting infrastructure construction are also relatively weak. Moreover, due to Malaysia's vast territory, there are many infrastructure projects that need to be implemented. If the level of infrastructure cannot be improved rapidly, it will affect the growth rate and scale of attracting foreign investment. For example, among ASEAN countries, in attracting foreign investment in the past 10 years, the Philippines has attracted the most significant increase in foreign investment, with an average annual increase of more than 20%, followed by Cambodia 18%, Laos 10% and Vietnam 8%. Relatively speaking, Malaysia's performance is not outstanding.

According to Fitch Solutions, in 2020-2021, Malaysia's transportation infrastructure projects focused on roads and bridges, which mainly involved the construction of expressways and bridges. Judging from the newly signed contracts of foreign contracted projects in China, in 2021, there were 11 new traffic construction projects signed between China and Malaysia with a contract value of

more than US$ 5 million, involving US$ 3.64 billion, including 7 projects related to East Coast Railway. At present, the Malaysian government vigorously promotes the construction of railways and other infrastructure, which is in line with the goal of "the belt and road initiative" initiative on interconnection. China's infrastructure capacity can help improve Malaysia's transportation situation and accelerate economic development. For example, the bridge across the Rajang River built by China enterprises has been completed and opened to traffic, which has effectively relieved the existing traffic pressure and successfully boosted the economy of Sarawak State, which is rich in natural resources.

In recent years, China and Malaysia have signed a number of cooperation projects in the field of transportation, covering railways, highways and bridges. Specifically, in the field of railways, China Communications Construction Corporation, as the general contractor, has undertaken one of the largest projects in Malaysia, namely, the East Coast Rail Link (ECRL) of 44 billion Malaysian ringgit (about 10.2 billion US dollars), which is expected to be completed in December 2026 (Column 1).

Column 1 East Coast Rail Link (ECRL) Helps Local Development

Malaysia relies more on private cars for transportation. The local railway system is not smooth enough, and some are only meter-gauge railways built more than 100 years ago. Therefore, railway construction is very important for local transportation and logistics. ECRL is the flagship project of China-Malaysia Belt and Road cooperation, and the largest single transportation infrastructure project under construction by China enterprises overseas. It is a railway built by China enterprises and designed according to China standards. This railway, built with the full set of "China standards", has become another powerful support for Malaysian infrastructure construction, and will connect important ports on the east and west coasts of the Malay Peninsula, and play a role in improving traffic, attracting investment and creating jobs. According to the plan, the total length of the East Coast Railway in Malaysia is 665 kilometers, which is an international first-class electrified railway for both passenger and freight. The design speed of passenger trains is 160 kilometers per hour, and the speed of freight trains is 80 kilometers per hour. Former Malaysian Prime Minister Ismail said that the East Coast Railway project undertaken by China enterprises will help Malaysia build a more efficient public transport system and promote local economic development.

Travel in Malaysia depends on private transportation, and the road congestion is serious. When the railway is completed, the journey from Kuala Lumpur to Kota Bharu will be

reduced from the current 8-12 hours to 4 hours, and the travel time will be reduced by half, which greatly facilitates the travel of residents. At the same time, the traffic safety along the route will be greatly improved. Furthermore, the Malaysian government hopes to promote the economic development of the three backward east coast States, narrow the distance with the west coast States, stimulate the tourism and economic growth of the east coast while saving travel time, and greatly reduce the time and cost of freight transportation in Malaysia, and directly enter the hinterland of South Asia through the ECRL. In the future, the ECRL will become a part of the Trans-Asian Railway and the most direct and convenient passage connecting the Malay Peninsula.

ECRL is not just a "China standard", but fully integrates local characteristics. It not only introduces the concept and technology of railway construction in China, but also respects local environmental protection and regulatory requirements, fully meets the needs of local people, not only meets the needs of people's travel, but also connects with local meter-gauge railways to meet the needs of industrial enterprises.

The project will create tens of thousands of local jobs and benefit 4.4 million people. According to the research of Malaysia Industrial Development Finance Research Center, it is estimated that the East Coast Railway will boost Malaysia's economic growth by 2.7% only in the construction stage, and the demand for machinery and transportation equipment in the East Coast Railway project will boost commodity imports and fixed assets investment by 3.3% and 2.1% respectively.

