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Security Cooperation of Global South Energy Supply Chain under the BRICS Framework ——Take Arab Countries as An Example

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Abstract: The expansion of BRICS contributes to the South-South cooperation of energy supply chain security in the southern countries of the world. The new members of BRICS in Arab countries are not only important consumers of energy demand in China, but also important countries of resource supply. Oil exports are dominant, which forms a complementary pattern with the energy demand of BRICS members. Deepening the participation of Arab countries in the global energy governance system is conducive to stabilizing the safe supply of resources in the energy supply chain, and can also create a diversified and resilient South-South cooperation network for the countries in the south of the world that are "warming up". In the short term, under the geopolitical risk characterized by traditional political and military security and the green energy technology security environment characterized by technological innovation, the opportunities and challenges of energy supply chain cooperation in southern countries of the world coexist. To build a three-dimensional South-South cooperation on BRICS-Arab countries' energy supply chain security, it is necessary to achieve synergy and cooperation among BRICS-Arab countries from the aspects of trade, transportation, logistics, investment and financing, technological innovation and system construction, make use of the means and mechanisms such as strengthening the connection between energy production and consumption, improving the financial and settlement payment systems, and strengthening the coordination of technical standards among countries in the south of the world, so as to build a stable, safe and sustainable new ecology of South-South cooperation in the multi-symbiotic energy supply chain of countries in the south of the world.

Keywords: BRICS Cooperation; Arab Countries; Global South Energy Supply Chain

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1.Introduction

The traditional international environment of oil and gas energy security governance has changed, and the geopolitical risks of American protectionism, unilateralism and "rising to the east and falling to the west" have reshaped the security guarantee ability of the global energy supply chain. Developing countries have to rely on the export advantages of oil and gas in the global value chain because they have been placed in the "second-and third-rate" position of the global energy international system for a long time. The expansion of BRICS brings new hope to solve the above difficulties. The introduction of Arab countries such as Saudi Arabia, United Arab Emirates and Iran has greatly enhanced the influence and role of BRICS in the global energy structure. The oil and gas resources and mature industrial model in the Arab region make China, the world's

largest importer of oil and gas resources, and India and other countries within the BRICS framework more complementary. At present, there are many studies on Arab countries' participation in BRICS overall energy cooperation, but the research on its role and cooperation practice in energy security supply chain is still scarce, and its institutional mechanism and attitude towards BRICS construction are also lacking in full description. Studying the theoretical mechanism and practice mode of Arab countries' participation in BRICS energy security supply chain cooperation will help to promote the formation of a more just and reasonable international energy security governance system, which is of great benefit to this research.

2.Cooperation Mechanism of Energy Supply Chain in Arab Countries under the BRICS Framework

2.1 Multi-level governance structure and coordination mechanism

Arab countries' energy cooperation under the BRICS framework has established a multi-level governance framework at the government level, enterprise level and technical level, and adopted institutional arrangements for collaborative governance [1]. At the government level, the BRICS Energy Ministers' Meeting established an intergovernmental governance mechanism for Arab countries to participate in policy-level coordination. The consensus on building new industrial revolution partners and industrial chain supply chain cooperation put forward by the BRICS Industry Ministers' Meeting held in 2024 was widely supported, and Arab countries actively responded to the establishment and promotion of relevant initiatives. At the enterprise level, the Energy Working Group of the BRICS Business Council has absorbed large Arab energy companies such as Saudi Aramco and Adnock in the United Arab Emirates, and used regular dialogue and cooperation among enterprises to promote industrial cooperation projects. On the technical level, the BRICS New Development Bank has set up an energy project evaluation committee to provide financing facilities for clean energy-related projects that Arab countries participate in. By the end of 2022, the clean energy investment provided by the BRICS New Development Bank has reached more than 3 billion US dollars, so the BRICS multi-level governance can provide an intermediate link between the top-level design and specific projects for Arab countries' energy cooperation, and ensure the effectiveness and sustainability of cooperation from the technical and financial aspects.

