

The Research of China's Foreign Trade Transformation Based on the Perspective of the Connotation of Energy under the Background of Ecological Civilization

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Abstract. Low carbon economy had gradually become the mainstream trend of economic the development, the relationship between trade and environment had been concerned. Thus the 17th National Congress of the CPC and 18th National Congress of the CPC have proposed the building of ecological civilization, in this context, this article from the perspective of the connotation of energy, the use of 2001th -2012th China's foreign trade data estimates the input-output analysis, concluded that China undertake trading partner of carbon emissions, ecological deficit in foreign trade. In order to realize the transition of foreign trade, to optimize the export structure of industry; to promote the upgrading of processing trade; to implement the import substitution policy; to improve the environmental laws and regulations.

Introduction

In recent years, with the rapid development of international trade, energy consumption increases, resulting in carbon dioxide and other gas emissions continue to grow, human survival environment is facing severe challenges. "Low carbon economy" has gradually become the mainstream of the world economic development, the relationship between the environment and trade has become a growing concern. Since the reform and opening up, China's economic construction and foreign trade has made remarkable achievements. Especially since joining the WTO, China's economy further integrated into the global system, foreign trade rapid development, foreign exchange reserves continued to increase.

In 2012, China's total foreign trade reached 3.87 US dollars, ranking first in the world; foreign exchange reserves reached 3.31 US dollars, the scale of foreign exchange reserves in the first place in the world. With the great achievements of economic construction, China's energy consumption continues to increase, the resources, the environment has paid a huge price. 2011 China's energy consumption is 3.48 million tons of standard coal, in 2012 reached 3.62 billion tons of standard coal, at present China has become the world's second largest energy consumer and importer, in 2012 China's carbon dioxide emissions ranks first in the world. As carbon emissions continue to increase, the ecological environment in China continues to deteriorate and resources are facing the potential of depletion. In 2012, according to the latest statistics, National more than 90% of the river water contaminated, soil erosion, land desertification, atmospheric haze serious; rich in resources more than half of the city into the resource exhausted cities.

For the 17th National Congress of the Communist Party of China put forward the construction of ecological civilization and 18 for the first time, the "beautiful China" of the construction of ecological civilization as the grand goal, put forward to promote the revolution in energy production and consumption, energy consumption control, strengthening energy saving, support low-carbon energy industry and new energy and renewable energy development, ensure energy security[1]. The Third Plenary Session of the Third Plenary Session of the eighteen clearly proposed the establishment of ecological civilization must establish a complete system of ecological civilization system, improve the system of environmental governance and ecological restoration. Therefore, in the context of the

establishment of ecological civilization, from the perspective of the connotation of China's foreign trade transformation has a very strong reality.

Related literature review

Connotation energy refers to energy, which is directly and indirectly consumed in the production process. The study of the connotation of energy in international trade has arisen since the end of twentieth Century, which is mainly focused on the relationship between trade and carbon emissions. Wyckoff and Roop (1994), estimates the 1984-1986 six largest OECD countries import trade of embodied carbon emissions, found hidden import products containing carbon accounted for 13% of the total carbon emissions^[2]. For the first time that the import and export trade of implicit carbon emissions; Schaeffer and SA (1996) studied between 1972-1992 in Brazil import and export trade of embodied carbon emissions, pointed out in developed countries by domestic consumer products offshore manufacturing and production, CO₂ emissions to developing countries^[3]. Mukhopadhyay (2004), according to the 1993-1994 India import and export data to calculate the content of India's imports and exports of goods, India is a net importer of energy and carbon. Mongelli (2006) to product section as the foundation, and with the application of investment output of energy consumption in Italy international commodity trade, by calculating the Italian goods trade in energy and CO₂ content, it is verified that the "pollution haven hypothesis"^[4]. Peters and Hertwich, (2008) for 87 countries in 2001 data of Embodied Carbon Emission calculation, put forward to consumption based calculation of a country's carbon emissions. Christopher L. Weber (2008) based on 1987-2005 years China's export data of embodied CO₂ emissions estimates, we draw a conclusion: the export products of China's carbon emissions impact on China and the global environment.

Domestic research on the connotation of the trade in the more concentrated in 2005. Matao (2005) according to the 1994 China's foreign trade data on foreign trade embodied emissions estimates that China is carbon emissions from net exporter into a net importer of transformation. Zhou Zhitian and Yang Duogui (2006) 2002-2003 China's import and export of virtual energy was calculated. It is pointed out that in recent years China's energy consumption growth too fast is to trade in carbon emissions continue to rise. Li Hong (2007) using the input and output method, from 1996 to 2004, China's foreign trade in carbon emissions were calculated, and draw a conclusion: China's imports of carbon emissions than the export of carbon emissions, China has gradually become the connotation of a net importer of energy. Chen Ying (2008) using input and output method, has conducted the research on the connotation of energy from 2002 to 2006, China's foreign trade. The results show that as a net importer of energy, in our country the connotation of energy in the long run, net exports of the state. Zhang Xiaoping (2009), Lin Boqiang and Sun Chuanwang (2010), and other similar conclusions.

