

# A Study on Element Market Competitiveness of Power Generation Group

Zhitan Liu<sup>1,2</sup>, Liwen Tan<sup>1</sup>

1. Economics and Management School, Wuhan University, Wuhan 430072;

2. Guodian Science and Technology Research Institute, Nanjing 210031

1, 2 Email: zhitanliu@163.com

**Abstract:** In this paper, the element market competitiveness concept and the competitiveness model of power generation group are presented based on the analysis of the market structure and competitiveness characteristics of the power industry, and the relationship between the comprehensive competitiveness and the element market competitiveness is analyzed. The element market competitiveness of power generation group is not only the source of enterprise's comprehensive competitiveness, but also the performance of enterprise's comprehensive competitiveness.

**Keywords:** power generation group; element market competitiveness; enterprise's comprehensive competitiveness; element market competitiveness of power generation group

## 1. Introduction

Electric power is one of the primary industry critical to the national economy. Power generation enterprises as the front-end of power system, is the most important basis to the entire power industry and its operational situation plays a vital role in maintaining the sustainability and health of the whole industry chain. Since the new round of the power-system reform in 2002, a competition pattern has emerged in the generation field, which is characterized by the coexistence of many enterprises with the dominance of China Huaneng, China Datang, China Huadian, China Guodian and China Power Investment group. However, due to the proceeding of the power-system reform, electricity and electricity price in the trade market, which failed to appreciate marketization, retain the government pricing mechanism. Thus electricity distribution is heavily controlled and regulated by power grids and the government. Therefore, in terms of generation enterprises, what they can do is limited in product market owing to the incomplete competition circumstance. Meanwhile, after reforming for over twenty years, coal which accounts for the main cost of production in thermal power plants, had gradually become market-oriented. Furthermore, under the progressively increasing pressure of resource and environmental protection, coal enterprises obtained growing bargaining power in transaction with power enterprises. At present the total thermal power installed capacity reaches up to 76%, hence, the issue of coal is not only the most significant factor in some individual thermal power enterprises, but also an essential factor affecting the whole competitiveness of power generation group. In addition, with increasing fierce completion among power plants and rapid development of new energy, capital,

high-quality power projects and talents especially experts in new energy as well as other elements have become a key point hankered after by each power group. In the present situation, it bears both practical and theoretical significance to strengthen the research on element market and its competitiveness of power generation group.

## 2. Enterprises competitiveness and element market competitiveness

Competition is common in human society and often occur at three levels: national competitiveness on a macro level, industrial competitiveness and regional competitiveness on an intermediate level, and various organization competitiveness on a micro level. At present, research on competitiveness at home and abroad is mainly concentrated on enterprises competitiveness. Nevertheless, there are different views on enterprise competitiveness: Authoritative professor Michael Porter pointed out in his book that “*Enterprise has competitiveness*” and “*Enterprise has competitive advantage*” are the same concept. He described competitive advantage as “enterprises’ ability to attain average investment return rate in excess of capital cost”. Parahalad and G. Hamel thought that core competencies are the collective learning in the organization, especially how to coordinate diverse production skill and integrate multiple streams of technologies. Jin Bei held that enterprises competitiveness is referred to the comprehensive quality an enterprise possesses, which could persistently provide markets (consumer, including productive consumer) with products and service much more efficient than other enterprises.

For most enterprises, product competition is the main aspects. Current research on competitiveness was focused more on product market. However, along with the intensive study, there is a growing concern about enter-

prises element market. Study on element market competitiveness has become a hotspot.