2.2 Trade facilitation and payment system innovation

Arab countries and BRICS countries have made many achievements in the fields of payment and settlement, trade facilitation, economic and trade cooperation and innovation, which laid the foundation for further improving the cooperation mechanism of energy supply chain in the future [2]. The crude oil trade between China and Saudi Arabia was settled in RMB, which opened the way to get rid of the US dollar settlement system. The direct exchange rate between the UAE dirham and RMB officially started, making the settlement of oil and gas trade between the two sides more convenient. In the face of US sanctions, Iran has established a barter exchange and local currency settlement mechanism with China and India, and maintained a certain amount of oil and gas exports. BRICS countries began to try to build a unified payment system to reduce their dependence on the SWIFT system. Russia put forward the idea of the BRICS payment system during the Kazan BRICS Summit in 2024 and received enthusiastic feedback from Arab member States. In addition to innovation in payment, countries have formulated facilitation mechanisms for customs clearance, quality inspection, conflict handling and other fields. The United Arab Emirates launched a "one-stop" comprehensive platform for energy trade, which can comprehensively handle customs declaration, inspection, insurance and other services, effectively improving trade convenience.

2.3 coordinated industrial development and value chain reconstruction

As an important member of the BRICS, Arab countries have contributed to the establishment of a more equal, balanced and coordinated global energy industry chain [3]. For example, in the petrochemical industry system, Saudi Arabia's rich light crude oil resources were used to cooperate with petrochemical enterprises in China to implement large-scale refining and chemical integration projects with world-class standards, which promoted the cooperation of the whole industry chain; For another example, in the petrochemical industry system, the UAE has established a free zone to attract BRICS enterprises to establish local oil storage and transportation centers, and realize the development of the energy "production, supply, storage and sales" system for Asia and Africa; For another example, in the petrochemical industry system, Iran has built an oil transit corridor connecting Central Asia, South Asia and the Middle East by virtue of its unique geographical advantages, providing

new energy export channels for BRICS countries such as Russia and India; In terms of new energy, we will make full use of the unique solar and wind energy resources in Arab countries and cooperate with Chinese enterprises to develop new clean energy on a large scale. For example, the green hydrogen project of NEOM New Town in Saudi Arabia is expected to produce 1.2 million tons of hydrogen annually, which will serve the global hydrogen industry.

3.The practice mode of Arab countries participating in the BRICS energy supply chain

3.1 Differentiated market positioning and competitive strategy

The Arab countries in BRICS mainly give full play to their own resource advantages and use local market conditions to obtain corresponding market positioning and competitive position [4]. Saudi Arabia takes advantage of its super-large production capacity and reserves, positioning itself as a "stable supplier" in the market, signing stable long-term contracts to ensure major customers, and providing stable energy supply guarantee for BRICS countries. The supply of the 20-year long-term supply agreement signed with China has remained at a stable level of 85 million tons, and the long-term cooperation with India has reached 40 million tons every year; With its strategic location and supporting infrastructure, the United Arab Emirates is positioned as an "energy trade center". In addition to exporting its own crude oil and natural gas, it also provides entrepot trading and storage services for crude oil and natural gas from other Middle Eastern countries. The port of Fujairah in the United Arab Emirates has become the most important spot trading center for petroleum products in Asia. Iran, on the other hand, supplies oil in the form of "flexible supplier", adopts a relatively flexible way at a lower price, maintains oil and gas trade relations with BRICS countries under sanctions, and implements the mode of "supply first, then pay" for China's oil exports, thus avoiding financial sanctions.