From the domestic and foreign literature, we can see that different countries have the connotation of energy import and export, which is implied in the international trade, which is influenced and restricted by various countries' trade patterns. The import and export of the connotation of energy will have an impact on the environment and resources of the relevant trading countries.

Trade connotation energy model and data description

Constructing the energy model of trade

It is a need to use the input output model to calculate the connotation of China's foreign trade. The input-output model is put forward by Leontief, which is mainly through the establishment of input-output table, the establishment of model, and the analysis of the model of mutual interdependence between sections. The input output table is shown in Table 1.

Table 1 Basic structure of input output table

		Intermediate Product X				Final Product Y						Total Output
		1	2	j	n	Savings	Investment	Consumption	Export	Import	Others	
Intermediate Input	Section1											
	2											
	i			X_i								X_i
	n											
Factors	Labor Remuneration											
	Capital Depreciation											
	...											

Table 1 shows a input-output model $X = AX + Y$ (1)

Which AX for intermediate products, Y said the final product, X for the total output. A is the direct consumption coefficient matrix, $A_{ij} = X_{ij}/X_i$ is the direct consumption coefficient in the input output table.

The formula (1) is in order $X = (I - A)^{-1}Y$ (2)

$(I - A)^{-1}$ is Leontief inverse matrix.

The formula (2) is in order $B = (I - A)^{-1}I$ (3)

Bas a complete consumption coefficient, which represents the direct and indirect consumption of the unit output to the I section in the j sector.

The formula (3) is in order $EB = EA * (I - A)^{-1}$ (4)

$EA = E_i / X_i$ (5)

EB represents the full energy intensity, EA refers to the intensity of direct energy consumption.

Considering the existence of processing trade, import and export coefficients M and X for A are considered to be modified. Therefor,

$$IME = EB * IM = EA [I - (I - X)A]^{-1} * IM \quad (6)$$

$$EXE = EB * EX = EA [I - (I - M)A]^{-1} * EX \quad (7)$$

$$\Delta E = EXE - IME \quad (8)$$

IME for excluding the processing factors of imported energy connotation. Exe for excluding the processing factors of export of embodied energy,] e net content of energy, when] $E < 0$ said imported carbon emissions than the export of carbon emissions, namely a country's trade exist ecological surplus; when] $E > 0$ said export carbon emissions than imported carbon emissions, namely a country's trade exist ecological deficit.

Data description

The following empirical sharing of four input output tables, respectively, 2002, 2005, 2000 and 2007, the input-output table. The 2001 data using the 2000 chronology, the data from 2002 to 2004 by 2002, data for the year 2005-2006 by 2005 chronology, 2007-2012 data by 2007 chronology. In the calculation of data in various sections, with 2000 chronology as the basis, our section is divided into 17 sections. The data of each year comes from the calendar year, "China Statistical Yearbook", "China energy statistical yearbook".

Calculation results

In this paper, we use the 2001-2012 data to calculate the three indicators, such as the energy of the export, the connotation of energy and the net energy value, as shown in Table 2. Table 2 shows, 2001-2012, steady growth of China's export connotation of energy, import content of energy, the net energy value of its connotation of foreign trade is positive, which means 2001-2012 years our country foreign trade existence ecological deficit.

It is worth noting that with China's accession to the WTO in 2001, from 2001 to 2007, a significant increase of the export trade of our country, with substantial growth in export trade, from 2001 to 2007 the foreign trade embodied energy net always keep growth, and in 2007 exports connotation energy value reached 280 times in 2001. On the import side, with the increase of import volume of China, the import of the content of the energy value continued to grow, and in 2007 the import content of energy value reached 2.13 times in 2001. As a result, the content of external trade in the energy value of a substantial rise, from 2001 to 0.4 tons of standard coal rose to 4.6 tons of standard coal in 2007.

Due to the impact of the financial crisis, decline in China's export, 2009 exports connotation connotation of energy and imported energy decline, foreign trade embodied energy net down the export of embodied energy from 17.4 million tons of standard coal in 2008 dropped to 16.7 million tons of standard coal, imported within Han energy value from 12.9 million tons of standard coal in 2008 dropped to 12.7 million tons of standard coal, foreign trade embodied energy net from 4.5 million tons of standard coal down to 4.0 million tons of standard coal, starting from 2008. Although from the beginning of 2010, China's export of embodied energy and import content of energy began to increase again, foreign trade embodied energy net still maintain downward trend, 2011, 2012 two years foreign trade embodied energy net appeared growth.