Element market hasn't been well-defined yet. It is generally considered that element market is the transaction or bargain relationship and place formed in the process of commercialization amongst production factors including capital, land, labor, raw material, and information etc. Element market is a resource market, in the meantime, element market and product market are highly interdependent. Li Gang(2007) deemed that enterprise competitiveness is the comprehensive embodiment of enterprise element competitiveness, product market competitiveness and enterprise' operational efficiency competitiveness. Enterprise competitiveness at element market is the initial source of competitiveness. The structure and interrelationship of enterprise competitiveness are shown in Fig.1. Zhang Lihui(2005) argued that enterprise comprehensive competitiveness was mainly determined by three basic segments: resource base, operation processes and performance. In the meantime, enterprises' comprehensive competitiveness is also influenced by the external environment, especially the laws and regulations enacted by local governments. This sort of influence is applied through exerting actions upon enterprise resource base and operational processes. He also found that resource base is an extremely crucial source to the competitiveness of China power generation enterprises.

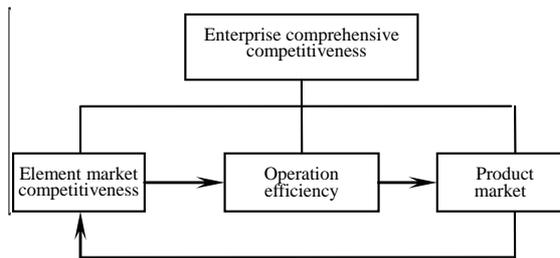


Fig. 1 The competitiveness structure and relationship of enterprises

In this paper, the element market competitiveness means the sustained and effective capability of an enterprise to capture various kinds of product elements essential for its development. In some certain specific market structure, element market competitiveness is even regarded as the principal aspect of enterprise comprehensive competitiveness. Power generation group is precisely typical of the characteristics.

### 3. Power generation industry and its element market

#### 3.1 Power generation industry and its characters

Power generation acts as a hub converting primary energy into electric energy. Power generation industry has the following features:

1. Power industry's products are homogeneous, unitary, intangible, and production and consumption should also be completed simultaneously. Thus a power company in the product market competition is difficult to adopt different strategies.
2. Power generation industry is capital -intensive and technology-intensive industries which possess characteristics of large investment, long recovery period. Meanwhile, for its industry particularity, it is not available for any other use once investment is made. Furthermore, it has strong asset exclusion and fixed cost precipitability that enhances barrier of industry entrance and withdrawal.
3. Power generation industry has a vital bearing on the national economy and people's well being, and it's investment and electricity price are controlled by the government to a certain degree. Therefore, production of power generation industry has some characteristics of public goods.

Apart from the characteristics aforementioned, because of the unique resource condition and the current system status in China, our power generation industry has the following features:

First, after 2002, China's power industry has formulated a relatively fully competitive pattern whereas transmission grid is still monopolized by one enterprise as shown in Fig.2. In this N-1 market structure, grid is almost the unique client. On-grid electricity is largely controlled by grid enterprise, and electricity price is also regulated by the government. Under this circumstance, power generation enterprise competitiveness in product market is mainly embodied in utilizing hours of power equipment.

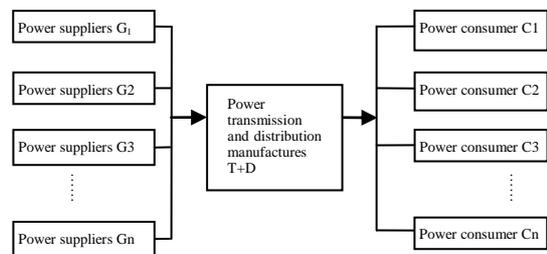


Fig.2 The structure chart of power market

Second, because of the relatively mature technology and relatively low cost of coal-fired power generation, especially resource condition in our country is rich in

coal, poor oil and less gas, coal will be the primary energy source for quite a long time. Hence, coal-fired generation industry chain will be the leading form in the power generation industry chain in China. For the majority of power generation enterprise, coal cost constitutes over 60% of the total cost, therefore the impact of the coal resource control is a key factor in business efficiency and benefit. Coal resource as an element in power generation industry is attracting more and more attention.

Based on the above analysis of the power generation industry characteristics, compared with product market, our power generation enterprise ought to emphasize more on element market in the competition as well as reinforce the control of element market.