3.2 Technical cooperation and industrial upgrading model

Arab countries also use technology introduction to promote the transformation and upgrading of domestic energy industry and increase the added value of technology for the energy commodity chain [5]. Aramco of Saudi Arabia and China's petroleum technical service enterprises jointly set up a research and development center to develop higher-performance drilling technology and more advanced downhole technology according to the characteristics of oilfields in the Middle East, such as high temperature, high pressure and high salinity, which promoted the exploitation of Saudi oil fields and enhanced the support capacity of similar projects in other BRICS countries. The UAE has made progress in the integration of seawater desalination and oil exploitation, and the developed "zero emission" oilfield exploitation technology has been exported to Russia, Brazil and other BRICS countries. Iranian and Russian enterprises have cooperated closely in the cooperative research and development of natural gas liquefaction technology, and the jointly developed small transportable LNG equipment has been used in Iran's South pars gas field, making gas transportation more convenient and economical. Arab countries cooperated with China enterprises to build an advanced intelligent oilfield management system, and applied Internet of Things technology and artificial intelligence technology to well control and intelligent maintenance of the oilfield, so as to realize remote monitoring of the oil well and timely predict the failure of underground facilities, effectively saving the operating cost of the oilfield and improving the production efficiency of the oilfield.

3.3 Green transformation and sustainable development practice

Arab countries actively explore energy transformation within the framework of the BRICS mechanism, develop and utilize clean energy to improve energy efficiency, and make contributions to building a high-quality BRICS energy supply chain. Saudi Arabia is implementing "Saudi Vision 2030", and it is planned that the installed capacity of renewable energy in Saudi Arabia will reach 58.7 GW in 2030. The Red Sea New Town built by China Company is completely powered by renewable energy, becoming a global benchmark example of renewable energy application; The UAE has the closest cooperation with Russia in the field of nuclear power and energy development. Baraka nuclear power plant has been put into operation, providing clean electricity for the Middle East, and has also cooperated with India in the field of offshore wind power. The designed installed capacity of this project is 2 GW; Iran is relying on its rich natural gas resources to vigorously develop natural gas power generation instead of oil power generation. The overall efficiency of the combined cycle power station built in cooperation with Chinese enterprises has reached 62%, which has an important demonstration role in improving utilization efficiency; In terms of technical development of CCUS, Arab countries have cooperated with countries with developed

technical level among BRICS members. For example, the disposal capacity of Saudi Aramco carbon capture project has reached 1.5 million tons/year, which has laid a good foundation for the low-carbon development of oil exploitation methods.

4.Optimize the path of BRICS-Arab energy supply chain security cooperation

4.1 To build a diversified supply guarantee mechanism

Build a BRICS-Arab energy supply chain security cooperation mechanism, set up a multi-node and multi-path security framework, and rely on the diversification of supply sources, transportation routes and coordination of reserve mechanisms to increase the flexibility of the entire energy supply chain and ensure safety and stability. Diversification of supply sources is to ensure that China, Indian and other major energy consuming countries maintain stable and safe energy supply relations with many Arab oil-producing countries with diversified sources, and reduce the fragility of supply. Floating price mechanism and flexible contract relationship are helpful to improve the ability of supply to cope with changes. Diversification of transportation routes is to build a diversified pipeline transportation and railway transportation network on the basis of traditional maritime transportation. China-Pakistan Economic Corridor, China-Russia East Line natural gas pipeline and other projects are alternative supply routes for BRICS pipelines and other facilities. The coordination of reserve mechanism is mainly the synchronization and coordination of strategic oil reserves and natural gas reserves in various countries. The coordination and sharing of reserves can increase the resilience of BRICS energy supply chains, improve the effectiveness of dynamic market supply, establish an early warning system for supply chains, build intelligent and networked data analysis and decision-making capabilities, and use big data and artificial intelligence technologies to identify potential risks and formulate adjustment plans. According to the characteristics of its own geographical location, the Arab region will build a regional energy reserve and transshipment center to provide buffering and adjustment functions for the entire BRICS energy supply chain.