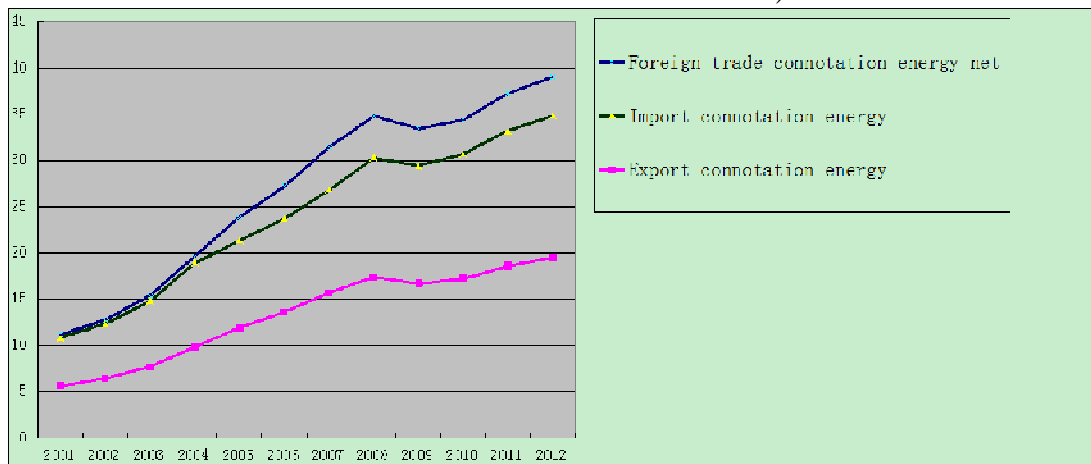
Seen from Figure 3, we can, with the development of China's foreign trade, China Import and export content total energy generally continued to rise, from 2001 to 2004, although the export of embodied energy values slightly higher than the import content of energy value and foreign trade embodied energy net is relatively small. Since 2005, China's import and export connotation of energy value has increased rapidly, so as to promote the growth of foreign trade in the connotation of energy, China's foreign trade in ecological deficit.

From China's foreign trade data 17 sections in accordance with the classification, we can see China's exports more concentrated in high output, energy consumption sector, such as mining, machinery manufacturing, coke, petroleum processing, garments and leather products, construction and other 10 sections. This is because China's export focused on technical content low, resource intensive primary products. China's imports more concentrated in high technology, low energy consumption of high value-added products.

Table 2 Energy value of foreign trade of 2001-2012 (unit: million tons of standard coal)

Year	Export connotation energy	Import connotation energy	Foreign trade connotation energy net
2001	5.6	5.2	0.4
2002	6.4	5.9	0.5
2003	7.7	7.1	0.6
2004	9.8	9.1	0.7
2005	11.9	9.4	2.5
2006	13.6	10.1	3.5
2007	15.7	11.1	4.6
2008	17.4	12.9	4.5
2009	16.7	12.7	4.0
2010	17.2	13.5	3.7
2011	18.6	14.6	4.0
2012	19.5	15.3	4.2

Figure 1 2001-2012 connotation of foreign trade and energy value (unit: one hundred million tons of standard coal)



Conclusions

Through the above calculation, draw the following conclusions: there is a ecological deficit in foreign trade of our country, indicating that the foreign trade to China bear many of the country's carbon emissions, increased the pressure on China's energy and environmental, this requires our country to change the high input, high consumption of the extensive growth mode, optimize the structure of foreign trade, green trade transformation.

In order to realize the transformation of green trade, we must do the following four points:

One is to optimize the structure of export industry. To inhibit the export of high energy consuming products, improve the scientific and technological content of products, and encourage the export products from resource intensive to technology intensive, clean and efficient. Specifically, to reduce the mechanical manufacturing, metal manufacturing, textile manufacturing and other industries. At the same time to the high pollution, high energy consumption, high emission of resources products levy export tariffs, in order to encourage the export of ecological products, the implementation of the tax rebate rate of ecological products. So as to promote the optimization of the industrial structure of China's export trade. For net export of embodied energy of government sections through quotas, taxes and other control export scale; the net imports of the energy content of the government sections can through preferential loan policies encourage the expansion of scale.

Second is to promote energy-saving emission reduction, improve energy utilization. First in energy exploitation, processing process using advanced technology, improve energy utilization. In the using process of the intermediate goods as far as possible to improve the process, less as far as possible energy loss and in final goods production and transport of the advanced technology, reduce energy consumption. Therefore, our country should formulate relevant policies, on imports of products of the "two high-1 capital" implementation of the policy of encouraging, promoting the domestic industrial structure adjustment, reduce environmental pollution of this kind of product, promote energy-saving emission reduction. Specifically speaking, we can encourage the import of this kind of products by reducing the tariff, the implementation of tax rebates, tax deduction and so on.

Third is to promote the processing trade upgrade. China's processing trade focus on technical content is low, high energy consumption and high emission products, to maintain and increase international competitiveness, to promote these products to extend to the ends, forms the independent brand, promote the upgrading of processing trade, thereby reducing carbon emission trading. Specifically, the government sections to play a management function, the development of long-term

development planning, increase the processing trade transformation of R & D investment and support, and actively introduce green processing trade.

Forth is to improve the environmental protection laws and regulations, and promote the export of cleaner production. In order to establish a sound energy-saving emission reduction and environmental protection, long-term mechanism, to the comprehensive use of economic policies, market mechanisms, supervision and management mechanism, to ensure effective use of energy, improve environmental pollution. In order to achieve better energy-saving emission reduction, the transformation of the trade, export enterprises should conform to the international trend, in accordance with the international rules of the organization of production, do production process of green and sustainable, promote export structure and the production process of ascension, so as to enhance the enterprise competitiveness, so as to achieve the purpose of trade in transition.

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