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RESEARCH ON GREEN ENERGY TRANSPORT THEORY UNDER THE FRAMEWORK OF THE «THE BELT AND ROAD»

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Introduction

The «the Belt and Road» initiative provides new opportunities for global energy cooperation, especially in promoting green energy development. With the global emphasis on sustainable development and environmental protection, green energy transport is particularly important under the «the Belt and Road» framework. This paper aims to explore the theoretical basis of green energy transport under the «the Belt and Road» initiative, and analyze the advantages of existing transport models.

1. Status quo and challenges of green energy transportation under the «the Belt and Road» initiative

1.1. Current Green Energy Transport Models

At present, countries along the «the Belt and Road» have adopted various modes in green energy transportation, including:

Railway transportation: The use of electric powered train transportation reduces carbon emissions.

Maritime transportation: Ships powered by LNG (liquefied natural gas) reduce reliance on traditional fossil fuels.

Pipeline transportation: Using pipelines to directly transport natural gas or other energy sources improves transportation efficiency and safety.

Renewable energy: In some key nodes, such as ports and logistics centers, renewable energy sources such as solar and wind energy are used.

These models demonstrate the potential and achievements of the «the Belt and Road» initiative in promoting green energy transport. However, there are still challenges in technology, funding, and international cooperation that require joint efforts from all countries to promote the construction of more efficient and sustainable green energy transportation networks [1].

1.2. Main technical and economic challenges faced

The main technical and economic challenges faced by green energy transport under the «the Belt and Road» initiative include:

(1) Technological innovation and upgrading challenges: Green energy transportation requires the adoption of more advanced technologies to reduce energy consumption and carbon emissions. This includes developing and adopting more efficient transportation vehicles, energy storage technologies, and energy management systems. However, the development and application of these technologies require a significant amount of time and funding investment.

(2) Capital investment and cost issues: Investing in green energy transportation projects requires huge amounts of funds, especially in infrastructure construction and technological innovation. In addition, the cost of some green technologies is still high, which is a major financial burden for many developing countries along the the Belt and Road.

(3) Uncertainty in policies and regulations: Differences in policies and regulations in different countries may affect the implementation of green energy projects. Lack of unified policy guidance and legal support may lead to slow project progress.

(4) Technology transfer and cooperation barriers: Technology transfer is the key to promoting green energy transportation, but due to technology protectionism, intellectual property issues, and technological gaps between cooperating countries, technology transfer and cooperation face many challenges.1.3 Challenges of Policies and Regulations

Since the «the Belt and Road Initiative» involves many countries with different policies, regulations and standards, it is very difficult to coordinate these differences to achieve a unified green energy transport policy. Among them, political stability and uncertainty in the legal environment may affect the safety and sustainability of cross–border green energy transportation projects, especially in countries with political instability or weak legal systems [2].

Country	Policy name/ regulation	Incentives	Green energy transportation goals
China	The the Belt and Road Green Investment Principles promote green investment	Promoting green investment	Build another batch of renewable energy projects and clean energy

Russia	The First Climate Act	Introducing carbon trading and carbon offsetting mechanisms	Set accountability standards, require large emission companies to report emission levels, and plan to implement domestic and international carbon trading systems in Sakhalin Oblast
Belarus	National Energy Security Outline	Improve energy utilization efficiency, develop green economy priority areas such as electricity and transportation	Promise to reduce domestic greenhouse gas emissions by 28% compared to 1990 by 2030

Government changes or policy changes may lead to changes in previously promised project support and incentive measures, which increases project uncertainty and risk. Achieving environmental protection goals while pursuing economic development is a challenge for many developing countries. We need to balance the relationship between industrialization, energy demand growth, and environmental protection.

2. Case Study on Green Energy Transport in the Belt and Road Countries

2.1. Project Case Analysis

1. China's export of photovoltaic power stations

– China has promoted a number of photovoltaic power station projects in the «the Belt and Road» countries, such as the Kwada photovoltaic power station in Pakistan.

– These projects have reduced reliance on fossil fuels and promoted the use of local renewable energy [3].

2. Cross border natural gas pipelines in Central Asia

– For example, the Central Asia China natural gas pipeline connects countries such as Turkmenistan and Uzbekistan with China.

– Pipeline transportation is more environmentally friendly than traditional sea transportation, reducing carbon emissions during transportation.

3. Green railway transportation in Europe

– Under the framework of the «the Belt and Road», freight trains between China and Europe will increase, and more environmentally friendly electric power will be used to reduce carbon emissions.

2.2. Case Summary and Inspiration

– The importance of technological innovation: Promoting green energy transportation requires continuous technological innovation, such as improving energy efficiency and developing low-carbon transportation methods.

– Policy support and international cooperation: Government policy support and international cooperation are key to promoting green energy transportation. We need to establish a cross-border cooperation mechanism, unify environmental standards and incentive policies [4].

– Balancing economic development and environmental protection: It is necessary to consider environmental protection and sustainable development while promoting economic growth, in order to achieve a win-win situation between environment and development conclusion.

This study emphasizes the importance of promoting green energy transport in the «the Belt and Road» initiative, especially in the face of global climate change and environmental protection challenges. Point out that technological innovation and international cooperation are key factors in promoting green energy transportation, and call for strengthening cross–border technological exchange and cooperation. Suggest strengthening the formulation of policies and regulations to support the development of green energy transportation, and propose the need for more unified policies and standards internationally. Through continuous innovation, the «the Belt and Road» initiative can effectively promote the green energy transport of countries along the Belt and Road, and make contributions to global environmental protection and sustainable development.

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CHINA'S EXPERIENCE IN TRANSITION TO A CIRCULAR ECONOMY

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In China the circular economy has begun to develop as part of an industrial ecology program that looks at how one company's waste can become another's resources. Currently the country has formed a legislative framework for the circular economy, and the concepts of environmental design and extended producer responsibility are actively developing, which indicates significant progress in this area. The need to move towards greener production and consumption in China is driven by its rapid economic growth and industrialization which has led to pollution problems.

The Chinese government mainly focuses on the macro and meso levels of circular economy development, using territorial planning tools such as the creation of special industrial or regional pilot zones, industrial symbioses [1, p. 218].

The major economic reform that occurred in China in the late 1970s led to rapid economic growth, increased international trade, and large flows of foreign direct investment due to China's attractive new economy business environment. The accelerated process of industrialization of China's economy has directly contributed to the negative impact on the