

The Impact of Energy Cooperation on Economic and Trade Exchanges in the Context of the Belt and Road Initiative: A Case Study of China and ASEAN Countries

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Abstract: The Belt and Road is an important strategy for China's international relations and overseas investment. International trade and transnational investment with countries along the Belt and Road are of great significance to our country, from domestic and foreign affairs to military economy, and from international relations to domestic development. In addition, with the outbreak of the "COVID-19" epidemic, the balance of the international industrial division of labour has been disrupted, and the industrial chain of various industries has undergone a certain degree of shift and change, from globalisation in the pre-epidemic period to regionalisation in the post-epidemic era, which is both a challenge and an opportunity for the Belt and Road Initiative project. Among other things, China's energy security is under considerable pressure from rising freight costs for international energy trade and geopolitical tensions. In September 2021, a number of Chinese provinces, most notably Zhejiang, Hunan and Jiangsu, experienced a very rare electricity shortage. In response, the central government ordered local governments to introduce policies such as open source, spending cuts, and power restrictions and shutdowns. Although the problem of power shortage has been alleviated to some extent, the problem of power shortage still exists and the problem of energy shortage has not been completely solved. In the second half of the year, Australia also took the opportunity to raise the price of coal, the main raw material for thermal power generation, adding to the energy pressure.

1. Introduction

Energy stability has a direct impact on our daily production and life and is closely linked to economic development. As a result of the rising cost of living caused by rising energy prices, the Yellow Vest movement broke out in France a few years ago, and this movement has had a very negative impact on the French economy and society. Although the energy situation in China is not as critical, China has developed well in recent years and is at a critical stage of economic growth. If there are problems with energy supply, it will not only affect the speed of development of manufacturing and industry, but will also have a negative impact on the current rapid economic development. It can be seen that stabilising energy supply and prices is necessary, but China's

energy security issues have yet to be resolved. Taking the "Belt and Road" as an opportunity to develop energy trade with other countries can not only promote economic and trade flows, reduce domestic energy prices and promote economic development, but also improve trade relations between the two countries and feed economic and trade exchanges between the two countries. This paper takes the example of China and ASEAN countries to illustrate the impact of energy trade on other trade between the two countries.

2. Background of energy cooperation between China and the "Belt and Road" countries

2.1 The international environment that China faces

Since 2010, China's total economic output has surpassed Japan has been ranked second in the world and maintained its development. In recent years, with the strengthening of China's national power and rapid economic development, China's discourse in the international arena has become increasingly large and strong, and with China's rise is an increasingly complex international political and geopolitical environment. Since 2018, the United States has launched the '301 investigation' against China, kicking off the prelude to a trade war with China. Over the past four years, the United States has sanctioned Huawei and gradually squeezed the overseas market of Chinese companies. During this period, the United States announced its return to the Asia-Pacific strategy, and at the same time China and Japan, the Philippines and other neighbours in the geopolitical defence and economic friction, the United States to play its so-called "Asia-Pacific rebalancing" role, and Japan and South Korea to conclude an alliance, held many military exercises, posing a serious threat to China's border security.

2.2 The Value and significance of the "One Belt And One Road" strategy

The core content of the "One Belt, One Road" strategy is to carry out trade and investment by land and sea in two directions and at the same time go out to sea, break the siege on China's development, and take this as an opportunity to carry out foreign investment and economic and trade exchanges with geopolitical countries, promote regional unity and stability, and provide a strategic basis and platform support for economic and trade exchanges with neighbouring countries.

^[1] "One Belt, One Road" for our country out of the trade containment of Europe and the United States, to strengthen exchanges with Central Asia, South Asia, Africa and other countries and regions opened up a new situation. The economically developed Northeast Asian economic belt is connected to the well-established and stable development of the European economy through the Land Silk Road. The Maritime Silk Road spans two oceans (the Pacific and the Indian) and passes through Southeast Asia, the ASEAN countries and most of the countries in the Middle East and Africa, which are rich in energy reserves and production, and whose economies are becoming increasingly complementary by linking major energy suppliers and consumers on land and at sea. From transport and communications to agriculture and finance, these countries share great prospects and potential for development.