### 3.2 Power generation industry element market and its characters

Power generation industry element market is composed of the following elements:

The first element is raw material represented by coal. The resource condition in our country determines that the energy supply pattern will not be changed in a short run, thermal power unit is bound to occupy a predominant position for a long term. Consequently, coal is the most concerned production raw material as well as the most sensitive production element for profits. Coal market has the following features:

① Scarcity of resource: by the end of 2008, coal resource deposits in our country was 1246.4 billion tons, however, the most optimistic economic recoverable reserves is estimated at about 300 billion tons, coal output was 2.716 billion in 2008. Along with the continuously rising difficulty of exploitation and transportation cost, coal will gradually become a rare resource in the forthcoming 20~30 years. Accordingly, coal price will fluctuate in pace with economic cycles. Nevertheless, it is irreversible for coal price to rise continually in the long run.

② Reverse distribution of resources: Coal resource in China is distributed unevenly, especially high-quality coal which concentrated mainly in the relatively under-developed economy region such as north China and northwest China. However, economic developed and large electricity consumption area such as eastern region is lack of coal resource. Thus, the matter of transportation is another fundamental factor influencing the coal market.

③ Remarkable integration tendency: In order to avoid risks effectively, it is essential to enhance the control of coal resource. At present, almost every power generation group is dedicated to developing coal resource actively and extending its industrial chain. The tendency of coal-electricity integrated complex has been evident. For instance, currently, the top 5 state-owned power genera-

tion enterprises are all speeding up the coal exploitation strategy. By the end of 2008 the top 5 power generation groups have produced over 110million tons coal.

The second element is capital: Power generation business is a capital-intensive industry, sufficient capital guarantees the sustainable and healthy development of power generation enterprises. Capital factor is considerably influenced by macroeconomic policy.

The third element is high-quality power projects and franchise items. Good power project is fundamental for the power generation group to achieve benefits. It is also a major factor effecting power generation group's competitiveness. All types of power projects are restricted by environmental protection and resource. For example, the site selection of coal-fired power plant should consider several factors such as medium-long power planning, fuel supply, transportation, outlet corridor, geological conditions and environmental protection of surrounding regions. The site selection of clean energy such as hydropower, wind power should also take factors such as geological condition, natural condition and environment into consideration. Hence, with the ever scarce land resource and improvement of environment protection standards, power projects such as urban power plant, pithead power plant, power plant in the side of ultra-high voltage transmission terminal, large-scale hydropower station become high-quality resource and focus that all power generation enterprises compete for. Different from conventional power supply project, nuclear power projects need special permission management presently. Only China nuclear power, China Guangdong nuclear power group, China Power Investment corporation are qualified for independent development and operation.

The fourth element is talent. As talent intensive industry, talent is also a measurable element influencing enterprises' comprehensive competitiveness. Particularly in current situation that new energy is vigorously developed, experts in new energy fields such as nuclear power, wind power, solar energy are precious resources that all enterprises need.

### 4. Research on the relationship between power generation group element market competitiveness and comprehensive competitiveness

Element market competitiveness of power generation enterprises means the ability to lastingly acquire and efficiently control the important production element related to the sustainable development of enterprises such as coal, capital, power supply project and talents. It is the main aspect of power generation comprehensive competitiveness. Currently, individual power plant has limited right in making operational decision. Furthermore, elements influencing enterprises competitiveness which

mainly consist of capital and raw material are relatively simple. Therefore, in this paper, it is important to take power generation group as a research object to explore the relationship between power generation enterprises element market competitiveness and enterprises' comprehensive competitiveness.