In the field of port, the port project jointly built by China and Malaysia is Melaka Gateway, which is located in Malacca City between Kuala Lumpur and Singapore. It is connected with several major highways and has convenient transportation. It is less than 150km away from Kuala Lumpur and consists of four islands, covering an area of 1,366 acres, with a total investment of RM 40 billion.

In the field of subway, in June 2022, the first phase of Kuala Lumpur Metro Line 2 was officially opened to traffic. Kuala Lumpur Metro Line 2 is the north-south "artery" of the rail transit network in Greater Kuala Lumpur, which will enable more than 2 million residents along the line to realize a "half-hour living circle" and greatly alleviate the current situation of local traffic congestion and inconvenience for residents to travel.

In the field of rail transit equipment, rail transit vehicles made in China have landed in Malaysia since 2010, and handed over to local production and manufacturing, making Malaysia the first

country in ASEAN with the manufacturing capacity of rail transit equipment products. China enterprises actively promote the localization practice, which promotes the development of employment and related industries, and also promotes the transfer of industrial technology.

Table 3.2 shows some newly signed transport projects between China and Malaysia from 2019 to 2022.

Table 3.2 Some Newly Signed Transport Projects between China and Malaysia in 2019-2022

Year	Project
2019	Malaysia Light Rail Line 3-Design and Construction of Underground Tunnel Project (Area 13 to Area 12 of Shah Alam Gymnasium)
2019	Jiepa Bridge Project of Bid 5 of Sarawak Coastal Avenue
2019	Sabah oil terminal expansion project
2020	Sarawak Second Trunk Road Project (Bid B1A and Bid B1)
2020	The East Coast Rail Link Line Project Section C was rerouted.
2021	Saribas Bridge Project in Sarawak
2021	Supporting wharf project of Sarawak methanol plant
2021	SEJINGKAT Bridge Project in Sarawak
2021	Malaysia-Singapore MRT Depot Equipment and Maintenance Vehicle Project
2021	Sabah Container Terminal Expansion Project
2022	Kuantan Skytrain Development Project
2022	Malaysian Johor-Singapore Rapid Transit System (RTS) Offshore Section Project
2022	Malaysia Light Rail Line 3-Design and Construction of Underground Tunnel Project (Area 13 to Area 12 of Shah Alam Gymnasium)

3. Status Quo and Trend of the Green Development of Transport in Malaysia

In recent years, the greenhouse gas emissions of Southeast Asian countries have been increasing, with Indonesia, Thailand and Malaysia accounting for three quarters of the whole region,

while Malaysia's per capita carbon emissions are much higher than other Southeast Asian countries. The transport sector is Malaysia's largest energy consumption sector and the second largest contributor to the total carbon dioxide emissions, and the transportation industry accounts for 21% of the total carbon dioxide emissions, of which road transportation accounts for the largest proportion [28]. According to statistics from the Ministry of Transport of Malaysia, in 2015, CO_2 emission from the transport sector was nearly 50 million tons, in which 85.2% came from road transportation, as about 90% of vehicles in Malaysia use fossil fuels. According to Our World in Data, in 2019, the GHG emissions of the transport sector of Malaysia was 65.31 million tCO_2e, an average annual growth rate of 4.7% compared with that of 2010. In recent years, relevant departments in Malaysia have gradually attached importance to the green development of the transportation sector, and accelerated the construction of green transportation by formulating relevant plans, popularizing and applying new energy transportation equipment, and developing intelligent transportation.。

Figure 3.6 shows the energy consumption, energy intensity and energy efficiency of the transport sector of Malaysia from 2010 to 2018.

