

# Cost Reduction Ability by Electricity Tariff Selection for Construction Facilities Located in Non-price Areas

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**Abstract.** State of the art in the tariff type selection in the retail and the wholesale electricity market for construction or reconstruction facilities located at Far East are considered. As a management solution the electricity tariff's selection for enterprises at stage of construction or reconstruction is accented.

## 1 Introduction

The Far Eastern Region is one of two non-price areas with regulated wholesale electricity and power market, which has intensive construction growth by strategy of priority development areas [1-3]. Where industrial, agricultural, tourism and sports facilities of construction and reconstruction are situated [2].

Construction and start enterprises growth is accompanied with increase in electricity consumption. As a result, the electricity consumption in the Far Eastern Region is approximately 5% of total electricity consumption in Russia [3].

According to the amendments, which adopted by Resolution of the Government of the Russian Federation on May 17, 2016 № 433, the ability of selection one of the 6 types of electricity tariff category on the retail electricity market is provided for consumers. At the same time special tariff conditions wholesale electricity market are approved for consumers with capacity from 670 kVA to 10 MVA, which are located in non-price areas [4]. Therefore, the electricity tariff's selection for enterprise should be considered as a management solution in the facilities construction or reconstruction.

## 2 State of the art inn the tariff type selection in the retail electricity market

Since 2006, a part of electricity sold to the consumers (except population) at non-regulated, free market prices, was determined on the basis of the market's demand and supply in the majority of regions in Russia [3-8]. Nevertheless, the Far Eastern Region including the Primorsky Territory, the Khabarovsk Territory, the Amur region and the south of Yakutia is one of two special non-price areas categories of the wholesale electricity market [9]. In

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contrast to the central part of Russia there are no free market electricity prices in non-price areas. Competition in the wholesale electricity and power market among generating stations is not possible because there are only two generating company in the Far East. It is the RusHydro [5] and the JSC «Far East Energetic Company» (JSC «FEEC») [6].

Resolution of the Russian Government defined the unified buyer and the unified guaranteeing supplier of electricity for the Far Eastern Region [1,5,6]. This status is assigned to JSC «FEEC». Purchase of electricity on the wholesale market has been allowed only for JSC «FEEC». That is why it is called «the unified buyer». JSC «FEEC» sells electricity to consumers not only in wholesale market, but in the retail market too. However, because of absence of free market electricity prices in the Far Eastern wholesale electricity market, there are none of them in the retail markets too.

All the electrical energy in the Far Eastern Region is bought and sold on the set rates. Rates are set by the state. Absence of competition rules destroys the possibility of free choice of electricity supplier. This situation doesn't permit to reduce the cost of electricity to consumers by using free market prices, but there is a possibility of selecting one of 6 tariff categories in the retail electricity market. Possibility of selecting electricity price category in the retail market for consumers depends on the following factors: (Figure 1):

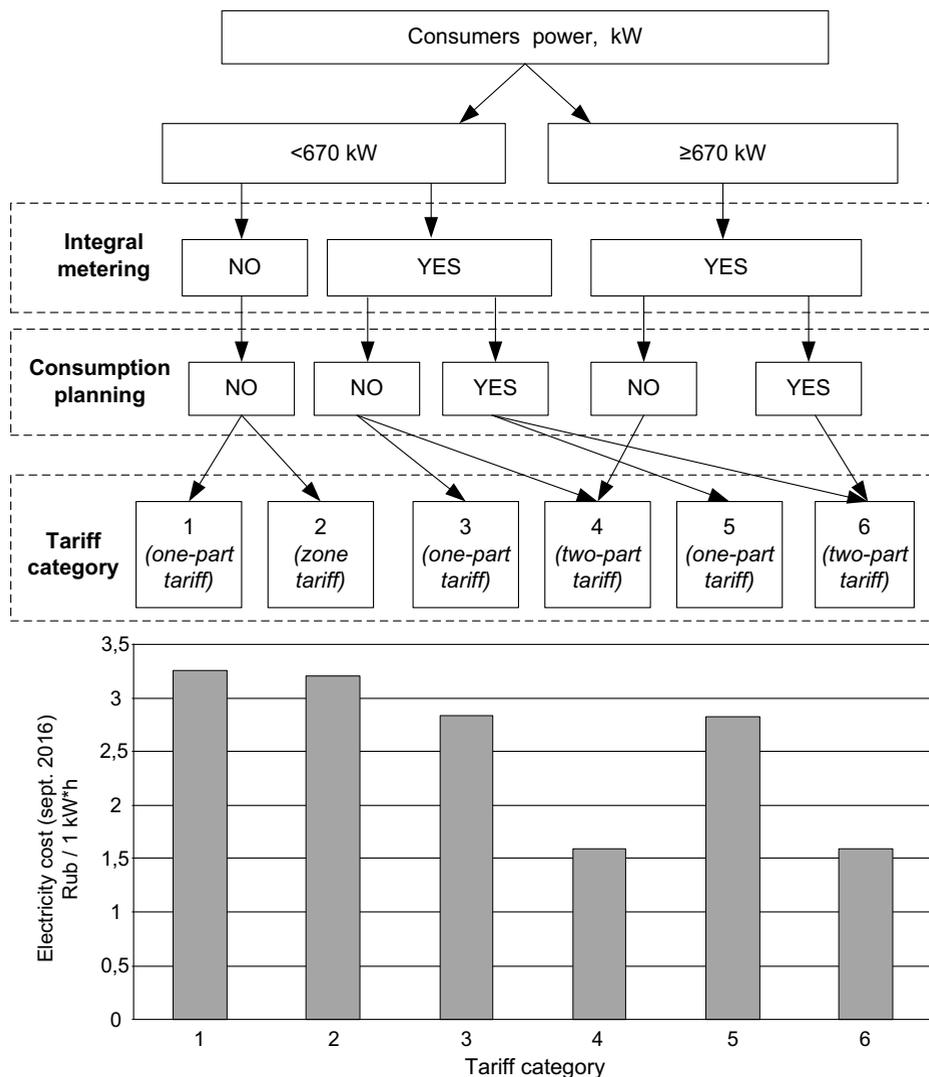
1. Consumer's power agreed upon in the contract with the power supplier.
2. Consumer's absence or presence of electricity integral hourly metering system.
3. Possibility of electricity consumption planning.

