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# CROSS-SECTION SUBSIDIZING IN POWER ENGINEERING. WHAT IS THE LIMIT OF GROWTH?

## ABSTRACT

One of key problems of the Russian energy sector is the problem of cross-section subsidizing by different groups of consumers. The volume of cross-section subsidizing in Russia has increased 4-fold over last 15 years. The conditionally permissible level of cross-section subsidizing is estimated based on the additional tariff burden on industrial consumers associated with implementation of the cross-section subsidizing mechanism. In order to reduce cross-section subsidizing, it is recommended to increase tariffs for electricity for the population by 6% annually. At the transition stage, the target model should be based on the marginal tariff load on industrial consumers; retail electricity prices for similar consumers in Europe can serve as a "benchmark" of such a limit (the possible increase in tariffs for electricity for industrial consumers in Russia is on average 1.4 times the level of 2016). Options for reducing cross-section subsidizing and recommendations are suggested how to determine the appropriate volumes, which is important in current conditions of absence of a single accepted methodology for estimating both the value of cross-section subsidizing and economically justified tariffs.

In the target model of pricing for electricity, the mechanism of cross-section subsidizing should be completely excluded, for which it is necessary to include the indicator "increase of regulated (final) tariffs for the population" (to restore the existing practice until 2017) in the forecast of Russia's social and economic development, providing for anticipating growth rates in comparison with other consumers.

## KEYWORDS

ELECTRICITY, CROSS-SECTION SUBSIDIZING, TARIFFS FOR ELECTRICITY FOR THE POPULATION, ELECTRICITY PRICES FOR INDUSTRY, FORECAST.

## ANALYSIS OF CURRENT TRENDS

Today, the average weighted prices for electricity for other consumers in Russia are on average 30% higher than for the population, which contradicts economic principles of formation of corresponding prices [Zolotova I.Yu., 2017; Linder N.V., Trachuk A.V., 2017]. Other consumers (mainly large industrial enterprises) bear an additional tariff burden, paying a part of cost of electricity supplied to the population (the mechanism of cross-section subsidizing) [Trachuk A.V., Linder N.V., Zubakin V.A. et al., 2017].

Since 2004, the volume of cross-section

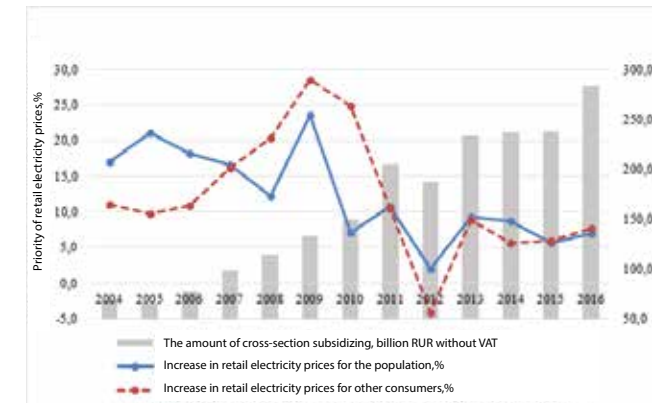
subsidizing between consumer groups has quadrupled (from 69 billion RUR to 283 billion RUR without VAT), there have been periods of slowing/decreasing growth rates of cross-section subsidizing and a significant increase in the corresponding volumes (figure 1):

- 2004–2006 – the excess of growth rates of electricity prices for the population over the rate of price growth for other consumers allowed to reduce the amount of cross-section subsidizing (in real prices);
- 2007–2011 – a further significant (by more than 5 pp) anticipation of growth in tariffs for other consumers over growth of electricity prices for the population led to

a sharp increase in cross-section subsidizing rates – almost twice in five years;

- 2012–2017 – the trends of the last five years (minor differences in the growth rate of retail electricity prices for categories of consumers in question) do not lead to a solution to the problem of cross-section subsidizing.

**Fig. 1. The dynamics of retail electricity prices and cross-section subsidizing volumes (according to JSC RJSC "UPN of Russia", CJSC "AFEEB", FTS of Russia)**



To reduce the amount of cross-section subsidizing, it is necessary that retail (final!) prices for electricity for the population grew at a faster pace compared to prices for other consumers.

Starting in 2017, the forecast for socio-economic development, prepared by the Ministry of Economic Development of Russia for three years, includes parameters that reflect the prospective growth of tariffs for electricity for the population and for other consumers, rates of changes in utilities fees for citizens. Indicators of forecast changes in final prices for electricity for the population are excluded from the forecast.

The forecast provides for the anticipated growth rate (by 2 p.) of network tariffs for electricity for the population in comparison to network tariffs for other consumers starting from 2017. Thus, the target vector aimed at eliminating (reducing) cross-section subsidizing has been set set [Forecast of socio-economic development].