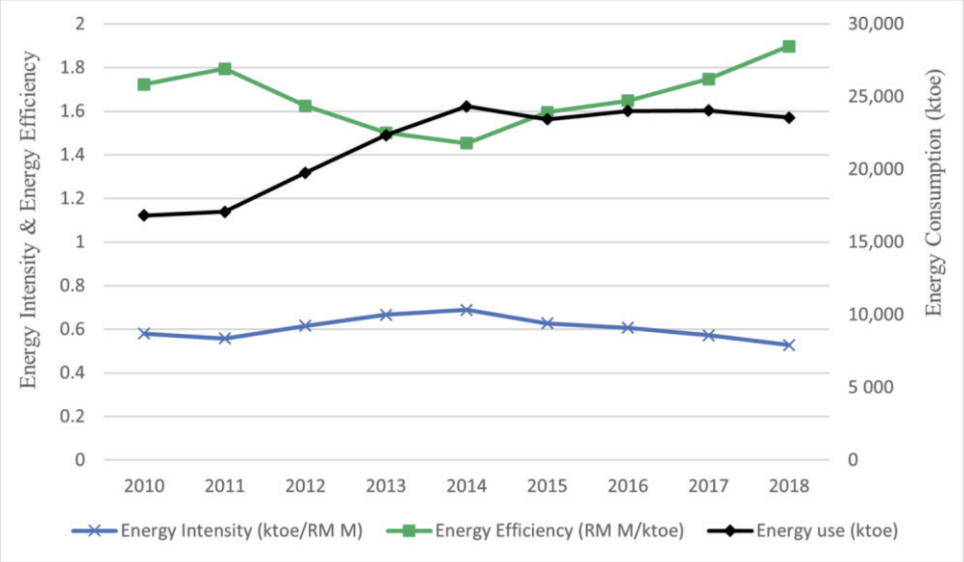


Figure 3.6 Energy use, energy intensity and efficiency of Malaysia's transport sector (2010-2018)[29]

(1) Green Transport Policies have been Developed on Multiple Levels

On the one hand, Malaysia's sustainable transportation policy has been integrated into the overall national development strategy, on the other hand, it has also formulated specific industry plans. In 2018, the Malaysian government conducted a mid-term review of the 11th Malaysia Plan,

and put forward a new blueprint for economic development, including development plans such as "inclusive development, benefiting the whole people", "balanced regional development", "administrative reform to improve efficiency", "developing high-value industrial chains", "strengthening human capital", "developing high-value industrial chains" and "environmental protection and sustainable development". In the *Twelfth Malaysia Plan (2021-2025)*, environmental sustainability is listed as a priority during this five-year period. The Malaysian government will introduce a national energy policy to reduce energy consumption in the industrial and commercial sectors, and promise to stop building new coal-fired power plants and achieve carbon neutrality by 2050.

As early as the National Land Public Transport Master Plan released in 2012, the Malaysian government put the improvement of public transport standards in major population centers on the agenda, hoping to increase the proportion of public transport to 25% by 2020. In order to attract more people to use public transport, measures have been taken, such as increasing the proportion of people living within 400 meters of public transport routes from 63% to 75%, renovating bus stations, introducing new public transport services, and extending railway routes. In promoting the diversified development of fuel, the government promotes natural gas vehicles (NGV) through incentives and legislation, and encourages car owners to use natural gas, exempting the import tax and sales tax on refitted sets of natural gas vehicles. The gradual reduction of fuel subsidies and the increase of gasoline and diesel prices have also led to a sharp increase in the number of new natural gas vehicles. In addition, the national biofuel policy in 2006 encouraged the use of biodiesel as vehicle fuel. The National Electric Transport Blueprint (2015-2030) proposes that by 2030, the government hopes that there will be 100,000 electric cars, 100,000 electric motorcycles and 2,000 electric buses and 125,000 charging stations on the roads in Malaysia. In October 2019, the Malaysian government announced the National Transportation Policy for 2019-2030, proposing to develop more effective, comprehensive and safe transportation, enhance the sustainable development capacity in the transportation field, and promote the development of Malaysia's logistics industry by accelerating the development of land, railway, aviation and shipping fields, so as to turn Malaysia into a regional logistics center.

(2) Promoting Green Ways of Travel

Southeast Asia is one of the most promising new energy vehicle markets in the world. According to the data released by the ASEAN Automobile Federation, in 2021, the total sales volume of major automobile markets in ASEAN was 2.79 million, an increase of 14% over the

previous year; Among them, the market size of new energy vehicles has reached more than 500 million US dollars, and it is expected to break through to 2.5 billion US dollars by 2026, reaching a compound annual growth rate of more than 32%. Malaysia is an important automobile parts manufacturing center in Southeast Asia. The new energy automobile industry is a new field that Malaysia has focused on in recent years, and it is also one of the fastest-growing sectors of foreign investment, with a good industrial development foundation.