2.3 Energy trade under the framework of "Belt and Road" strategy

As mentioned above, "Belt and Road" a sea a land two routes have a very clear direction, each have their own strategic significance, land Silk Road economic belt way Russia, southwest, eventually to Europe, maritime Silk Road is the South China Sea, the Indian Ocean, and radiation to the surrounding countries, covering many places in the Middle East, Africa.^[2] On the land and a sea two lines, each contains several countries with rich oil and gas reserves, such as Russia, ASEAN

countries in Brunei, Indonesia, Saudi Arabia in the Middle East, etc., they have a huge number of oil and gas reserves and mining quantity, at the same time, China also imports from the countries along hundreds of millions of oil and gas.

3. Energy trade between China and ASEAN countries

3.1 Oil and gas endowment of ASEAN countries

The oil and gas reserves of ASEAN countries are somewhat insufficient to compare with the Middle East, but in Northeast Asia, represented by China, Japan and South Korea, the oil and gas reserves of ASEAN countries are still quite rich, and among ASEAN countries, Malaysia and Indonesia have the largest production of resource reserves, and the two countries' oil and gas exports have a certain position in the world. [3] The International Energy Agency (IEA) data show that the ten ASEAN countries have oil reserves of about 13.9 billion barrels, accounting for about 1.1% of the world's total oil reserves, and 96% of which are mainly in the ASEAN countries in Malaysia, Indonesia, Vietnam, the Philippines, four countries, in addition to Singapore, Cambodia and Brunei's oil reserves are zero. ASEAN countries are much richer in natural gas reserves than in oil reserves, which, at 7.8 trillion cubic metres, account for about 3.6 per cent of the world's natural gas reserves, according to the International Energy Agency (IEA). Six countries, Thailand, Brunei Darussalam, Vietnam, Malaysia, Myanmar and Indonesia, account for 95 per cent of the natural gas reserves of the 10 ASEAN countries and have relatively concentrated reserves. The Philippines has only 0.1 trillion cubic metres of natural gas reserves, while Laos, Singapore and Cambodia have no natural gas resources at all.^[4]

3.2 Trade development between China and ASEAN countries

China and ASEAN are geographically close and good neighbours and partners. China has consistently pursued a friendly geopolitical policy, while Southeast Asia, with its huge economic potential, is an important trading partner for China. Looking back at the history of China's engagement with ASEAN, since 1991, when China and ASEAN first established a friendly partnership, the two governments have maintained frequent exchanges and further consolidated political mutual trust between the two sides; in 1997, the Future-oriented Mutual Assistance and Friendship Partnership (FAMPP) was again proposed; in subsequent dialogues, the relationship was upgraded to a strategic partnership; in 2010, the China-ASEAN Free Trade Area (CAFTA) was established; in 2011, in an effort to promote East Asian economic integration against the US-led TPP, ASEAN launched the China-ASEAN Free Trade Area (CAFTA). led TPP, the ASEAN Economic Ministers' Meeting (EMM) agreed on a draft of the RCEP, which eventually became a deep, high-quality regional free trade agreement (FTA) covering 15 countries (with India's later withdrawal), including China, South Korea, Japan, the Philippines, Malaysia, Indonesia, Brunei, Cambodia, Laos, New Zealand, Singapore and Australia, and will finally enter into force in 2022 after ten years. [5]It is the first regional cooperation mechanism to cover the whole of Asia, injecting vitality into the development of Asian economies and laying the foundation for promoting regional industrial chain cooperation.

3.3 Challenges faced by the economic and trade cooperation between China and ASEAN countries

With the relationship between China and ASEAN countries getting closer and closer, the economic and trade cooperation between the two sides is gradually deepening, with the scope of

cooperation and more and more projects. But at the same time, there are also some challenges to be overcome together.

4. The Construction of the empirical research index system

4.1 Construction principles and data sources

The research areas include energy trade between China and ASEAN countries as well as total trade and trade investment to reflect trade friendliness. China-ASEAN import and export trade data is from China Customs Database, and ASEAN oil and gas production data is from ASEAN Secretariat.

