

# Design of electric power package for different user groups

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**Abstract:** Design the electricity packages for electricity sales company in the context of electricity reform<sup>[1]</sup>. We Research two provinces (Guangdong and Heilongjiang) with large geographical differences, and access to the monthly electricity consumption of urban residents. Taking into account the regional differences and quarterly difference of the two provinces and combining with the existing package design principles and design methods, we design the monthly basis packages. Guangdong is hot in summer and air conditioning electricity is very large, so we design the summer packages. However, Heilongjiang province does not use air conditioning. At the same time, there is a big difference in the use of electricity between the day and night, so we design the night packages.

**Keywords:** Electricity package Regional difference Quarterly difference difference between day and night

**1 Introduction :** After the electricity reform, the electricity sales company can participate in market competition. In order to improve the core competitiveness of the company, it is necessary to design their own characteristic package. The package can attract more users to buy electricity. It not only improve the company's revenue, but also allow residents to get more electricity concessions. In order to design packages, we research on about 200 households of Heilongjiang and Guangdong provinces to get the payment of electricity of per household. And then deal with the data to get the average amount of electricity paid of each province. Combined with existing methods, we design the packages, including the monthly basis packages, summer special packages and night packages.

## 2 Analysis of differences in the use of electrical energy

Analysis of electricity consumption in different regions is an important reference for the design of packages.

### 2.1 Difference of electric energy use in different regions

Due to the large span of China and the regional climate differences, the characteristics of electricity consumption is also different. For example, Heilongjiang Province belongs to semi humid temperate continental monsoon climate. The winter in the province is long, cold and dry, but summer is hot and rainy. Spring and autumn are short, windy and dry. The electricity consumption of the province is characterized by more electricity consumption in winter, lower in summer, and more average in spring and autumn. Guangdong is a subtropical monsoon climate zone in Southern Fujian province. The surface of the region receives more solar radiation. At the same time, the heat flow in the sea form a high temperature, high humidity and rainy climate in summer due to the impact of the monsoon. The residents have higher electricity consumption in summer. Because there is no electrical heating habits in the winter, so the use of electricity is basically equal to the spring and autumn.

## 2.2 Difference of electric consumption in different quarters

As we all know, the electricity consumption is a barometer of national economy and social life. Electricity consumption presents more stable statistical features in different seasons, different seasons and different months of the year. This is the seasonal characteristics of electricity consumption. As shown below, most of China's land is located in the temperate zone, and the four seasons are distinct, so China's electricity consumption is also full of distinct seasonal characteristics.

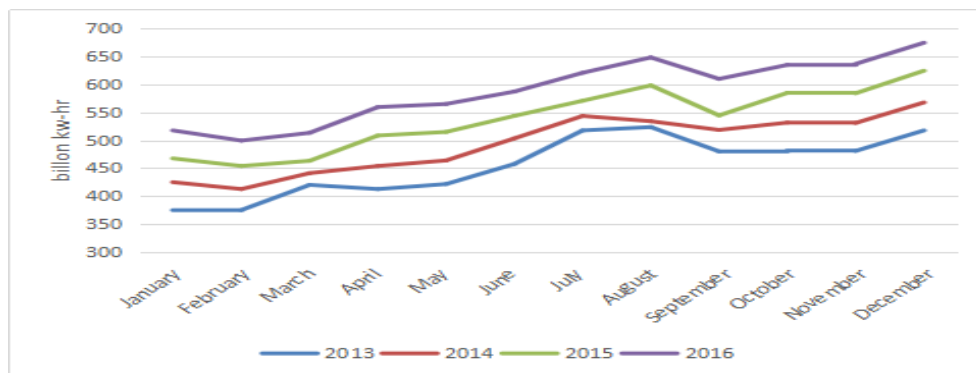


Fig. 1 China's total electricity consumption in 2013-2016

The above figure can be used as a basis for our simple analysis of quarterly electricity consumption. Most of our country is located in temperate zone, and the characteristics of the four seasons are very obvious. Seasonal characteristics of electricity consumption are mainly affected by climate, festivals and other factors<sup>[2]</sup>. Due to climatic factors, residents use electricity to cool in summer and heat in winter. All kinds of festivals have some influence on the residents' electricity consumption. For example, the Spring Festival is the most influential traditional festival in China. During the Spring Festival, the family returns home, leading to increased household electricity.

## 2.3 Difference of electric consumption between day and night

- Commercial electricity consumption is greatly reduced, and high power machinery does not work at night. But they use a few million kilowatt hours of electricity during the day.
- Household electricity consumption is also significantly reduced at night. The peak of electricity consumption is the time of cooking in the evening, then the power load is reduced. Although residents turn on the lights at night, the proportion of lighting electricity is very small.
- For the power system, the power generation can not be reduced suddenly at night, and the energy can not be stored in large quantities. Therefore, a large amount of power loss on the line and transmission equipment. Encouraging the use of electricity at night can avoid the waste of energy and balance the power consumption in the day and night<sup>[3]</sup>.