4.2 Deepening the coordination of technological innovation and standards.

Strengthening the coordination of key technologies and standards of BRICS-Arab energy supply chain is the direct driving force to promote the competitiveness of BRICS-Arab energy supply chain. We should make efforts to promote joint technical innovation, standard coordination and personnel training of BRICS countries, improve the overall technical level of BRICS countries, and form a coordinated standard system and personnel training mechanism. At the level of joint technological innovation mechanism, we will build a BRICS-Arab energy technology innovation alliance, carry out joint technological research in emerging fields such as ocean engineering, shale gas exploitation, hydrogen energy production, energy storage technology, etc., reduce the input cost of technology research and development by means of technology sharing, and accelerate the transformation process of technological achievements; Standardize the working mechanism, build a BRICS energy technical standard system, set unified technical standards in equipment interface, safety and environmental protection, reduce technology docking costs and improve interoperability; On the aspect of personnel training mechanism, the BRICS University Alliance should be established to implement joint personnel training projects in the fields of energy engineering, petrochemical industry and new energy, so as to provide sufficient intellectual resources for the implementation of energy cooperation; At the level of digital transformation, we will build a BRICS digital energy system, and rely on blockchain, Internet of Things, big data and other technologies to implement digital management of energy trading, energy logistics and energy quality. Arab countries can make use of their investment advantages in new energy, jointly build new energy R&D centers with China and India, and increase the transformation and promotion of new energy technologies such as solar energy and wind power generation technology.

4.3 Improve the financial payment and risk management and control system.

Improve the financial payment system and provide institutional guarantee for deepening BRICS-Arab energy cooperation. In order to ensure the sustainable cooperation, it is necessary to use diversified payment mechanisms, risk sharing mechanisms, supervision and coordination mechanisms to reduce transaction costs. To build a diversified payment mechanism, BRICS countries should speed up the establishment of a unified payment system, establish a payment system independent of SWIFT, achieve direct currency exchange settlement among BRICS countries, and reduce dollar dependence. The establishment of BRICS energy cooperation insurance fund can realize the investment risk sharing of BRICS energy cooperation, establish a

risk dispersion mechanism and improve the confidence of BRICS investors in energy cooperation. It is suggested to set up the BRICS Financial Supervision Coordination Committee to unify the regulatory standards and compliance requirements of cross-regional investors, simplify the approval process and improve the regulatory efficiency. In addition, a carbon trading market alliance should be established to bring clean energy projects in Arab countries into a unified carbon trading market and use financial mechanisms to promote clean energy investment. At the same time, it is suggested that the BRICS New Development Bank expand its capital and set up an energy cooperation fund to provide long-term low-interest loan funds for transnational energy infrastructure cooperation projects. Countries strengthen macroeconomic policy coordination and adopt joint monetary and fiscal policy measures to maintain exchange rate stability and reduce the impact of financial market fluctuations on energy cooperation.

5.Conclusion

BRICS' global southern energy supply chain security cooperation is facing a rare development opportunity, and the active participation of Arab countries has added new kinetic energy and new impetus to BRICS cooperation. Countries in the Arab region take advantage of the comparative advantages of resources, the interconnection of infrastructure and the coordination of technical standards to participate in the security cooperation of BRICS energy supply chain. Under the current geopolitical risks, regulatory differences between standards and technical systems, and the constraints of infrastructure interconnection, countries need to adopt innovative institutional arrangements, coordinate technological innovation, promote the harmonization of standards, and improve the organization and coordination of cooperation mechanisms to solve the above problems. Establishing a multi-supply security and guarantee mechanism, strengthening the system construction of technical innovation and standard coordination, and improving the system construction of financial payment security and risk prevention can provide a path for establishing and improving the security cooperation between BRICS and Arab energy supply chains. With the global energy transformation and the development of South-South energy cooperation, the energy cooperation between BRICS and Arab region has the ability to build a new global energy governance system. The BRICS-Arab cooperation has provided the world with a path choice to deal with global energy security and sustainable development.

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Conflict of Interests

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