Discussions on Some Problems of Electricity Tariff Cross-subsidies

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Abstract. This paper provides an introduction to electricity tariff cross-subsidies and analyses the main forms and problems of the cross-subsidies of electricity tariff in China. According to the essence of power system reform, it provides some suggestions on how to find appropriate solutions to the problems mentioned in this paper in order to promote the electricity market reform.

1. Definition and Classification of electricity tariff cross-subsidies

1.1. Definition of electricity tariff cross-subsidies
According to the principles of economic efficiency, consumer price should reflect the real power supply cost. And if not, there must be the existence of electricity tariff cross-subsidies. To be brief, the cross-subsidy of the electricity tariff means that, the consumers of low electricity cost carry out the high electricity price, but the consumers of high cost implement the high tariff. The consumers who execute lower price than their real cost are subsidized by those who execute higher price than their real cost.

1.2. Classification of electricity tariff cross-subsidies
At present, there are four types of electricity tariff cross-subsidies:

1.2.1. Cross-subsidy between different consumers. Electricity power users are divided into four categories: huge industry, general industry and commerce and others, residents and agricultural production. The supply cost of huge industry and general industry and commerce and others is basically lower than the cost of residents and agricultural production. However, due to the strong profitability and endurance of industry and commerce, it undertakes a high level of price and bears the responsibility of electricity tariff cross-subsidies. Residents and agricultural production are vulnerable with a poor endurance, so they are set a lower price and enjoying the cross-subsidization.

1.2.2. Cross-subsidy between different voltage grid. According to the voltage level, electric power users are generally divided into 5 levels from "less than 1kV" to "220kV and above". The transmission chain needed by high-voltage users is shorter and costs lower, and the transmission line loss and non-linearity spoilage are less. So the power supply cost is lower. On the contrary, the low-voltage users
require a longer chain and so the power supply cost is higher. Taking the users of 220V as an example, they are at the end of the power system network, and so involve many power transmission and distribution segments as follows: first, power plants convert energy such as coal, wind and others into electricity; secondly, transmission networks of Extra-High Voltage (EHV) (1000 kV AC, plus or minus 800 kV DC, etc.) or Ultra High Voltage (UHV) (500 kV) transmit electricity to load centers; and then the voltage is gradually reduced under the influence of the distribution networks and transformers from 220kV, 110 kV, 35 kV, 10 kV and so on in order to satisfy the 220V users. On the whole, there is a phenomenon that high-voltage users subsidize low-voltage users.

1.2.3. Cross-subsidy between users of different load characteristics. In general, the higher the load rate of users is, the lower the unit power costs. However, this difference is not considered in the electricity price. It’s equivalent to pricing based on average load rate to all users. Therefore, users of high load rate subsidizing users of low load rate exists.

1.2.4. Cross-subsidy between different areas. Take urban and rural areas as an example. The city has developed economy, strong consumption capacity and high price tolerance. After the same price of the same network in urban and rural areas, the city bears more cost and the rural bears less. That forms cross subsidies.

2. The status and problems of electricity tariff cross-subsidies in China

For historical reasons, electricity price is closely related to many policy objectives, such as addressing the basic people's livelihood, supporting rural development, guiding power investment and power consumption, and this leads to the existence of a large-scale cross subsidy of electricity price. Referring to the price comparison relationship of various kinds of electricity prices (the ratio of residential, huge industry and average selling price is 1.35 and 0.79 times respectively) in foreign countries, residential and agriculture in China enjoy about 300 billion yuan of electricity tariff cross-subsidies. Meanwhile, due to the huge cross subsidies for high-voltage users and low-voltage users and the overlaps of electricity tariff cross-subsidies between different voltage levels and user category, it cannot simply be added together. In addition, there are still many enterprises through various ways to avoid the cross subsidy of electricity price and the related social responsibility. They are mainly behaving as listed below: not paying or paying less of cross-subsidies for self-use electricity, government funds and surcharges, lower standard of system reserve cost, and so on. It leads to unfair competition with general industrial and commercial enterprises.

Recently, while fully affirming the importance of price cross subsidy, price authorities fully realize that price cross subsidy distorts price signal and restrict the market-oriented reform of electric power. They take various measures to gradually alleviate the cross subsidy of electricity price, for instance, merging user categories, canceling preferential tariff, implementing step tariff for residents, adopting time-of use price, etc. Also, pay attention to the protection of people's livelihood and the general service of electric power, and subsidize the basic electricity demand of the low insured households and five guarantee households. However, these cannot eliminate all the problems of electricity tariff cross-subsidies completely. Many problems still exist.

2.1. The aggravating imbalance between supply and demand of electricity tariff cross-subsidies.

As China's economy enters the new normal, the growth rate of huge industrial power consumption slows down or even shows negative growth, which leads to the continuous reduction of cross subsidy of electricity price. On the other side, the power consumption of residents and agriculture has maintained a rapid growth rate, the scale of power consumption enjoying the cross subsidy of electricity price has been expanding, and the demand has been increasing. Considering that the proportion of residential electricity in China is only about half of that in developed countries, and the potential for growth is huge in the future, the development of this trend will aggravate the contradiction of electricity tariff cross-subsidies.
2.2. There is a contradiction between the linkage measures to alleviate cross subsidy and the expectation of reform dividend expected by the public.