The Malaysian government attaches great importance to the development of the new energy vehicle industry. As early as 2010, the government encouraged car companies to research and produce hybrid vehicles through preferential tax relief policies. In 2014, the Malaysian government formulated the National Automobile Policy 2014 (NAP2.0), which liberalized the production restrictions of new energy vehicles, and proposed to build Malaysia into a production base of energy-saving vehicles in Southeast Asia and expand the export volume of whole vehicles and parts. The government will spend 2 billion ringgit to implement this policy and set up the Malaysian Automobile Council to supervise the implementation of the new policy. The government plans to achieve the goal that 85% of the cars produced in Malaysia will be energy-saving cars by 2020, and the overall production goal of 1.25 million passenger cars and 100,000 commercial vehicles by 2020. In 2020, the Malaysian government promulgated the National Automobile Policy 2020 (NAP 3.0), which not only continued all new energy vehicle policies, but also proposed to further improve the certification system for new energy vehicles, so as to encourage and attract more automobile enterprises to invest and build factories. In 2022, the government proposed to cancel all taxes on electric vehicles in Malaysia, including import duties, consumption taxes and road taxes. At the end of 2022, Volvo Truck Company of Malaysia signed a memorandum of understanding with Green Technology and Climate Change Company of Malaysia under the Ministry of Natural Resources, Environment and Climate Change, and both parties will accelerate the application of green technology in Malaysia's transportation industry. Volvo Truck Company will use electric vehicles to promote green logistics, provide green technology training, and adopt a green badge MyHijau login mechanism to accelerate the popularization of green technology. Employees who log on MyHijau's roster can enjoy tax relief of green investment technology allowance when purchasing Volvo electric trucks. In January 2023, Malaysia's Ministry of Natural Resources, Environment and Climate Change said that Malaysia plans to extend the tax relief for electric vehicles in the federal budget due next month to promote the country's green and low-carbon travel. As mentioned earlier, Malaysia's National Electric Transport Blueprint (2015-2030) plans to introduce 100,000 electric

vehicles with 125,000 charging stations in 2030. However, the gap between the actual situation is obvious, with only 900 at present. The latest plan is to install 10,000 charging points for electric vehicles by 2025.

(3) Promoting Innovation and Development of Sustainable Aviation Fuels

Malaysia attaches great importance to the development of biomass energy, and has successively formulated a number of policies such as Renewable Energy Law, Biofuel Industry Bill, National Green Science and Technology Policy, Green Science and Technology Master Plan, Malaysia Economic Transformation Plan (ETP) and Malaysia Biomass Energy Strategy Blueprint. Malaysia is the second largest palm oil producer in Southeast Asia. At present, it is implementing the B10 biodiesel policy and plans to implement the B20 biodiesel plan as soon as possible. 70% of biodiesel in Malaysia is used for domestic consumption, among which the transportation industry is the main consumer.

The aviation industry accounts for 2% to 3% of global carbon emissions, which may increase to more than 20% by 2050. Southeast Asian countries, with fragile climate defense lines, have a strong sense of urgency in environmental protection, and have begun to seek a clean transition road that conforms to their own national conditions by relying on their respective resource endowments. Biofuels have been favored by many ASEAN countries [30]. Malaysia Airlines joined the International Aviation Carbon Offset and Emission Reduction Program (CORSIA) in 2020, and is committed to achieving zero carbon and environmental sustainability in the whole operation process, mainly by adopting renewable energy to achieve low-carbon development of air transportation. In June 2022, Malaysia-operated MH603 passenger plane flew from Kuala Lumpur to Singapore, using sustainable aviation fuel produced from 100% renewable wastes and residues. Because Malaysia is rich in fuel manufacturing raw materials, such as used cooking oil and other forms of biomass, Malaysia has the opportunity to become an important player in sustainable aviation fuel supply. At the same time, Malaysia is trying to include palm oil as part of the carbon offset and reduction plan that meets the international aviation (Corsia) qualified fuel standards.

