



Research on the Sustainable Development of Urban Rail Transit under the Concept of Green and Low Carbon

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Abstract: Under the guidance of the “dual carbon” goal, the research on the implementation path of green construction for urban rail transit is getting deeper and deeper, which is not only an important contribution to the sustainable development of cities, but also a positive response to the global climate change response. Based on the existing research, this paper further discusses the new ideas, strategies and methods for green construction of urban rail transit.

Keywords: “dual-carbon” target; urban rail transit; green construction

1. Introduction

Because of its high degree of environmental protection and convenience, urban rail transit is regarded as a high-quality mode of transportation by various countries and cities, and its low-carbon characteristics also allow the national “dual-carbon” goal to be realized as soon as possible. Now in China, urban rail transit has become a more major means of transportation, in-depth exploration of the implementation of its green construction path, can to a greater extent to promote the benign development of the city.

2. The real value of urban rail transit green construction

2.1 Contributing to the implementation of “energy saving and emission reduction” policy

According to the relevant data to prove that a passenger in the subway travel a distance, compared to the passenger using fuel cars to complete the same travel distance, can save energy consumption more than 5/6, with the development of science and technology, for urban rail transit “green” construction, subway engineering can further enhance the energy-saving emission reduction Level. Taking City B as an example, the application of energy efficient technology system (e.g. the application of regenerative braking system, which can turn the energy formed during braking into electricity for recycling in time) and intelligent management system reduces the energy consumption to a greater extent, and the saving of energy consumption naturally brings about the reduction of emission, avoiding unnecessary damage to the ecological environment, which is in line with the relevant requirements of the goal of “double carbon”. This is in line with the requirements of the “dual-carbon” goal.

2.2 Promoting sustainable urban development

Green construction of urban rail transit is not only conducive to energy saving and emission reduction, but also an important means to promote sustainable urban development. With the acceleration of urbanization, urban traffic congestion, environmental pollution and other problems are becoming more and more prominent, urban rail transit as a kind of green, low-carbon, efficient way of travel, can significantly ease the urban traffic pressure and improve the urban environment. Through green construction, it can reduce the resource consumption and waste emission in the process of urban rail transit construction, improve the resource utilization efficiency and reduce the impact on the environment. At the same time, green construction can also promote the development of related industries, such as green building, environmentally friendly materials, energy-saving technologies, etc., forming a virtuous cycle and promoting the sustainable development of urban economy.

3. Implementation Path of Green Construction for Urban Rail Transportation under the Goal of “Dual Carbon”

3.1 Macro dimension: optimize the policy and institutional system to promote green development

3.1.1 Do a good job of top-level management and actively optimize laws and regulations

For the development and construction of urban rail transit projects, it is necessary to optimize the top-level design,

create a legal system that promotes the application and promotion of green policies, implement policies on clean energy, green building materials, etc., and make clear the guidelines of perfect pre-approval of the project, in-place supervision of the process, and rigorous evaluation of the project after the event, and cooperate with the corrective mechanism, energy consumption limits, emission reduction indexes and other mandatory standards to enhance the greening of the construction and development of the project. Strength.

In addition, it is also necessary to create industry norms. At present in most urban areas in the rail transportation industry standards are not very perfect reality, it is necessary to combine the actual situation to create industry norms system, in order to solve practical problems based on the actual situation. Specifically, it is necessary to closely combine the macro-guidelines put forward by the national level, to build the whole industry, the whole cycle of the green low-carbon construction and development standards, and with appropriate support and subsidy policies, in order to make the rail transportation project gradually turn to the direction of green and low-carbon development, and gradually form the whole process, the whole cycle of the carbon reduction, carbon reduction normative mechanism.

3.1.2 Create a more complete “carbon market”

“Carbon market” is the abbreviation of “national carbon emissions trading market”, which is the core policy tool to promote carbon neutrality and peak carbon, on July 16, 2021, the national carbon emissions trading market opened. The construction of a unified national carbon emissions trading market is an important decision made by the CPC Central Committee with President Xi at its core, and is an important institutional innovation that uses market mechanisms to control and reduce greenhouse gas emissions, promotes the green and low-carbon transformation of the mode of economic development, and is an important policy tool for strengthening the construction of an ecological civilization and the implementation of international emission reduction commitments.

