

Research on Price Guidance Mechanism Based on Energy Ratio and Price Relationship

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ABSTRACT. *Under the background of energy consumption structure in China, this paper compares the prices of natural gas, coal, liquefied petroleum gas, electricity, diesel oil and natural gas, coal, electricity and coal used by industry and residents by using calorific value ratio method, respectively. Based on the comparison of the price changes of household electricity and other goods, the guiding mechanism of electricity price in electricity market, cross-subsidy, tax, and consumer and so on is further discussed on the basis of revealing the relationship between energy price and price.*

KEYWORDS: *energy price, price guide, bidding online, cross subsidy, resource tax*

1. Introduction

With the promotion of reform and opening up, China's electricity has been rapid development. First, the power supply capacity is further enhanced. By the end of 2017, the installed capacity of China's generation reached 17.70 billion kilowatts and generated 6.4 trillion kilowatt-hours of electricity respectively. Secondly, the demand for electricity consumption has further picked up, and the supply and demand of electricity are generally relaxed. By 2017, the per capita electricity consumption and per capita daily electricity consumption in China were 4589 kilowatt-hours and 628 kilowatt-hours, respectively, and the power supply capacity and service quality continued to improve. The power grid has always maintained a safe and stable operation, which can guarantee the growing demand of the economy and society. In addition, electricity clean development Significant results have been achieved in China's hydropower growth, nuclear power, wind power, solar energy from scratch, clean energy installed capacity has increased significantly, promoting the increasingly diversified, clean and optimized power supply structure in China. However, in the long period of time that China can still foresee, the basic energy source has to be based on coal. In the course of nearly 40 years of reform and

development, however, there has been a tendency to "reverse green development" in the aspect of the price comparison relationship of basic energy. How to reform the price formation mechanism on the basis of this kind of price comparison relationship? How to guide the price has become a big problem that our country faces at present, this article carries on the research to this question.

2. Energy price comparison

2.1 Implications and implications of energy price comparisons

Energy price ratio refers to the price ratio of conventional energy and the price ratio between conventional energy and secondary energy. The analysis of energy price requires two basic premises: whether energy is substitutable and strongly related. Reasonable energy price ratio can not only reflect the existing conditions and scarcity of various energy resources, guide the rational utilization of energy, but also reflect the cost of development and utilization of various energy industries, and promote the optimization and coordinated development of energy structure.

It is of great significance to study the relationship between energy price and price: first, it is helpful to promote the price reform of energy products and coordinate the development of energy industry; Second, it is helpful to give full play to the economic leverage of price, promote the development of environmental protection technology, and realize the optimization of energy consumption structure; Third, it can provide a decision basis for revaluing the value of petroleum, coal, natural gas, electricity, heat and other products, and avoid the imbalance of value or the excessive fluctuation of its value; fourth, it is helpful to realize the basic equilibrium of energy utilization at home and abroad. Fifth, it is beneficial to promote the development and utilization of real energy saving technology and achieve the goal of real energy saving.

2.2 China's energy consumption structure

Before analyzing the relationship between energy price and price, we should analyze the current energy structure of our country, study the energy consumption structure of our country, can grasp the direction of energy consumption, and provide scientific basis for rational distribution and utilization of energy. It will lay the foundation for the balance of energy supply and demand. Table 1 reflects the total amount and composition of energy consumption in China from 1978 to 2017.

Table 1 Total energy consumption and composition 1978-2017

Year	Total energy consumption (10,000 tons of standard coal)	Share of total energy consumption			
		Coal	petroleum	natural gas	Primary electricity and other sources of energy
1978	57144	70.7	22.7	3.2	3.4
1980	60275	72.2	20.7	3.1	4.0
1985	76682	75.8	17.1	2.2	4.9
1990	98703	76.2	16.6	2.1	5.1
1995	131176	74.6	17.5	1.8	6.1
2000	146964	68.5	22.0	2.2	7.3
2005	261369	72.4	17.8	2.4	7.4
2010	360648	69.2	17.4	4.0	9.4
2015	429905	63.7	18.3	5.9	12.1
2017	449000	60.4	18.8	7.0	13.8