The linkage measures to alleviate the cross subsidy of electricity price need to gradually improve the electricity price of residents, agriculture, etc., and to reduce the electricity price of industry and commerce. However, people from all sectors of society have high expectations for the release of reform dividend. Some regions even propose appeals such as increasing the base of graded power and reducing the price makeup standards of progressive pricing for households, which goes against the reform direction of alleviating electricity tariff cross-subsidies. On the other side, with the increasing cost of agricultural labor, land and environmental protection in China, the price of agricultural products has been rising, and are higher than the international price. Raising the level of agricultural electricity price will reduce the competitiveness of China's agricultural products in the international market.

3. Thoughts on properly solving the electricity tariff cross-subsidies

From the experience of foreign countries, the problem of the electricity tariff cross-subsidies exists extensively in power industry in the stage of government pricing. Only slight differences can be seen in depth and scale. A certain period time-buffer has been set up to gradually cancel the cross subsidy of electricity price in most countries. For the small amount of necessary cross subsidy, it can be solved by collecting the general electrical service fund or by collecting the makeup of cross subsidy from market entities, relying on the service platform of power grid enterprises.

The problem of the electricity tariff cross-subsidies cannot be isolated. In the process of power market reform, we should not only look at market efficiency, but also take measures from policy, fairness, efficiency and other aspects, combining with the document of several opinions of the CPC Central Committee and the State Council on further deepening the reform of electric power system (ZF No. 9, 2015), to realize the problem actively and safely.

3.1. Deepen the research on the mechanism of transmission and distribution price and explore the change from "hidden subsidy" to "open subsidy"

The electricity tariff cross-subsidies should be quantitative and distinct. The accurate quantitative analysis requires very heavy work and needs a premise. That is, to establish accurate voltage level and user category and to establish the collection and allocation system of transmission and distribution cost considering power supply nodes and load characteristics. At present, the scale of cross subsidization of residential and agricultural electricity prices can be calculated according to the data of price comparison of various kinds of electricity prices in foreign countries, which can provide the basis for establishing the mechanism of electricity tariff cross-subsidies.

3.2. Explore and study the scientific implementation scheme of electricity price adjustment to alleviate the contradiction of cross subsidy

Deeply understand the policy essentials of solving cross subsidy safely, explore and research the perfect scientific implementation scheme of electricity price adjustment, find the right opportunity to raise the electricity price for residents and agricultural production and restore the real electricity price for industrial and commercial users to reduce their electricity costs. Firstly, use proper public opinion to guide the residents to pay the electricity price according to the electricity cost. It is consisted of increasing the electricity price of residents directly and gradually, or increasing the electricity price indirectly through the implementation of time-of-use price, progressive price, two-part tariff and load rate electricity price. Secondly, study the implementation scheme of selective sales price reform based on the level of load rate, reduce the price of high load rate users and improve the price of low load rate users. Thirdly, make a profound study on the implementation scheme of two-part tariff, select the opportunity to price all users according to the capacity tariff and electricity fees to fully reflect the cost structure of the power system and the power supply cost of users. Fourth, study on the adjustment and implementation scheme of improving the price of low voltage consumers. Fifth, promote the
government to establish a well-developed supervision mechanism to resolutely avoid some enterprises and self-provided power plants from evading cross subsidy responsibilities in the name of reform.

3.3. Study the independent implementation scheme of electricity universal service, promote the establishment of long-term mechanism, and avoid damaging the interests of a small number of people in need in the price adjustment

At present, there are universal service policies for the electricity consumption of the disabled families, the families with low-income level and other special groups in China. It is suggested that, it should be combined with the actual situation of each region to promote the establishment of an independent implementation plan for electricity universal services on the principle of ensuring the basic electricity demand of the users in need. Also, it needs to clarify the service objects, scope, conditions, contents and sources of funds, so as to avoid damaging the basic interests of a small number of people in need in the adjustment of electricity prices.

4. Conclusion

The main beneficiaries of electricity tariff cross-subsidies are residents, agriculture, rural remote areas and other vulnerable groups in China. This is consistent with the imbalance development of economy and society, based on the basic situations and cannot be canceled completely in very long time. However, with the deepening of the market-oriented reform, it needs to take the economic analysis of electricity tariff cross-subsidies as the starting point. From this point, it is necessary to properly handle the relationship between the electricity tariff cross subsidy and the construction of electricity market and stabilize cross subsidy resources, from restoring the system of the electric power commodity and conforming to the path in line with the national and network conditions. At the end, gradually solve the cross subsidy of electricity price, further promote the reform of service power market and continuously improve the operation efficiency of power market.

Acknowledgments

This work was financially supported by State Grid Henan Electric Power Company Science and Technology Project [5217L018000L] fund.

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