4.2 Evaluation indicators and measurement methods

The impact of energy trade on the closeness of trade between China and ASEAN constructed in this paper has two main level 1 indicators: the China-ASEAN energy trade indicator and the China-ASEAN trade intimacy indicator, and this paper will examine the correlation between the two through correlation analysis to verify whether the conduct of energy trade can make the trade relations between the two countries closer and thus conduct more import and export trade.^[6]

4.2.1 China-ASEAN energy trade indicators

This indicator mainly shows the closeness of energy trade between China and ASEAN and its own countries, and is composed of three secondary indicators: China's investment in ASEAN's energy sector, China's annual oil imports to ASEAN, and China's annual natural gas imports to ASEAN, and replaces absolute natural gas imports and exports with the ratio of China's natural gas exports to ASEAN's total external natural gas exports (later, due to the unavailability of natural gas data, only oil trade data were used for analysis and research).

4.2.2 Indicators of China-Asean trade intimacy

The index mainly reflects the closeness of China's trade with ASEAN and within ASEAN, and consists of four secondary indicators: China's imports and exports to ASEAN and ASEAN's imports and exports to China. The four secondary indicators of imports and exports are replaced here by four percentage points of China's imports and exports to ASEAN as a share of China's external imports and exports, and ASEAN's imports and exports to China as a share of ASEAN's external imports and exports.

5. Empirical study

5.1 Analysis of the status of energy trade between China and ASEAN

By calculating the proportion of China's investment in ASEAN's energy sector, the proportion of China's oil imports to ASEAN's oil exports, and the proportion of China's natural gas imports to ASEAN's natural gas exports, the closeness of China's energy trade with ASEAN can be objectively reflected. The higher the share of Chinese investment in ASEAN's energy sector, the higher the share of ASEAN's oil and gas exports to China in its foreign oil and gas exports, the stronger the vision of energy cooperation.^[7]

5.1.1 China's annual oil imports to Vietnam as a proportion of Vietnam's annual oil exports

The volume and share of Vietnam's oil trade with China are shown in Table 1 and Figure 1 below. It can be seen from the chart that the proportion of Vietnam's oil exports to China is high, mainly due to the fact that China and Vietnam share a border, which facilitates the construction of oil transportation pipelines and reduces transportation costs. In addition, China is undergoing rapid development and has a high demand for energy. And it can be seen that Vietnam's oil exports are on a downward trend, which is related to Vietnam's limited oil reserves and its own development and increased demand for energy.

Table 1: Vietnam to China's oil trade and oil trade proportion

		Oil exports	Proportion of oil exports to China
Vietnam	2011	8,240,475,228	0.148277802
petroleum	2012	9,458,438,720	0.124016896
	2013	8,567,654,420	0.077470225
	2014	9,306,184,176	0.169778008
	2015	9,486,413,040	0.228336498
	2016	7,471,094,211	0.518198525
	2017	7,319,397,100	0.322530663
	2018	4,418,175,077	0.283546163
	2019	3,694,116,400	0.30871312
	2020	4,217,263,556	0.44082152

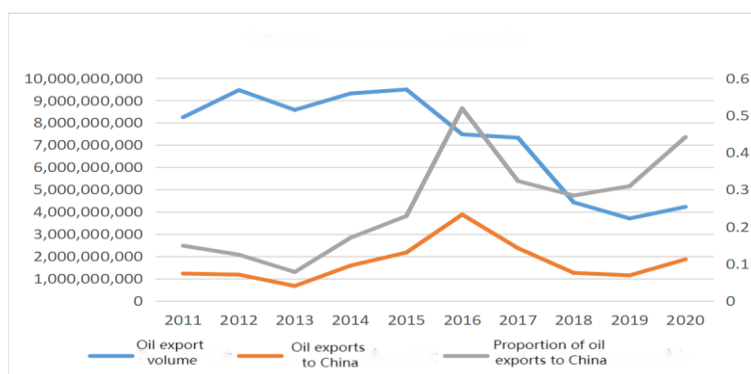


Figure 1: Oil trade between China and Vietnam

5.1.2 China's annual oil imports to Thailand account as a percentage of Vietnam's annual oil exports

Table 2: Thailand's oil trade volume and oil trade ratio to China

		Oil exports	Oil exports to China	Proportion of oil exports to China
Thailand	2011	1,845,279,989	329,195,118	0.178398465
petroleum	2012	2,170,395,696	694,433,256	0.319956982
	2013	1,535,812,897	572,962,599	0.373067969
	2014	556,222,626		
	2015			
	2016	1,652,100,716	788,503,745	0.477273412
	2017	1,748,702,057	647,122,023	0.370058479
	2018		660,295,218	
	2019	1,559,291,932	695,126,564	0.445796294
	2020	1,293,311,693	622,987,004	0.481699042

Thailand's oil trade volume and oil trade ratio to China are shown in the following table 2 and line chart. It can be seen from the figure 2 that Thailand's oil export volume fluctuates greatly, but Thailand's oil export volume to China shows a significant upward trend.