As can be seen from Table 1, since 1978, coal has occupied the first place in the total energy consumption in China, with oil being the second largest but less than half the proportion of coal. Natural gas and primary power and other energy account for a small proportion, but show an increasing trend year by year. China is the first coal producing country in the world and the largest country in coal consumption. The resource characteristics of "more coal, less oil and less gas" determine the energy consumption structure of our country, which is dominated by coal. On the one hand, this structure affects China's energy use efficiency, on the other hand, it also increases the emissions of atmospheric pollutants and greenhouse gases. However, the energy saving and emission reduction in China has been adversely affected, so at present, the energy consumption structure of our country is still unbalanced.

2.3 Analysis of Energy Price ratio in China

Under the background of imbalance of energy consumption structure and fluctuation of supply and demand in China, this paper analyzes the relationship between energy price and price in China, which can coordinate the development of China's energy industry and optimize the energy structure. It is of great significance to promote the price reform of energy products and to promote energy saving and emission reduction. This paper analyzes the relationship of energy price ratio in China from three aspects.

First of all, because the pricing mechanism of energy is different, and the energy prices are different in different regions and at different times, and because of the lack of systematic and comprehensive analysis of various energy price ratios in China, the calorific value ratio method is adopted. Taking Sichuan Province as an example, the comparison of natural gas, coal, liquefied petroleum gas, electricity and diesel [3]. Calorific value refers to the complete combustion of fuel per unit weight (solid or liquid) or unit volume (gas) and the amount of heat released when the combustion product is cooled to the pre-combustion temperature (generally

ambient temperature), in thousands of units of heat Card (Kcal), is also called a large card. See table 2.

Table 2 comparison of energy efficiency prices

Energy types	heat efficiency	calorific value	price	Equal calorific value (10000kcal) price
Natural gas (non-resident)	92%	8500kcal/m ³	3.11RMB/m ³	3.98RMB
Coal	82%	5000kcal/kg	0.8RMB/kg	1.88RMB
liquefied petroleum gas	92%	11000kcal/kg	5.6RMB/kg	5.53RMB
Electricity (industry)	92%	861kcal/kW·h	0.62RMB/kW·h	7.83RMB
diesel oil	52%	10200kcal/kg	8.4RMB/kg	15.83RMB

According to Table 2, among all kinds of energy prices in Sichuan Province, the price of diesel is the highest, and the price of coal is the lowest, which is about 0.24 times that of industrial electricity, followed by natural gas, which is about 0.5 times the price of industrial electricity. Our country is faced with the situation that energy consumption is too much dependent on low-cost energy products. The thermal power pattern of high coal power and low gas power has made it more difficult to make the power clean transition, according to the data of China and ITU's basic data list of National electricity Statistics 2017. The proportion of coal power generation in China is still as high as 71 percent, although this proportion can be gradually reduced in the future, but this is a relatively slow process; Natural gas The proportion of electricity generation is only 3.04, the external dependence of crude oil and natural gas is as high as 65%, in addition, due to various restrictions, the proportion of hydropower in the whole power supply is actually decreasing. Wind power, photoelectric growth rate is high, but the proportion of various energy generation is also relatively low. The formation of this kind of situation is not only the objective factor of energy resource endowment with less gas and more coal, but also the result of our country's energy development strategy choice and the reason of energy development inertia, as well as the high cost of energy transformation, the lack of matching policies and various benefit games. Electricity market reform lags behind many other reasons.

Secondly, based on the calorific value ratio method, the natural gas and coal, electricity and coal of China's industrial and residential areas from 2010 to 2014 are compared, as shown in Table 3.

Table 3 Industry, resident energy ratio

Contrast species	industry	resident
Natural gas and coal	2.5	2.0
Electricity and coal	5.6	4.4

According to Table 3, the ratio of electricity to coal is higher than that of natural gas to coal, and the industrial price is higher than that of residents. On the one hand, the reason for this is that the government has not made reasonable adjustments to the household electricity and electricity consumption. The price does not reflect the reasonable relationship between supply and demand and supply cost. On the other hand, there are obvious deficiencies in China's natural gas reserve and pipeline network construction, natural gas supervision and natural gas price mechanism, natural gas market, laws, regulations and so on [4].