(4) Implementing Green and Low-carbon Logistics Plan

Malaysia's Ministry of Transport is committed to urging logistics companies to adopt green logistics to reduce their carbon footprint. Green logistics cooperation aims at reducing carbon emissions by improving efficiency. Malaysia has launched the Master Plan for Logistics and Trade Facilitation from 2015 to 2020, and green logistics is an important part. The government attaches

great importance to the logistics industry based on transportation and wants to build Malaysia into a logistics center in Southeast Asia. In the process of accelerating urbanization, Southeast Asian countries are also actively promoting the construction of logistics infrastructure, hoping to occupy their own place in the logistics and e-commerce industries in the region and even the world. Malaysia's transportation department is committed to improving local enterprises' awareness of environmental protection and sustainable development, and improving infrastructure construction led by logistics hub, thus reducing the negative impact of industry development on Malaysia's environment. Some plans have been launched, including the Digital Free Trade Zone (DFTZ) logistics hub at Kuala Lumpur International Airport, which aims to minimize transportation and thus reduce carbon emissions.

(5) Cooperating with China to Develop Intelligent Transport

In the future, sustainable transport will focus on green development, intelligence and sharing. In early 2018, the Malaysian capital Kuala Lumpur introduced China Alibaba Cloud City Brain. The test results show that the urban brain can improve the local traffic efficiency by 12%. In May 2019, Alibaba Cloud cooperated with Senna Malaysia to build an intelligent traffic management system in Malaysia. Alibaba Cloud provides the core technology and cloud computing resources of urban brain platform, and Senna Company supports the design and development of intelligent traffic light system.

4. Recommendations for the Development of Green Transport in Malaysia

At the 21st Conference of the Parties to the United Nations Framework Convention on Climate Change (COP21), Malaysia set a higher goal to deal with climate change, that is, to reduce its greenhouse gas emission intensity by 45% compared with that of GDP in 2005 by 2030, of which 35% is unconditional and the other 10% is conditional on obtaining climate financing, technology transfer and capacity building from developed countries. As an important department of energy consumption and greenhouse gas emission, the green and low-carbon development of transportation is particularly critical, focusing on strengthening pollution prevention and control in the transportation sector, accelerating the implementation of low-carbon travel plans, and strengthening publicity and guidance of green transportation.

(1) Accelerating the Development of Energy-Saving Electric Vehicles

A study by the Institute of East Asian Economics of ASEAN [31] shows that the conclusion drawn by scenario analysis tools shows that the deployment of Energy-Efficient Vehicles (EEV) has the best emission reduction effect in Malaysia, followed by Electric Vehicles (EV), Public Transport

and biofuels. To promote the deployment of energy-saving vehicles and electric vehicles, it is necessary to reduce the cost of electric vehicles, popularize charging stations and develop low-carbon electricity as soon as possible. Malaysia's electric vehicle market has great potential, but the current construction progress of electric vehicle charging pile equipment is lagging behind, and it is necessary to continue to speed up the deployment.

(2) Improving the Efficiency of Transport

Traffic in Malaysia is highly dependent on private cars and road traffic, and the efficiency of travel needs to be improved. It is also necessary to reduce the intensity of carbon emissions and the level of traffic pollution. 75% of Malaysia's population lives in urban areas, which increases the demand for travel, from 40 million in 2010 to 133 million in 2030. With the huge amount of travel and the urgent need of Malaysia to achieve carbon neutrality, green travel mode is imperative.

World Bank research shows that compared with other major cities, the share of public transport in Malaysian cities is low. In order to promote the development of green transportation, combined with Malaysia's transportation structure, it is suggested to use public transportation as much as possible, such as high-speed railway, subway, light rail and bus, to improve the efficiency of public transportation and promote the green transformation of transportation in major urban agglomerations; promote the connectivity between land transportation modes, develop shared transportation modes, pay attention to the people-oriented development concept, and enhance the attractiveness of public transportation; cultivate a car rental fleet of hybrid electric vehicles, promote the change of freight mode from mainly relying on trucks to railway transportation, and improve the transportation efficiency of passenger and freight with the help of the rapid development of railway network in Malaysia in recent years; continue to promote the construction of green ports and build an intelligent port system.