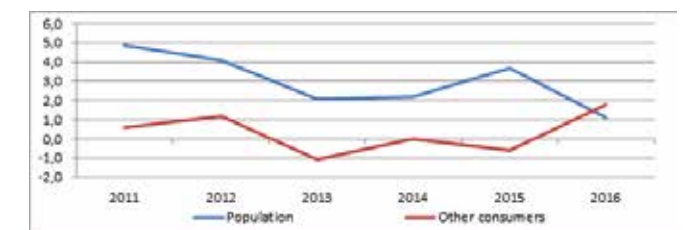
Taking into account the peculiarities of pricing for the population<sup>1</sup> [Forecast, [n/y]], the indicated forecast parameters can not be achieved. An additional obstacle is the restriction on the rate of growth of citizens' utilities fees (no more than 4%), which is an indicator for the limitative indexation of the final tariff for the population. The increase in prices in the wholesale electricity (capacity) market exceeds the inflation rate (in connection with implementation of capacity contracts), which means that the increase of the network tariff for the population in fact may be lower than not only the parameters indicated in the forecast, but below a benchmark of 4%. In 2016, with the same parameters of increase in the network tariff for the population and other consumers (in accordance with the forecast of 7.5%), growth rates of retail electricity prices for other consumers were higher than those ones for the population [Association, [n/y]].

<sup>1</sup> Formation of tariffs for electricity transmission services for a group of people is calculated from the final level of the corresponding tariff minus the indicative price (the cost of electricity and capacity in the wholesale market) and the sales premium

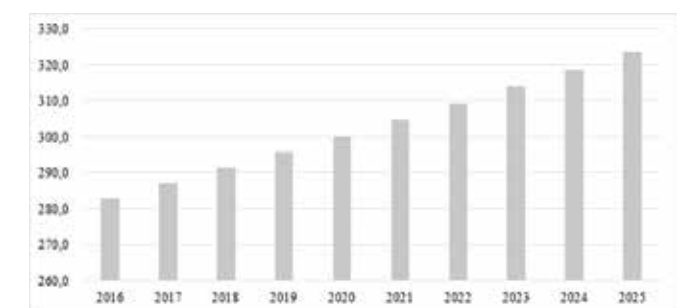
In order to ensure transparency in solving problems of reducing cross-section subsidizing (taking into account the pricing of electricity for the population), it is necessary to include the indicator "growth of regulated (final) tariffs for the population" into the forecast (as was until 2017), providing for anticipating growth rates in comparison to other consumers [Dolmatov I.A., Zolotova I.Yu., Maskaev I.V., 2017].

In addition to differentiating rates of tariff changes for the considered groups of consumers, the dynamics of cross-section subsidizing volumes is also affected by the difference in growth rates of electricity consumption for the population and other consumer groups. According to estimates of the Ministry of Energy of Russia and a number of experts (see, for example: [Trachuk A.V., 2010; Sellyakhova O., 2012; Volodin Yu.V., Linder N.V., 2017; Trachuk A.V., Linder N.V., 2017]), the trends of recent years characterized by exceeding the growth rates of electricity consumption by the population in comparison with other consumers (Figure 2), will remain in the coming years, which, other things being equal, will lead to an increase in cross-section subsidizing in perspective (fig. 3 shows the invariability of tariffs for electricity for the population, the annual increase in electricity consumption is 1.5%).

**Fig. 2. Dynamics of power consumption, an increase compared to the previous year [Association, [n/y]]**



**Fig. 3. The volume of cross-section subsidizing (forecast without VAT), billion RUR.**

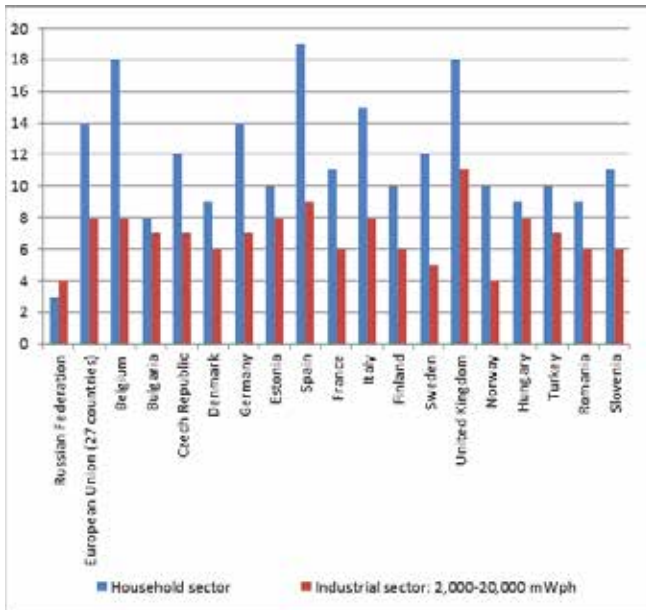


## ASSESSMENT OF THE PERMISSIBLE LEVEL OF CROSS-SECTION SUBSIDIZING

Considering the problem of cross-section subsidizing, it is necessary to take into account the current level of retail electricity prices for industrial enterprises (which bear the burden of cross-section subsidizing today), the maximum permissible level of price increases for these consumers (especially for large energy-