Finally, the change of the relationship between electricity consumption and other items is analyzed, as shown in Table 4.

Table 4 changes in household prices for electricity and other goods

classification	Residential electricity consumption (RMB/ d)	Price (RMB / m ²)	Annual average wage (RMB)	Dress (RMB)	Eggs (RMB/ unit)	Edible oil (RMB/ 500g)	Bus fare (RMB)
Eighties	0.16	1900	762	80	0.03	0.85	0.10
Recent years	0.48	48000	61240	500	0.75	12.00	2.00
Increase (times)	3	25	80	6	25	14	20

As can be seen from Table 4, for 80 years, residents used 0.16 yuan per degree of electricity. The first step price of electricity is 0.48 yuan, which is only three times the original price, while the residents' clothing, food, housing and transportation are in the same way. Annual average wages and house prices have risen by more than 20 times, and household necessities and travel costs have risen more than electricity prices. In addition, from the point of view of the enterprise, the power expenditure of the enterprise has also been greatly increased, but compared with the cost of travel, material and labor of an enterprise, the increase is also low. Whether residents or enterprises, the increase in electricity prices is much smaller than other expenditures, electricity in residents and enterprises. Only a small part of the industry's consumption, so you will not economize on energy savings, or even lead to wasteful use of electricity, this wasteful consumption of electricity actually means more coal consumption, The resulting coal pollution exacerbates the deterioration of China's environment, such as severe haze weather in China.

In summary, we can see that the current energy price ratio relationship in China is not reasonable. In order to change the current situation of "inverse green development" of the basic energy price ratio relationship in China, the next step will be to study the power price guiding mechanism.

3. Price guidance mechanism

3.1 Electricity returns to commodity attributes

In 2002, our country issued the reform plan of electric power system 5, but for many years, the substantial reform of our country is not good and good, and there are still many problems in the reform. On March 26, 2015, China issued the 9th text, which marks the opening of a new round of electric power system reform. The basic system construction problem to be solved in the reform of the power sector is how to make the electricity return to the commodity attribute.

3.1.1 Establishment of electricity markets

The establishment of the market is a key to the return of electricity to commodity attributes. A few days ago, the southern (starting in Guangdong) electricity spot market test start will be held in Guangzhou, this is the first trial operation of the national electricity spot market. Spot electricity market is an important link in price discovery and resource optimal allocation. Spot trading is closer to the running time than medium and long term transactions, which is conducive to discovering electricity price, being faster and reflecting the actual demand and supply capacity of the market. The change of supply and demand and the trend of supply and demand make electricity return to commodity property, so that electricity price can better reflect the cost and the relationship between supply and demand.

However, it should be noted that there are three key points in establishing the electricity market: one is to define the market, that is, to define the target of the transaction. On the subject matter, coal, oil and other energy have quality differences, high calorific value, the price of pure ingredients on the high, otherwise low. Although there are distinctions of power quality, such as green, power quality, schedulability, etc., but at present there is no abstract commodity attribute. In other words, there is no consensus on the attributes of electricity, so the target of the transaction is not clear. It is difficult for both buyers and sellers to price; the second is the introduction of buyers and sellers; the third is to formulate trading rules. Because of the difference in power quality (whether electricity comes from coal or wind power, is it possible In order to achieve the stability, reliability and safety of the power supply, there are two reasons for power outage, stability, and stable time and interval) and the very high storage cost of the current power supply. In some period of time, the power system should be FM, peak-shaving, black start and so on, which need to provide corresponding auxiliary services. All these ancillary services should be reflected in price. Only long-term and bilateral transactions cannot truly reflect the value of electricity, but only by co-ordinating the wholesale and retail markets and establishing compatible bilateral contracts. A market that combines medium- and long-term transactions with spot transactions and is freely chosen by market participants, and is a unified, open and competitive market. The system is the real establishment of the modern electricity market system.