(3) Developing Diversified of Transportation Fuels

To provide diversified fuel supply and improve fuel efficiency, we should especially seize the opportunity of the rapid development of biofuel technology in Malaysia, implement B20 biodiesel policy as soon as possible, and reduce carbon emissions in the transportation industry. Biofuel is considered as the most promising alternative fuel for transportation energy supply system besides solar energy and fuel cells. Compared with pure diesel oil, palm oil biodiesel can greatly reduce engine exhaust emissions and is a clean fuel. From the production point of view, Malaysia is rich in biomass resources, and the government attaches great importance to the development of biomass energy, and has formulated a number of favorable policies, creating a favorable development

environment for the biofuel industry. From the consumption side, the Malaysian government encourages and supports the application of biofuels. Take biodiesel as an example. As early as a few years ago, the Malaysian government passed the Biofuels Industry Act, which has already enforced the B5 (that is, the blending ratio of biodiesel is 5%) policy. In 2015 and 2019, the Malaysian government upgraded the original B5 policy to B7 and B10 respectively. In 2021, some regions began to implement the B20 policy, and plans to promote it nationwide within a certain period of time. In this context, it is suggested to strengthen the development of alternative fuels such as biomass energy and hydrogen energy, increase investment in technology development, and reduce the use of fossil energy in transportation industry.

(4) Promoting China-Malaysia Cooperation in Green Transport

China and Malaysia have a good foundation for cooperation in transportation infrastructure, electric vehicles, intelligent transportation systems and clean fuels. In the future, with the help of low or zero tariffs provided by China-ASEAN Free Trade Agreement and the favorable policy that Regional Comprehensive Economic Partnership Agreement (RCEP) will come into effect in Malaysia, there is great potential for cooperation between China and Malaysia in the field of green transportation. China enterprises can find suitable partners locally, invest and build factories locally to realize the localized production of their products, and make full use of the tariff preferences of China-ASEAN Free Trade Area to export related automobile products to other ASEAN countries. At the same time, actively respond to Malaysia's tax-free policy to encourage the production of new energy vehicles, identify the market positioning, and seek opportunities to invest and build factories in the local area. Continue to implement the construction of the East Coast Railway Project in Malaysia with high quality, ensure the protection of the local ecological environment during the construction process, lay a foundation for cooperation in other transportation infrastructure projects, and create a green transportation route for Malaysia.

Chapter IV Recommendations for Promoting the Green Development of Transport in BRI Participating Countries

1. Jointly Identifying the Green Transport Development Path for BRI Participating Countries

The three countries studied in this report, Saudi Arabia, Greece and Malaysia, all belong to countries with rapid economic and social development in the region. The transportation industry accounts for a high share of its GDP, and the contribution of transportation carbon emissions and pollutant emissions is also high. Summarizing the green development status and future planning of transportation in the three countries, there are several common characteristics: First, all countries emphasize that enhancing the interoperability between different modes of transportation is the key to developing an efficient and sustainable transportation system; Second, railways are generally favored because of their high transportation efficiency, cleanliness and low carbon; Third, countries have seized the development opportunities of the new energy automobile industry, with intensive policies and continuous release of favorable market signals; Fourth, attach importance to the development of multimodal transportation system, and the transportation industry has become a major focus of implementing the commitment to address climate change.

In reference to the characteristics of various countries, this report puts forward a road map for green transportation development in BRI participating countries (Figure 4.1):