Amongst various elements of power generation group, coal and capital are the major factors regarding cost, and have direct and evident influence over power generation group's short term operating achievements. Since 2002, the government opened coal market gradually, canceled guiding price of power coal. In the subsequent years, the coal price is soaring uncontrollably, the contradiction between coal industry and power industry is getting tough. With regards to this situation, the government attempts to take measures such as regulating price and price linkage between coal and electricity. Unfortunately, the effect is unsatisfactory. Therefore, in spite of the mounting demand for electricity, profits of power generation group are whittled down gradually until the outbreak of drastic loss of the whole industry in 2008. In 2008, to ensure normal operation of power generation enterprises, the government increased the on-grid price for electricity twice and carried out regulations to control coal price. In 2009, owing to the relatively stable power coal price and increasing non-thermal power business investment, each power generation group began to turn losses into profits. However, since the fourth quarter of 2009, coal price climbed, as a result, some power generation enterprise fell into loss again. Table 1 shows the relationship between operational performance and coal price of the five power generation groups from 2007 to 2009. It evidently indicates that coal has been the most critical element to the benefit of power generation group. The control capability of coal resource directly contributes to the element market competitiveness and comprehensive competitiveness of power generation group. It is of great difficulty for thermal power enterprises to get rid of meager profit and loss dilemma unless the market-oriented electricity price mechanism has soon been formed.

**Table1 The relationship between the profits and coal price of 5 power generation groups from 2007 to 2009**

Year	The average price of coal <sup>③</sup> Yuan/t	Coal increase rate	Total profits of the 5 power generation groups (a hundred million Yuan)				
			Huaneng	Datang	Huadian	Guodian	CPI
2007	355.18	9.23%	106.82	75.62	42	47.5	45.34
2008	390 Yuan/t	10%	-55	-63.45	-68.61	-68.3	-67.08

2009	About 380 Yuan/t <sup>③</sup>	-2% <sup>③</sup>	60.86	22.8	20.9	59.8	31.65
------	----------------------------------	------------------	-------	------	------	------	-------

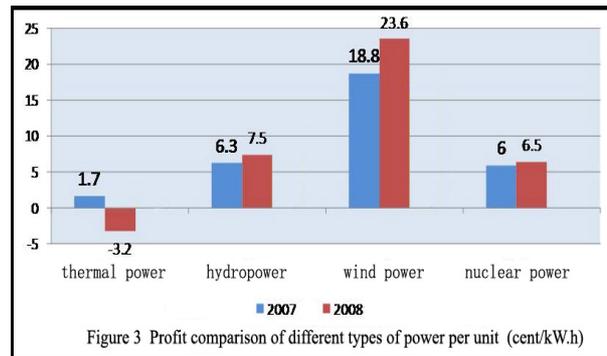
Note (1): Data source: "Annual development report of China power industry" of 2008 and 2009

Note (2): The average price of coal is the average price to the power plant

Note (3): The final data of 2009 hasn't been released, the data in this paper is estimate coal price.

Capital and its operation ability also have tremendous impacts on the overall cost of power generation group. Due to the fund shortage in the early period and the sharply rising coal price, by the end 2009, the debt ratio of the five power generation groups was as high as 80%, the worst is China Datang corporation which has reached 88.6%. Therefore, how to strengthen capital operation, how to put capital centralized management into effect and how to strive to reduce capital debt ratio are now becoming important tasks for each power generation group.

Power source structure, served as a substantial factor to the profit of current power generation groups, is directly affected by the acquisition ability and proportion of high-quality power project whatever regular thermal power, or clean energy like wind power, hydropower or nuclear power. Regular thermal power has stepped into meager profit era due to the unceasingly ascending coal price. On the contrary, clean energies such as hydropower exhibit strong capability to gain profits as shown in figure 3. Hence, reasonable power structure is now replacing scale size to be the crucial point with regard to the ability for obtaining interests. Besides, staff quality also has a bearing on power generation competitiveness. Particularly, along with the development of new energy, talents specialized in relevant subjects become the valuable resource for all enterprises.



Note (1): This chart is drawn in reference with a report of a certain power generation group.