3.1.2 Promotion of competitive bidding

Since the state put forward the concept of "separation of power plants and networks, bidding for access to the Internet", the situation of "separation of power plants and networks" has been basically formed, but bidding for the Internet has not yet been realized, and bidding for access to the Internet is only suitable for the implementation when the power supply is loose. An oversupply market is the basic premise for the realization of bidding and the elimination of backward manufacturers, but China is still in the period of rapid growth of electricity, and there are still great difficulties in the realization of bidding.

The measures that should be taken are: first, to establish an enterprise system adapted to the requirements of the power generation side bidding for the Internet, to make all power generation enterprises independent, to establish an equal economic relationship between the power production enterprises and the power grid operation enterprises, and to break the monopoly. Make all the power generation enterprises in the same fair competition position, promote enterprises to reduce costs, improve efficiency, and realize the fairness, openness and justice of power grid dispatching. Second, it is necessary to do a good job in the pilot project, accumulate experience, formulate the guiding opinion of "bidding on the Internet", standardize the bidding price of the power generation company, and take the unit quotation at the point of balance between supply and demand as the unified electricity price for the time period. Third, when electricity supply exceeds supply, in order to avoid supply and demand pull the power price bidding level is too high, which is harmful to the benefit of the power grid enterprise. The price department can reduce the power purchase cost of the power grid enterprise by reducing the capacity price in the same proportion, and let all the power plants and the grid management enterprises share the market risk [5].

3.2 Measures taken by the Government

3.2.1 Liberalization of price controls

Although the competition mechanism has been introduced into the sale price at present, the price formation mechanism based on the market has not been completely formed, and the government pricing is difficult to realize the optimal allocation of resources. To be market-oriented: first, to liberalize government price control and prevent excessive damage to market efficiency [6]; The second is to encourage private enterprises, break the traditional concept of public welfare organizations, seek privatization of electric power enterprises, and make them realize privatization of property rights; Third, on the basis of active pilot and promotion of bidding for the Internet, power transmission prices should be determined, transmission and distribution separated, a number of competing players in the distribution market should be constructed, and sales electricity should be gradually realized through market competition. Price.

3.2.2 Reduction of cross-subsidization

With the increase of energy consumption, energy reform, especially the reform of energy prices, has become the focus of national reform.

Source subsidies are also the top priority of energy price reform. There are three kinds of cross-subsidy in electricity price of our country: the subsidy of the user in the developed area of the province (autonomous region, municipality directly under the Central Government) to the user in the less developed area, the subsidy of the user of the high voltage grade to the user of the low voltage grade; Subsidies to residents and agricultural users by large industry and general industrial and commercial users.

However, there are several problems in China's cross-subsidy: first, the phenomenon of cross-subsidy is serious; the other is that China's current power subsidy mechanism, which does not discriminate between the residents, is unfair and ineffective, and most of the electricity subsidies end up in the hands of high-income people who do not need subsidies. Third, the cross-subsidy distorts the electricity price, which can not reflect the true power supply cost, and destroys the economic signal that the electricity price should provide. Fourth, if the electricity subsidy to the residents is completely abolished, the lower the income, the greater the negative effect of the increase in electricity prices.

The cross-subsidy in electricity price in our country is very complicated, so reducing cross-subsidy needs to consider the following direction and measure in all policies related to electricity price: avoid expanding cross-subsidy, calculate cross-subsidy clearly; Cross-subsidy should be changed into explicit compensation, and its enjoyment (or contribution) should be clearly listed in all kinds of electricity price, the level of electricity price of industry and commerce should be reduced, and the space of reducing price brought by all kinds of policies should be used to reduce the price of industrial and commercial electricity. In order to improve the level of electricity price of residents, we can gradually adjust the existing policy of ladder electricity price, and reduce the amount of cross-subsidy that residents enjoy as a whole [7].

3.2.3 Increase in green energy subsidies

In order to promote the transformation of energy structure and achieve the purpose of energy saving and emission reduction, the development of clean energy is imperative. But at present our country lacks the systematic financial support policy, the policy of guiding the clean energy industry marketization is relatively weak, and the incentive to the local government is also insufficient. In order to reverse the adverse trend of adverse green development in the price comparison relationship, the state should provide financial subsidies for the production and consumption of green electricity and strive to fully mobilize the potential of green energy in the competitive link. A gradual change in the pattern of electricity supply.