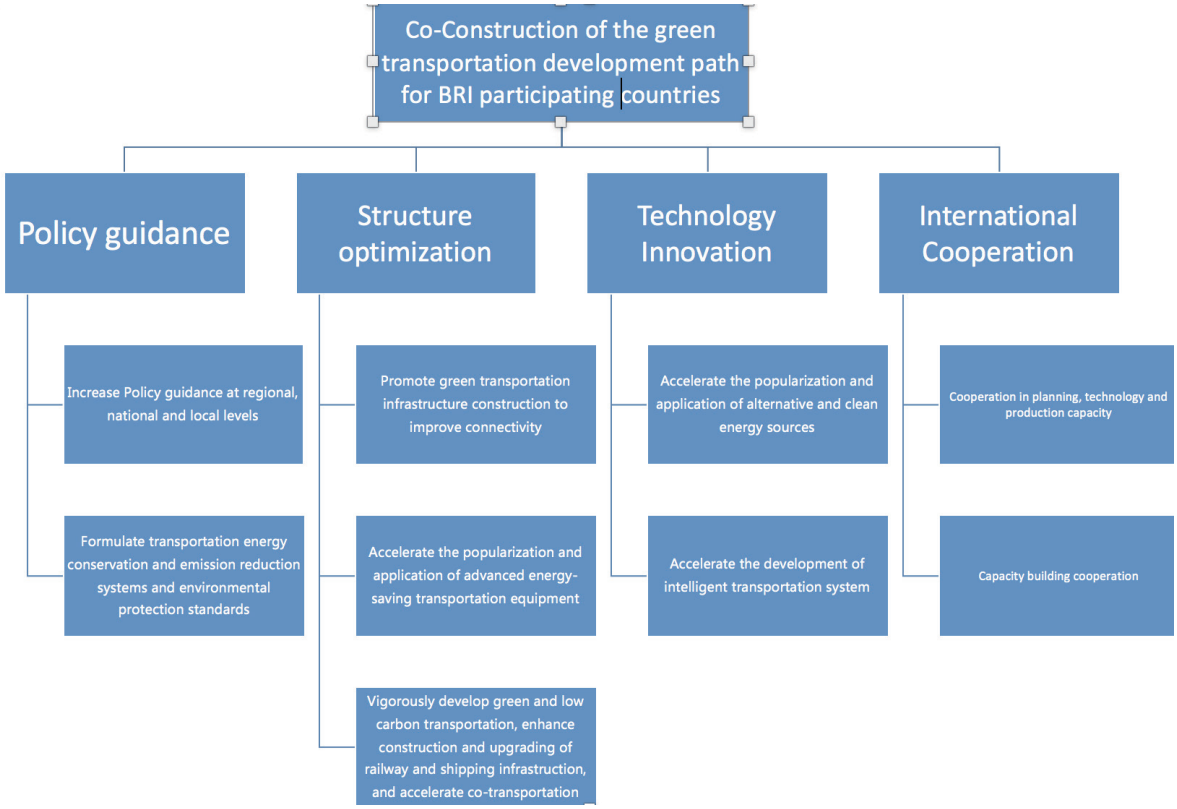


Figure 4.1 Road Map of Green Transport Development in BRI Participating Countries

2. Recommendations for the Development of Green Transport

Saudi Arabia has a relatively high level of economic, social and transportation development, and is rich in renewable energy resources such as solar energy and wind energy. At the same time, the port is also in a stage of great development, and it is also exploring a new low-carbon transportation city construction model. Greece is one of the moderately developed countries in the European Union. Greece's marine and blue economy has great innovation and growth potential. Domestic transportation is mainly by road and sea, and the national electric vehicle plan has been formulated. Ports are the focus of transportation development. Malaysia has become an eye-catching diversified emerging industrial country in Asia and an emerging market economy in the world. In recent years, the economy has maintained steady growth, the transportation infrastructure is relatively perfect, the port is also developing rapidly, and the quantity of transportation equipment has increased rapidly. Combined with the above analysis, this report puts forward the following suggestions on promoting the green and low-carbon development of the transportation industry in BRI participating countries, especially on increasing China's support for the green transportation of the countries:

(1) Carrying out Top-level Design for Green Transport in Reference to Climate and Environment Goals

In reference to the strategic objectives of building a "the Belt and Road Initiative" country's own ecological environment protection and coping with climate change, we will implement the requirements of national independent contribution on emission reduction in the transportation industry, and at the same time, we will coordinate the top-level design of green and low-carbon development in the transportation industry in combination with the development plans of relevant industries. At present, most countries regard the transportation industry as one of the main targets of national emission reduction, and at the same time, the transportation industry is the pioneering field and important support for the construction of "the Belt and Road Initiative". It is suggested that under the framework of green "the Belt and Road Initiative", combined with the specific environmental and climatic sustainable development goals of various countries, and guided by meeting the needs of economic, social and transportation sustainable development, we should coordinate industrial development, poverty eradication, land and resources development, trade and transportation facilitation, and sustainable development, and constantly improve the medium and long-term green development of transportation.