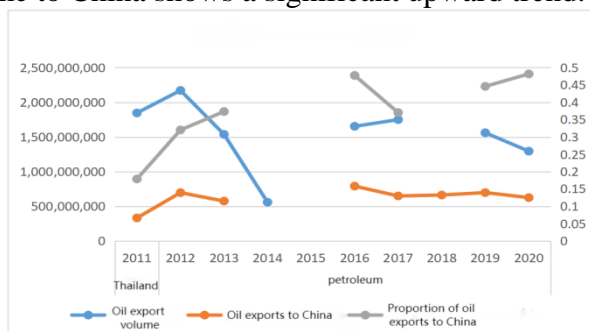


Figure 2: Oil trade between China and Thailand

5.1.3 China's annual oil imports to Malaysia are the proportion of Vietnam's annual oil exports

The oil trade and the proportion of oil trade between Malaysia and China are shown in Table 3 and Figure 3 below. We can see that Malaysia's oil export fluctuates and the proportion of oil export to China is less than 10%, which is related to Malaysia's long coastline and the production proportion of CNOOC, so the distribution of oil sales is very wide.

Table 3: Malaysia to China's oil trade and oil trade proportion

		Oil exports	Oil exports to China	Proportion of oil exports to China
Malaysia	2011	12,835,449,530	980,163,968	0.076363821
petroleum	2012	11,970,524,633	580,541,056	0.048497545
	2013	12,029,613,054	356,916,704	0.029669841
	2014	13,179,877,624	116,723,048	0.008856156
	2015	16,031,732,782	239,065,360	0.01491201
	2016	16,635,385,026	367,600,352	0.022097496
	2017	16,718,770,120	483,044,000	0.028892317
	2018	17,138,515,529	332,098,000	0.019377291
	2019	13,745,829,830	105,263,000	0.007657813
	2020	13,685,320,600	852,349,000	0.06228199

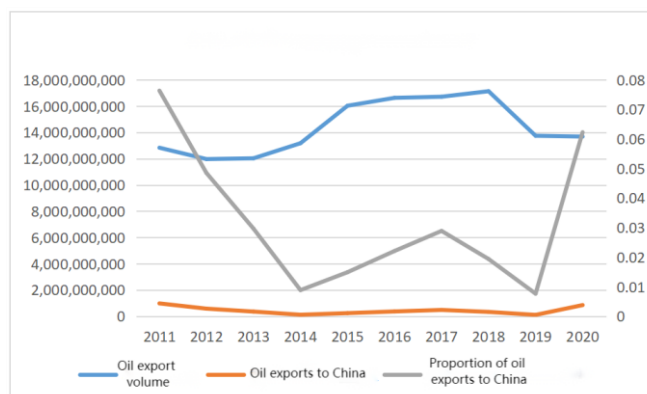


Figure 3: Oil trade between China and Malaysia

5.2 Analysis of the trade affinity index between China and ASEAN

We calculate the proportion of imports and exports to ASEAN countries in China's foreign trade imports and exports to reflect the trade closeness between China and ASEAN. The higher the proportion of imports and exports to each other, the closer the trade partnership between the two sides.

5.2.1 The proportion of Vietnam in China's foreign trade

Vietnam trade with China and the proportion as shown in the following table 4 and figure 4, you can see Vietnam although due to its size is smaller in China's foreign trade, but after 2010 in China's trade and trade ratio is a significant rising trend, the trend and asean has recently become China's largest trading partners.