First, strengthen the development planning of low-carbon industries, with a view to comprehensively enhancing the utilization efficiency of carbon emissions, promoting the healthy and sustainable development and optimization of the industry, strengthening the research and analysis of the industry’s realities, clarifying the indicators, reasonably allocating quotas, and determining the direction of the deep development of the low-carbon and carbon-sink technology industries.

Secondly, build a standardized and perfect carbon accounting mechanism, analyze the accounting methods of carbon emissions and carbon sinks, cooperate with cloud computing, remote sensing technology and other means to strengthen the accuracy of measurement, and build a standardized auditing system to assist.

3.1.3 Optimize the relationship between various social sectors to promote the development of industry linkage

Starting from the three perspectives of government departments, urban rail transit enterprises and the market, actively optimizing the tripartite cooperation relationship can help promote the development of the “green” industry mode and realize the linkage of multiple parties.

First, government departments should play a leading role in formulating and implementing relevant policies and regulations to provide institutional safeguards for the green and low-carbon development of rail transportation projects. At the same time, increase capital investment, set up a special fund to support the research and development and application of green low-carbon technology, and promote the technological innovation and industrial upgrading of the rail transportation industry.

Secondly, urban rail transit enterprises should actively respond to the national call, take the initiative to assume social responsibility, and integrate the green low-carbon concept into the enterprise development strategy. Through the introduction of advanced technology and equipment, optimize operation management, reduce energy consumption and carbon emissions, and realize green and low-carbon operation.

Thirdly, the market should play a decisive role in resource allocation and promote the market-oriented application of green and low-carbon technologies. Through the establishment of green bonds, green funds and other financial tools to guide social capital investment in the field of green low-carbon, to provide financial support for the green and low-carbon development of rail transportation projects. At the same time, strengthen market supervision, regulate market order, prevent vicious competition and speculative behavior in the market, and protect the healthy development of green low-carbon industry.

3.2 Mesoscopic dimension: Innovative construction and implementation routes, leading to green construction

Based on the national “green building technical guidelines” and other documents and policies, in practice, we can try to innovate the construction implementation route from the meso-level.

3.2.1 “Greening” Planning

Firstly, the “green” planning of urban rail transit project needs to first ensure the basic functional requirements, clarify

the main control indexes, the macro analysis of the comprehensive benefits, urban rail transit project adhere to the “green” planning idea is to integrate the whole life cycle of the green technology layout and the layout of the green technology in the cycle, as well as the green technology layout of the whole life cycle of the green technology layout and the layout of the green technology in the cycle. The urban rail transit project adheres to the planning idea of “greening”, which is to integrate the whole life cycle of the green technology layout and the prediction and analysis of the ultimate effectiveness of the layout.

Secondly, with reference to the standardized indicators, “greening” objectives should be added or integrated in different construction processes, and a fault-tolerant and corrective mechanism should be constructed to create a closed-loop management of review and audit and promote the benefits of greening construction. In terms of the current reality, the network planning of urban rail transit project has the problems of low reliability of the prediction of passenger flow and imperfect overall service mechanism, and the travel efficiency of the masses is relatively low.

Therefore, in the stage of “greening” planning, it is necessary to clarify the vein, pay attention to the guiding role, and make efforts to explore the ideas of solving the contradiction between “supply and demand” and the actual operational needs of the transportation, strengthen the service function of the transportation business in urban areas, and innovate the overall layout and macroscopic transportation structure of the urban areas effectively, so as to achieve the goal of “greening” the transportation business in urban areas. The overall layout of the urban area and the macro transportation structure, in order to promote the order of construction in the near and distant future, and to promote the coordinated development of the urban area.