Therefore, we should adopt the method of time price. This will not only enhance the load rate of the grid, but also promote the development of electricity and social economy. At the same time, rural residents should be encouraged to use electricity instead of heating fuel for heating at night. It can be a conservation of resources.

## 3 The principles and methods of Package design[4].

### 3.1 Package design principles

- (1) Lower prices at night can stimulate the consumer behavior. Reducing the electricity bills at night can improve the utilization rate of electric energy and reduce unnecessary waste.
- (2) The increase of household electrical equipment is the main factor of the increase of electricity consumption. The types of electric appliances and electricity consumption of urban residents are more.

It is necessary to give people who use more electricity more concessions when design the package. Otherwise the package will lose the attractiveness of these people.

(3)For the people who use more electricity, the value of the users to maintain is larger. Therefore, the electricity sales company need to make them get more price concessions and enjoy more discounts. In the competition with other companies, the people who use more electricity is also a resource that competitor snatch. Therefore, it is necessary to attract them with a higher discount rate.

(4)Although the user's electricity consumption is the same, there is a huge difference in the characteristics of its use of electricity. It can not be generalized. Equally research can not make packages close to users. For example, design summer packages for residents who use air conditioning in summer. Therefore, it is necessary to design a specific package for different user groups.

(5)Design based packages to meet the general needs of residents, and the use of alternative packages to meet the needs of different users. This allows residents to choose other packages based on the based packages.

### 3.2 Package design methods

(1)Based on the analysis of the electricity consumption, the user groups with similar consumption characteristics are classified. For all types of users, design the package according to the core features.

(2) According to the user's usage of electric energy, locate the user type in order to form a differentiated package design starting point.

(3)For different regions choose different package elements to achieve the goal of consolidating the user.

(4)When designing the company's package, the user's mental factors must be considered. For example, if the purchase of electricity is more, the user can get the greater discount.

(5)Finally, combine with the above factors to design the package. The package framework needs to integrate the consumer groups, and keep the structure simple and beautiful.

### 4 Design targeted packages

During the holidays, about 100 of households are surveyed in Guangdong and Heilongjiang provinces. We record their monthly payment of electricity. Taking into account the general situation, the more population of the family, the electricity consumption will be large. So the number of households also has been recorded. Then, count and analyze these data, and design packages for users to choose.

#### 4.1 Guangdong Province

Based on the electricity consumption of Guangdong residents, we get the following data (family population of 2 people, 3 people and 4 people)

Table 1 Residents of Guangdong pay electricity bills every month

Electricity fees /yuan	January	February	March	April	May	June	July	August	September	October	November	December
Two	108	116	123	134	128	356	367	369	118	121	109	126
Three	184	169	183	176	168	526	554	561	165	174	159	165
Four	234	223	235	251	248	628	598	613	209	231	235	218

Count the average quarterly payment of electricity, in order to reflect the seasonal characteristics of using electricity.

Table 2 Residents of Guangdong pay electricity bills every quarter

	First quarter	Second quarter	Third quarter	Fourth quarter
Electricity fees /yuan	527	1641	498	518

From table 1, we can draw a conclusion that the total number of households is greater, the use of electricity is more. Design based packages to let users to choose different stalls according to their own family situation.

Table 3 Based Package of Guangdong

	Electricity/kw-hr	Price/yuan per kw-hr	Total cost/yuan
Package one	300	0.50	150
Package two	500	0.51	252
Package three	700	0.52	356

As shown in Table 2, because of the use of air conditioning, residents use a high amount of electricity in summer. So we design the summer packages. It allows users to get more concessions and helps electricity sales company to maintain customers.

Table 4 Summer package of Guangdong

	Electricity/kw-hr	Price/yuan per kw-hr	Total cost/yuan
Package one	3000	0.50	1500
Package two	4000	0.51	2010

## 4.2 Heilongjiang Province

Based on the electricity consumption of Heilongjiang residents, we get the following data (family population of 2 people, 3 people and 4 people)

Table 5 Residents of Heilongjiang pay electricity bills every month

Electricity fees /yuan	January	February	March	April	May	June	July	August	September	October	November	December
Two	143	135	112	121	118	123	102	121	108	111	107	147
Three	211	209	166	176	169	156	176	167	158	163	166	213
Four	249	237	208	217	225	198	201	199	189	179	190	241

Design based packages based on table 5.

Table 6 Based Package of Heilongjiang

	Electricity/kw-hr	Price/yuan per kw-hr	Total cost/yuan
Package one	300	0.50	150
Package two	450	0.51	226.5
Package three	600	0.52	304.5

As shown in table 5, electricity consumption of residents does not have obvious seasonal characteristics. Because the residents do not use air conditioning in summer, so there is no special summer packages.

## 5 Conclusions

In the process of investigation of Guangdong province and Heilongjiang Province, it is found that there are great differences in electricity consumption between the two regions. It shows that the selection of the research area is representative and successful. Because the package can not be put into actual use, we can not predict subsequent problems. Looking forward to the real application of these packages, so we can continue to improve them through user's feedback.

## References

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