Fig. 4. The level of prices for electricity for domestic and industrial consumers in the Russian Federation and in Europe (excluding taxes) in 2015, eurocent/kW/h [Eurostat, [n/y]]



intensive consumers, for which the price of electricity is an essential factor, affecting the competitiveness of products). Retail electricity prices for similar consumers in Europe can act as a standard of such a limit (Figure 4).

As the analysis of electricity prices for the industrial sector showed in countries with a similar structure of household and industrial electricity consumption (Belgium, Germany, Finland, Romania), it is possible to increase electricity prices for industry in Russia by no more than 1.4 times from the level of 2016, or up to 4.2 RUR/KW/h (at the same time, the growth potential of tariffs for the population is significant, the actual tariff for electricity for the population in 2016 was 2.4 RUR/kWh without VAT, for other consumers – 3.1 RUR/kWh) [Eurostat, [n/y]].

So, the current level of cross-section subsidizing in Russia as a whole is conditionally permissible from the point of view of the tariff burden of industrial consumers. In a number of constituent entities of the Russian Federation, the current tariffs for electricity for industrial consumers are close to or exceed the limit level of 4.2 RUR/kW/h (for example, the Republic of Altai, Kostroma Region, Arkhangelsk Region), and further increase of price for this group of consumers (including the one in connection with the burden of cross-section subsidizing) can lead to the fact that large consumers will switch to alternative sources of power supply or reduce production volumes, their competitive positions and financial stability will decrease (see, for example: [Kholovalova T.V., 2017; Trachuk A.V., 2011a, b; Ryapin I., 2013]).

While maintaining the current practice of including these volumes in electricity prices for other consumers, further growth of cross-section subsidizing in the power engineering industry will lead to a significant increase in the tariff burden for industrial enterprises in the long term (for the latter, the price level may exceed analogous indicators of European countries in most regions of Russia by 2026 under other equal conditions).

## CROSS-SECTION SUBSIDIZING: METHODOLOGY FOR DETERMINING

The calculation of the amount of cross-section subsidizing essentially depends on how to determine the economically justified price for certain categories of consumers. Even if prices for actual payments for electricity and related services are unchanged, a change in legislation regulating the calculation of an economically justified price may lead to an increase or decrease in cross-section subsidizing (for example, if the number of voltage levels or the number of hours of use of capacity for different tariff groups changes).

It is objectively impossible to determine costs of the industry related to supply of electricity to each particular consumer (except for cases of autonomous power supply) unambiguously and reliably. In the general power system, almost all equipment is involved in power supply to the entire aggregate of consumers simultaneously. The power system itself is designed on the principle of minimizing total costs of all users (not only electric, but also thermal energy)

[Dolmatov I., Zolotova I., 2015]. Thus, it is impossible to determine the composition of equipment (and, consequentially, costs) justified from the standpoint of power supply to a particular consumer. If you try to take simulation for a certain category (group) of consumers, there inevitably arises the problem of justifying a certain classification of consumers (for example, what are the objective differences in the amount of infrastructure necessary to supply a household and a small store? Based on what does the regulator make no pricing distinction for households located at a great distance from each other and at different distances from the generating facility within the same subject of the Russian Federation? etc.).

Due to features of calculation described above, there are various estimates of the amount of cross-section subsidizing in the power engineering industry (from 220 to 400 billion RUR).

The solution to the problem of cross-section subsidizing turns out to depend on improving the methodological base. Digitalization of management processes and optimization of operations in the electricity (capacity) markets provide opportunities for detailed pricing and consideration of specific power supply conditions (capacity reservation, reliability category accounting, individualization of the tariff menu of retail consumers) [Trachuk A.V., Linder N.V., 2018; Dzyuba A.P., Solovieva I.A., 2018]. This circumstance can significantly affect the methodology for calculating cross-section subsidizing and its magnitude. Thus, it is necessary to update the relevant estimates of the amount of cross-section subsidizing taking into account various initiatives to introduce changes in the methodology for calculating tariffs.