Table 4: Vietnam trade with China and the proportion

	China's total import and export volume to it (us \$100 million)	China's total import and export volume in that year (100 million US dollars)	Proportion of China's foreign trade
Vietnam	401.98922	36407.08	0.011041512
	504.54851	38674.53	0.013046015
	654.85107	41589.94	0.01574542
	835.463172	43015.27	0.019422479
	903.3762965	39530.34	0.022852733
	992.2822871	36855.59	0.026923522
	1229.171717	41071.37	0.029927702
	1483.767856	46224.36	0.032099262
	1620.82797	45778.89	0.035405576
	1929.24274	46559.14	0.041436391

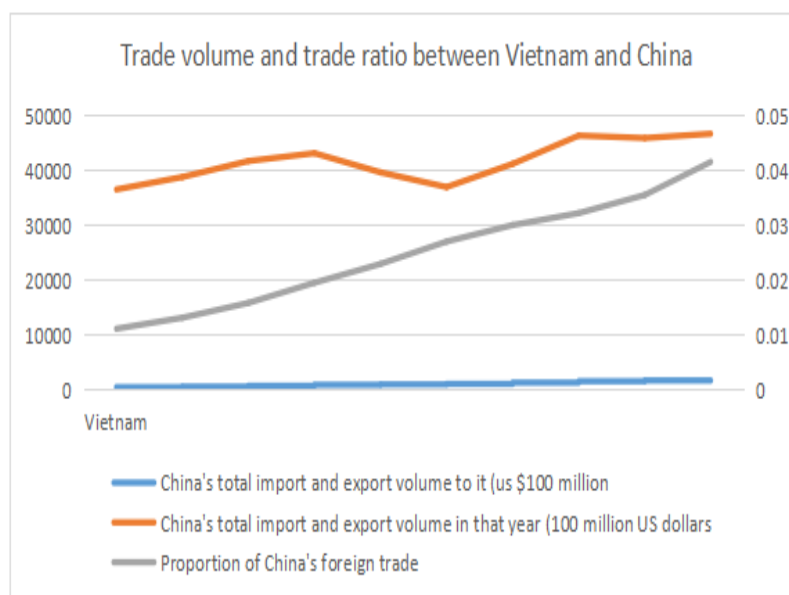


Figure 4: Trade volume and trade ratio between Vietnam and China

5.2.2 The proportion of Thailand in China's import and export of foreign trade

The proportion of Thailand's trade with China is shown in the following table 5 and Figure 5.

Table 5: The proportion of Thailand's trade with China

	China's total import and export volume to it (us \$100 million)	China's total import and export volume in that year (100 million US dollars)	Proportion of China's foreign trade
Thailand	647.43183	36407.08	0.01778313
	696.80343	38674.53	0.018017114
	712.55238	41589.94	0.017132806
	727.25738	43015.27	0.016906958
	755.24628	39530.34	0.019105484
	769.67937	36855.59	0.020883653
	807.44420	41071.37	0.019659539
	880.74407	46224.36	0.019053678
	917.54309	45778.89	0.02004293
	987.66769	46559.14	0.021213186



Figure 5: Thailand's trade in China

5.2.3 The proportion of Malaysia in China's foreign trade in import and export

The proportion of Malaysia's trade with China is shown in the table 6 and line chart below Figure 6.

Table 6: The proportion of Malaysia's trade with China

	China's total import and export volume to it (us \$100 million)	China's total import and export volume in that year (100 million US dollars)	Proportion of China's foreign trade
Malaysia	899.35869	36407.08	0.024702851
	947.82051	38674.53	0.024507615
	1060.09080	41589.94	0.025489116
	1020.63628	43015.27	0.023727301
	974.21091	39530.34	0.024644638
	884.70659	36855.59	0.024004679
	966.26235	41071.37	0.023526421
	1096.35949	46224.36	0.023718219
	1241.11631	45778.89	0.027111105
	1316.09912	46559.14	0.028267256



Figure 6: Malaysia's trade in China

5.3 Study on the relationship between energy trade and trade affinity between China and ASEAN countries

The proportion of oil export of ASEAN countries to China and that of China to ASEAN is introduced into SPSS for OLS analysis, with the following results:

OLS regression analysis results (n=10)									
	Regression coefficient Coef	Standard error Std.Err	t	p	95% Confidence interval	R2	Adjust R2	F	
constant	0.010	0.005	2.189	0.060	0.001 - 0.020				
* Proportion of oil exports to China	0.055	0.016	3.437	0.009 **	0.024 - 0.087	0.596	0.546	F (1,8) = 11.814, p = 0.009	