The way to be more effective on the retail power market for consumers includes creation of an automatic metering system and electricity consumption planning. But the electricity consumer has a choice even there is no integral metering system or consumption planning system. In other words, the consumer can to select one-part tariff or two-part (differentiated or zone) tariff. For example, if the electricity consumption is evenly without large fluctuations throughout the day, the consumer has more benefits through one-part tariff because of simple and quick calculation and no need of additional equipment. In contrast, if the electricity consumption is evenly without large fluctuations throughout the day the consumer has more benefits in one-part tariff.

A considerable difference the consumption of electricity during the day-time and night-time (more then 30-40%) determine the desirability of application two-part (differentiated) tariff, which is lower than the one-part tariff. For example, two-part tariff more beneficial if the electrical energy consumption of the enterprise in the evening and night-time increases as compared to the day-time by 30-40%. In this case, cost of electricity for the night hours is below [from 2.7 RUR/1 kW\*h to 1.55 RUR/1 kW\*h] [6].

This approach also gives consumers the opportunity to change their hour high consumption at the stage of designing the operating mode of enterprises, sliding them to time with lower cost of electrical energy. It should also be noted that 1 and 2th tariff category are integral. These rates apply to the total volume of electricity consumption per month or per day zone. This is the price for the total electricity (or power) volume during this whoul time period.

At the same time 3,4,5 and 6th tariff categories are interval. It means that the fixed set price to be applied to the different hourly volumes of consumption and the price is different for each hour [6-8, 10]. 3,4,5 and 6th tariff categories provide interval different fixed price for electricity for each hour of the day by the Law of the Russian Federation [1]. Meaning that cost of electricity to set for each hour of the day each month for each tariff category. It considerably complicates the calculation of the final efficiency of use different tariff categories for a particular company, because it requires time and expertise in this sphere. In addition, modern measurement systems are rather expensive and require considerable installation costs and installation [11-18].



**Fig. 1.** Principles of selection price category in the electricity retail market in non-price areas.

Nevertheless, there is a positive experience of transition companies of Far Eastern region to new tariffs categories of retail market. Transition has the payback period from 3 to 5 years. It depends on specific conditions of the enterprise – maximum power and electricity (or power) consumption. The accuracy corresponds to the consumption of electric energy to the volume, declared at the stage of its forecast, is also important. According to available statistics, these factors allow large retail electricity consumers to reduce electricity cost for 5-10 percent. This significantly reduces the cost of their products [2,6,19-22].

### 3 State of the art inn the tariff type selection in the wholesale electricity market

However, there is another way to reduce electricity cost by electricity tariff selection. Starting 07.01.2016 the company with a power capacity more than 670 kVA can buy

electricity from the wholesale market in wholesale price. But in fact this way is not as simple as it looks. Entering and working on the wholesale electricity market can only residents of this market. In the wholesale market of electric energy purchase is carried at wholesale prices set by the state. But the cost of electric energy on wholesale market is naturally lower than the retail market [2,4,6,7,].

The development strategy of the JSC «Energy Systems of East» involves the future creation the technological conditions and the same market relations like in price areas of the wholesale electric power market of Russia for introduction them in the non-price areas of the electricity wholesale market [2,6].

However, company wishing to buy electricity on the wholesale market can't do it by itself, if it is not a resident of that market. Become a resident of wholesale market is expensive on time and need administrative and financial investments. This option is often not necessary to company whose main activity is not the generation or sale of electricity. Therefore, the company can buy electricity from the wholesale market for the wholesale price itself does not directly, but through an intermediary who is a resident of the market.

There are three types of entities in the wholesale market of electric energy and power, which interact with each other: sellers, buyers, infrastructure organizations. In the wholesale market of electric energy trade is conducted in three sectors, which differ in terms of buying and sales transactions and terms of delivery of electric energy. These sectors include: day-ahead market, the balancing market, regulated by contract [2,3,7,8,10].

Such purchase from the wholesale market, even with the fixed allowance intermediary-resident market for the sale of electric energy, allows the company to reduce production costs by 30%. The non-price zone of Far East has experience of large companies in the wholesale market entry. This experience shows that the process of coordination and entry on the wholesale market of electric energy takes more than six months, often up to two years. Such complexity and duration of the entrance procedures to the wholesale market stopped more than half of companies willing to implement it [2,6].

As a whole, knowledge of ways to reduce the payment for electricity is very important at the design stage and construction of the facility. The necessity change in metering system in operation will require considerable investments, up to changes in design and engineering systems of buildings and structures.

## 4 Conclusion

Despite the availability of several cost reduction ability by electricity tariff selection the choice of the optimal variant is unique in each case and is accompanied by a lengthy review and approval procedures, which reduces its attractiveness for consumers.

Therefore, think about the electricity tariff selection for new or existing enterprise is desirable as soon as possible - for example, at the construction stage or even at the design stage.

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