## PROPOSALS TO REDUCE CROSS-SECTION SUBSIDIZING

When determining the forecasted dynamics of reducing cross-section subsidizing, it is necessary that the following conditions are fulfilled simultaneously:

- anticipating rates of growth of tariffs for the population;
- absence of significant pressure of rates of growth of tariffs for the population on a rate of inflation);

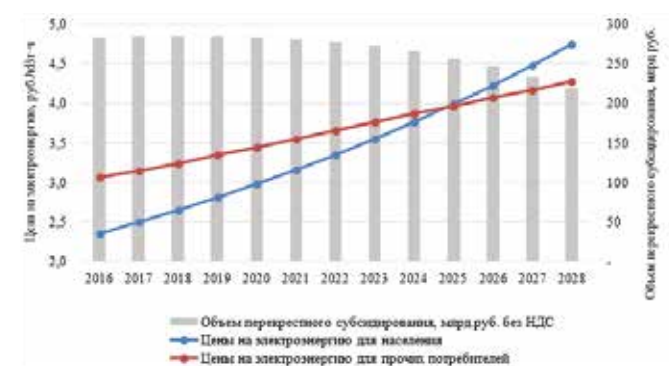
- the price increase for other consumers as a whole for the forecast period is no more than 1.4 times (taking into account the current Euro/RUR rate), or up to 4.2 RUR/KWh from the level of 2016 (with further significant increase slowdown);
- Compensation of total necessary substantiated costs of the industry (total revenue growth for all groups of consumers should correspond to an increase in corresponding costs).

Fig. 5 presents the forecast of retail electricity prices for the population, other consumers and cross-section subsidizing volumes formed taking into account following scenarios:

- annual increase of electricity consumption by the population – 1.5%, by other consumers – 0.5%;
- annual increase in prices (tariffs) for electricity for the population – 6%, for other consumers – 3% (the "inflation minus" indexation scenario);
- annual indexation of the calculated economically justified tariff for electricity for the population by 3%.

The contribution of the increase in tariffs for electricity for the population of 6% to the consumer price index will be 0.075 p., that is, it will not have a significant inflationary pressure.

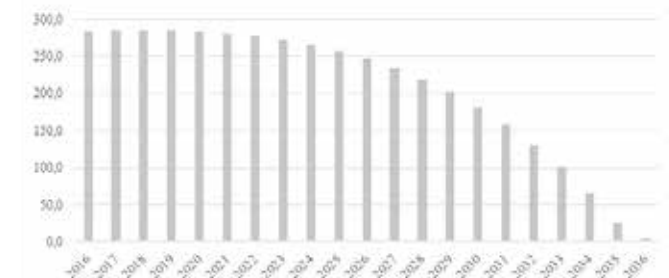
Fig. 5. The forecast of reducing cross-section subsidizing



Given the scenarios for calculations until 2025, electricity prices for households and other consumers will converge, starting from 2025, tariffs for the population will exceed the levels of retail electricity prices for other consumers; by 2028 the amount of cross-section subsidizing will be reduced to 234 billion RUR (by 49 billion RUR for 10 years)

In the object electricity pricing simulation, the cross-section subsidizing mechanism shall be completely excluded (the amount of cross-subsidization is reduced to zero): the average level of tariffs for electricity for the population should cover

Fig. 6. The volume of cross-section subsidizing (forecast, without VAT), billion RUR.



real costs of production, transmission and distribution of energy to this group of consumers. To support indigent citizens, it is necessary to use the targeted support mechanism, including a support tool for paying for utilities provided for by the current legislation.

As model calculations show, a significant reduction in the amount of cross-section subsidizing can be achieved by 2036 under considered scenarios and fulfillment of these conditions (Figure 6).

In accordance with regulatory legal acts, a phased reduction in the amount of cross-section subsidizing to an optimal level equal to subsidizing the most indigent households is envisaged by 2022 (in 2012, prices make about 45–50 billion RUR for about 30% of households) [Order as of 2013]. In considered scenarios, this level can be reached no earlier than 2032. To achieve these objectives, it is necessary that annual tariffs for electricity for the population increase more intensively (a increased of at least 10% per year).

## CONCLUSIONS

1. In the target model of pricing for electricity, the cross-subsidy mechanism should be completely excluded.

2. It is necessary to return the practice which existed before 2017 – to include the indicator "growth of regulated (final) tariffs for the population" into the forecast of social and economic development of Russia providing for anticipating growth rates in comparison with prices for other consumers.

3. The recommended annual increase in tariffs for electricity for the population in order to reduce cross-section subsidizing is 6%. When determining the permissible level of cross-section subsidizing (in the transition phase to the target model), one should proceed from the marginal tariff load on industrial consumers; as a standard, it is permissible to accept retail electricity prices for similar consumers in Europe (for industrial consumers in Russia averagely, the possible increase in tariffs for electricity is 1.4 times the level of 2016).

4. An estimated value of the amount of cross-section subsidizing can be adjusted as a result of change in the methodology for calculating economically justified tariffs. Given various initiatives to introduce changes in methodology for calculating tariffs, relevant estimates of the magnitude of cross-section subsidizing should be updated.

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