Dependent variable: proportion of China's foreign trade
D-W value: 1.074
*p0.05 ** p001

Figure 7: The proportion of oil export of ASEAN countries to China and that of China to ASEAN is introduced into SPSS for OLS analysis

As can be seen from the above Figure 7, OLS regression analysis takes the proportion of China's oil exports as the independent variable. It can be seen from the above table that the square value of the model R is 0.596, which means that the proportion of China's oil exports can explain the reason of 59.63% change of the proportion of China's foreign trade. In the F test of the model, it was found that the model passed the F test (F=11.814, p=0.009 < 0.05), that is, the proportion of China's oil export must have an impact on the proportion of China's foreign trade, and the model formula is the proportion of China's foreign trade = 0.010 + 0.055 * to China's oil export. According to the final specific analysis, the regression coefficient value of China's oil export ratio is 0.055, and the level is 0.01 (t=3.437, p = 0.009 < 0.01), which means that the proportion of China's oil export will have a significant positive impact on the proportion of China's foreign trade. The summary analysis shows that the proportion of oil exports to China will have a significant positive impact on the proportion of China's foreign trade.

6. Summary and Outlook

The above analysis shows that there is a positive correlation between ASEAN energy trade and China's foreign trade share. In addition to the influence of China's economic transformation and the shift in the centre of gravity of foreign trade from the traditional developed countries to Southeast Asia, there is still a positive correlation between international trade relations and energy cooperation between the two countries.^[8]

At present, China and ASEAN countries are working together to build a "Belt and Road" project of excellence. The Belt and Road Project will implement a large number of concrete projects of mutual benefit and win-win results, including many energy projects of great significance to the well-being of the people of the two countries. China has accumulated a lot of technological experience and first-mover advantages in the energy sector, especially in the field of new energy. Leveraging these technologies for overseas energy investment and cooperation will not only realise technology, but also deepen friendship with ASEAN countries and elevate bilateral relations to a higher level in the important field of energy, which is related to national security. With the official implementation of RCEP this year, China and ASEAN will carry out more energy cooperation in the future, covering coal, oil, natural gas and other traditional fossil energy as well as new energy sources such as electricity. The two sides have a wide space for future cooperation, which is worth looking forward to.

References

- [1] Xiong Zhiyu. *Research on Innovative Mode of International Energy Cooperation Mechanism under the Background of "the Belt and Road"* [J]. *Price Theory and Practice*, 2020 (02): 157-159+175. DOI: 10.19851/j.cnki.cn11-1010/f.2020.02.293
- [2] Guan Songtao. *Empirical Analysis on the Dynamic Correlation of Five Major Asset Classes between China and the United States* [D]. Shanghai University of Finance and Economics, 2022. DOI: 10.27296/d.cnki.gshcu.2020.000545
- [3] Li Youmeng. *Ports in Gulf Countries after Financial Crisis and War* [J]. *Port Economy*, 2012 (03): 56-58
- [4] Zhang Yufu, Yang Tianren. *Research on Trade Cooperation between China and the Ten ASEAN Countries* [J]. *Business Economics*, 2022 (06): 82-84. DOI: 10.19905/j.cnki.syjjj1982.2022.06.012
- [5] Liu Yang, Zhang Xing. *Analysis of Factors Influencing Diamond Pricing Based on the Hedonic Model: A Case Study of Natural White Diamonds* [J]. *China Business Review*, 2021 (09): 27-30+76. DOI: 10.19699/j.cnki.issn2096-0298.2021.09.027
- [6] Zhang Hui, Wei Dongming. *Achievements, challenges and paths of high-quality development of the "the Belt and Road" and promoting high-level opening up* [J/OL]. *Journal of Lanzhou University (Social Sciences Edition)*, 2023 (05): 13-26 [2023-10-26] <https://doi.org/10.13885/j.issn.1000-2804.2023.05.002>.
- [7] Yu Yang. *Witness the historic moment of collusion and development* [N] *Economic Daily*, 2023-10-26 (008)
- [8] Wu Huimin, Guo Yan. *Research on the strategy of strengthening Fuzhou's brand market based on the "the Belt and Road" initiative* [J]. *Brand and Standardization*, 2023 (06): 11-13+17