Power supply construction and the adjustment of power structure take comparatively longer time as compared with coal and capital elements. Either is the improvement of human resources condition. Thus, these two kinds of elements which produce a hysteretic nature of the enterprises competitiveness and operating per-

formance have a great effect on the middle and long term enterprises competitiveness.

Based on the analysis above, this paper constructs a competitiveness structure model of power generation group illustrated in Fig.4. In this model, element market competitiveness occupies a core position for it is both the fountainhead and main embodiment of enterprises com-

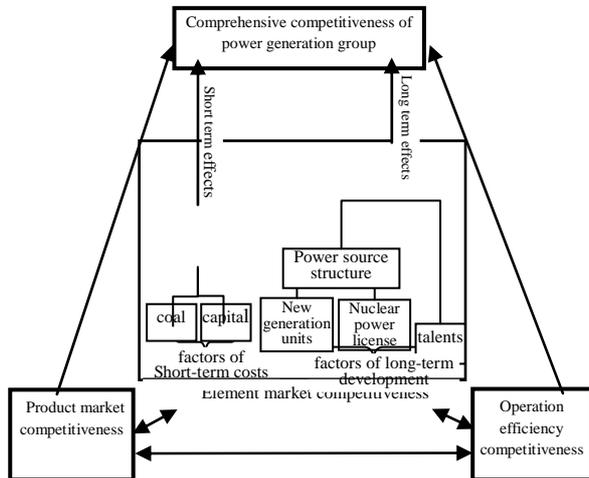


Figure 4 The structure model of competitiveness of power generation group

prehensive competitiveness.

## 5. Conclusion

Element market competitiveness plays a decisive role in affecting the comprehensive competitiveness and operational performance of power generation group. It is indispensable for power generation group to intensify the research and establishment of element market competitiveness strategically. Several feasible and specific measures should be taken as follows:

1. Extend industry chain actively, strengthen control and development of coal resource; develop clean coal combustion technology, improve the utilization and conversion rate of coal resource; tighten up the monitoring and management in coal purchasing, attempt actively

scientific mixed burning of coal, spare no effort to control combustion cost.

2. Vigorously develop clean energy such as hydropower, wind power, nuclear power and solar energy, reduce our dependence on coal resource as much as possible.

3. Open financing channels actively and reinforce capital management, replace different interest rate capital reasonably to increase the utilization efficiency of capital to create greater value.

4. Grab high quality power supply project by new construction, merger and acquisition. Establishment power supply at UHV transmission line output terminal should be paid more attention to.

5. Intensify the training of assigned staff, enhance quality of the talents. Reinforce training and introduction of new energy talents and top-level talents.

## References

- [1] 《Annual Development Report of China Electric Power Industry》 [R], China Electricity Council, 2009, p22;
- [2] Michael Porter, 《Competitive Advantage》 [M], Translated by Chen Xiaoyue etc, Huaxia Press, 1997, p4;
- [3] Parahalad and G. Hamel, 《Core competency of Corporation》 [A], Selected from 《Strategic -45 strategist on how to set up core competencies》, Liu Shouying editor, China Development Press, 2002, p352;
- [4] Jin Bei, 《Economic competitiveness》 [M], Guangdong Economic Press, 2003, p20;
- [5] Li Gang, 《The Research on interaction between Enterprise competitiveness and Project competitiveness》 [M], Press of Economics and Management, 2008, p34;
- [6] Zhang Lihui, 《Analysis model and application of the power generation Enterprises competitiveness》 [J], “China Industrial Economy” 2005 (5), p105-117;
- [7] Long Yuan Electric Power officially landed in Hong Kong Main Board [N] China Electric Power News 2009-12-14;
- [8] Interpretation of the main economic and technical indicators of Five Power Generation Group in 2009 [N], China Electric Power News 2010-2-10;
- [9] Annual Development Report of China Electric Power Industry [R], China Electricity Council, 2008;
- [10] Gui Zhaoming, New idea on the Competitiveness of Enterprises[M], Huazhong University of Science and Technology Press, 2008