Therefore, the following measures can be taken: first, to set up special funds for financial subsidies, to focus on subsidies to large clean energy projects at the national level and to small and medium-sized enterprises with better market prospects, especially to encourage and support poor areas. Clean energy utilization in remote areas. The second is to subsidize the investors in clean energy, according to the production of clean energy equipment, increase subsidies to users, encourage consumption, and expand the market. Third, perfect the preferential policy of import

and export tariff, improve the international competitiveness of clean energy, promote its development, perfect the preferential policies of income tax in development zones, special economic zones and remote areas; Personal income tax preferential terms, for the development of clean energy technology personnel to reduce personal income tax.

3.3 Perfect taxation

Resource tax is a kind of taxation to adjust the state resources differential income and to compensate the state-owned resources. At present, the resource tax collected by our country is a tax levied on enterprises and individuals who develop mineral resources and produce salt in our country according to the interim regulations of the people's Republic of China on Resources tax. The scope of resource tax in our country includes coal, oil, natural gas, non-metallic ore, ferrous metal ore, non-ferrous metal mineral salt and seven kinds of resource tax.

Resource tax is an important part of environmental tax. Resource tax can reduce the waste of resources, promote energy saving and emission reduction, and achieve the purpose of environmental protection. However, the following problems exist in the resource tax in our country at present: the scope of the resource tax is not wide; the proportion of the resource tax is not high; some resources tax has a variety of names. Therefore, the following measures should be taken: to improve the collection system of resource tax [9], to promote value-added tax, consumption tax to save resources, environmental protection and green high-tech industry; Strengthen the elasticity of taxation, form the system of regulating fair, regulating reasonably, collecting and managing efficiently resource tax, give full play to its organizational income, regulate the economy, and promote the development of the economy. The function of intensive utilization of resources saving and ecological environment protection, expanding the scope of resource tax collection, further bringing the non-renewable resources and the green resource products of lack of supply into the scope of collection and increasing the protection of the environment by resource tax.

3.4 Consumer awareness guidance

In terms of consumers, price changes will cause changes in demand, the implementation of ladder price is conducive to the suppression of unreasonable consumer demand for electricity; Electricity is a necessity of life, and its price change will not affect the obvious change of consumers' demand for electricity. However, the adjustment of electricity price may prompt some consumers to use other alternative energy sources, which is conducive to guiding consumers to set up a correct consumption concept. Environmental protection, green consumption; Make the information open and communicate well, let the consumer know all kinds of system of our country, communicate with the consumer actively, understand the consumer's demand, raise the minimum living standard in time and appropriately, make the consumer's reality in the lowest income stage. The standard of living does not decline, while the middle income class will consciously adjust consumption

habits, tend to low-carbon life; increase energy conservation and emission reduction publicity, improve consumer awareness of energy conservation and environmental awareness.

4 Conclusion

Based on the analysis of the relationship between energy price and price of electricity [10], the following conclusions are drawn: the key to the formation mechanism of energy price is the construction of electricity market and the promotion of bidding, so that electricity can return to commodity attribute; To clarify marketization and monopoly, to break all forms of administrative monopoly in oil, natural gas and electricity industries, to adopt a government-led market price mechanism, to liberalize price control and control, and to standardize market price behavior. Do well the combination of government pricing and market pricing; Reform the energy management system, which does not distinguish between government and business, confuse policy with commercial operation and seek rent seriously; break down the barrier of solidification of interests, To guide the relationship between electricity and other products, the government should perfect the policy and system, and combine the reform of energy price with the price subsidy. According to the situation of market supply and demand, we should reform the regulation of electricity price, solve the problem of cross-subsidy of electricity price from the source, adjust the price of sale electricity constantly, set up a market-oriented mechanism to promote the absorption of clean energy in our country, and continuously promote the transformation and development of clean energy. In order to promote the effective reform of the power sector, to improve consumers' awareness of energy conservation and to set up a good consumption concept, the consensus of the society should be consolidated and the interests of the public should be taken into account.

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