(2) Building Green and Intelligent Transportation Infrastructure

The development of green infrastructure is the key to promote the recovery of countries along the Belt and Road. With the help of China's accumulated experience in the field of green infrastructure, we will cooperate in green design, green construction, low-carbon operation and maintenance, share China's technology and ideas, and help build a "the Belt and Road Initiative" country to build more green transportation infrastructure. Incorporate the concept of green development in the whole life cycle of planning, design, construction, operation and maintenance of transportation infrastructure such as roads, railways, ports and airports, follow international best practices, and adopt green energy-saving and low-carbon technologies to minimize the damage to the ecological environment and reduce pollutants and carbon emissions during the construction process. Promote green finance to support green infrastructure construction, and improve relevant systems to increase the investment and financing of public and private sectors in the field of green transportation.

(3) Promoting Exchanges and Cooperation in the Development of Green Transport

We will continue to strengthen exchanges and cooperation between China and the countries that have jointly built "the Belt and Road Initiative" in the green development of transportation. In

terms of infrastructure construction, China enterprises should protect the ecological environment of the host country to the greatest extent, abide by local laws and standards, actively publicize and share the concept and experience of green transportation infrastructure construction in China, and strive to apply relevant technologies and standards in China; In the promotion and application of new energy transportation equipment, we can jointly carry out new energy transportation equipment technology research and development and application research projects, and China can provide relevant products, services and solutions for countries that need to jointly build "the belt and road initiative"; In terms of capacity building for green development of transportation, such as policy planning, technology research and development, and standard setting, we can further strengthen exchanges and mutual learning and achieve win-win cooperation.

(4) Promoting Cooperation in New Energy Vehicles

Under the background of increasingly severe global problems such as energy shortage, abnormal climate and environmental pollution, the major economies in the world have taken the development of new energy vehicles as an important strategic measure to deal with this situation and accelerated the development of the new energy vehicle market. According to the statistics and data released by the International Energy Agency, in 2020, although the global automobile market sales declined due to the epidemic, the new energy automobile market still maintained a strong development momentum, and the market sales increased to 3.125 million vehicles, a year-on-year increase of 41%, but it still accounted for less than 5% of the global automobile market sales; In 2021, the global new energy vehicle market sales increased to 6.6 million vehicles, nearly doubling year-on-year, accounting for about 10% of the automobile market sales. Generally speaking, the global new energy vehicle market still maintains a high degree of prosperity. China has carried out many fruitful cooperation on new energy vehicles with countries that have jointly built "the Belt and Road Initiative". In the future, other businesses in the industrial chain of new energy vehicles, including new energy batteries and charging piles, can be considered on the basis of vehicle sales cooperation. Explore the establishment of local factories to enhance the endogenous development of local new energy vehicles, and at the same time provide more green employment opportunities for the local area.

(5) Optimizing the Transportation Structure and Developing Multimodal Transport

Since the second half of 2020, disruptions in global supply chain have aroused concerns from around the world. In order to improve the resilience of the supply chain and improve the freight infrastructure in the global market, more investment will be made in the construction of multimodal

transport infrastructure to support the intermodal integration of global transport infrastructure. Governments of all countries will devote themselves to improving the infrastructure of multimodal transport, including improving port efficiency by investing in intelligent port infrastructure, developing dry ports to reduce the pressure on seaports, developing the connection between railway and highway infrastructure, widening and deepening waterways to accommodate large ships, and building other container terminals and berths. Most countries that have jointly built "the belt and road initiative" are in the stage of rapid development of infrastructure construction, and the need to optimize the existing transportation structure is urgent. Strengthen the interconnection between China and the jointly built national transportation facilities, build the hardware foundation of multimodal transport network, promote the convergence of multimodal transport standards and rules, and promote multimodal transport to play an important role in the integration of industrial chain, supply chain and value chain.

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