3.2.2 “Greening” Planning

Compared with other conventional public service public transportation, the operation stage of urban rail transit project is not significantly different, all need to experience a period of loss-making operation, and gradually make up for it in long-term operation, which is obviously not in line with the viewpoints of low-carbon development and green construction to a certain extent, so we can try to comprehensively take into account the basic financial level of the city and the construction scale of the project from the perspective of planning. Therefore, from a planning perspective, we can try to select the basic scale of grid planning, make a good phasing plan, and design the basic form of transportation engineering by analyzing in depth the demand for urban development and human flow, and judging the direction of sustainable development comprehensively.

Firstly, it is important to maintain the convergence with the urban spatial planning. From the point of view of the internal operation of the city, green planning should pay attention to the integrated development of key areas, associated with key core transportation hubs and commercial centers, for the city’s “morning peak” and “evening peak” flow of people to promote healthy and convenient travel, so as to make the internal rail transit grid appear as the “morning peak” and “evening peak”. The rail transit grid within the city shows consistency and coordination, realizes the optimal use of resources, and promotes network interconnection.

Secondly, promote the interoperability between urban areas. In-depth analysis of the national “comprehensive three-dimensional transportation network planning outline” related content, to promote the development of transportation connectivity and interoperability between cities and cities, to promote the integrated development of the main line railroad lines, intercity lines, suburban railroad lines, so that the infrastructure is connected, common tickets, information exchange, etc., at the same time, for the security check, facility maintenance and other systems, but also to achieve mutual compatibility, in the same time as saving energy, but also for the energy saving, but also to provide perfect service for the city residents. The city residents can also be provided with perfect services while saving energy.

3.3 Micro dimension: designing low-carbon technology routes and implementing green construction

Generally speaking, for the technical route of “carbon reduction” and “carbon lowering”, it is more intuitive and feasible to reduce carbon emission and enhance carbon absorption. Generally, in urban rail transit projects, the loss of building materials and power loss during the whole life cycle are the main ways of carbon emission, and when designing the technical route, we can try to start from the following aspects:

First, optimize the energy consumption structure, in short, is to reduce the proportion of thermal power, based on the actual, the development of wind power and solar power supply and other sources of electricity, conditions permitting, you can try to introduce a new type of low-carbon energy, such as hydrogen, in order to optimize the carbon emissions per unit of energy consumption indicators.

Secondly, develop and apply new building materials, promote the application of reduction and resourcing of building materials, comprehensively optimize the building structure and organization, implement low-carbon means, build a perfect

system, and create demonstration projects. In actual implementation, because there may be long-term progressive technical means to reduce carbon conditions, many building materials are still choosing more traditional materials, so we can try to increase the proportion of environmentally friendly materials such as low-carbon cementitious materials, and explore the application space of resin materials or fiber materials.

Third, preferred and application of mature key technologies, build the energy saving and efficiency industrial system of urban rail transit engineering, consolidate the environmental basis of low energy consumption technology, integration of energy feedback technology means, in addition, green heating, light storage and other directions can drive the rail transit engineering industry characteristics of the technology industry. For urban rail transit, carbon neutral technology route has a larger use of space, although at present China in the relevant policies and regulations and supporting technology system is not very perfect, but from an overall point of view, the current policy guidance and technology development direction have presented a clear “green” tendency, in order to ensure that the technical and economic conditions On the basis of technical and economic conditions, the technology route of carbon emission reduction is bound to have a wider application space.

4. Conclusion

To sum up, in the process of promoting the greening and decarbonization of urban rail transit engineering, it is necessary to consider the macro, meso and micro dimensions in order to achieve the goal of sustainable development of the industry. From the above analysis, it is easy to see that from the policy guidance, market mechanism construction, the main role of enterprises to play, to the innovation of construction and implementation routes, and then to the specific design of low-carbon technology routes, each step is closely linked and mutually supportive, forming a good internal driving force. The greening and low-carbon change of urban rail transit engineering is a long-term and arduous task, which requires the joint efforts of the government, enterprises, research institutes and all walks of life in order to inject a new impetus into the sustainable development of urban rail transit engineering.

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