

Innovative projects

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Decrease in expenses for electrosupply at Development of an infrastructure of Arkhangelsk



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Abstract. In article the estimation of a technical condition of electric networks is given, is long maintained in the city of Arkhangelsk. Because of the big deterioration of networks expenses on their operation are very high, is not provided энергобезопасность northern city, new building and reconstruction is broken. Deterioration of networks influences electric power cost. Experience of formation of the state tariffs for the electric power is analysed. The comparative analysis of tariffs for different categories of consumers of the Arkhangelsk area and other subjects of the Russian Federation is carried out. The building concept in Arkhangelsk a new cable line for the purpose of modernisation of an existing infrastructure of electrosupply is developed. Project realisation will allow to raise reliability, энергобезопасность and efficiency of electrosupply. There will be a possibility of technological joining of new consumers, demonopolizations of the power market and development of an infrastructure of a city.

Keywords: *an infrastructure, development, electrosupply, tariffs, a city, power safety.*

Operated by the electrical system of Arkhangelsk was founded over 30 years ago and since then has undergone significant changes. [1] The steadily growing problem of physical and moral deterioration of equipment and electrical networks leads to a decrease in the reliability, safety and efficiency of the entire power system, which is the basic component of all urban infrastructure engineering services. The high demand for investment in the modernization of networks and equipment, as well as the systematic increase in fuel prices imply a significant increase in tariffs for electricity and heat that activates the decline in industrial production. Because of the wear and tear of electrical networks in the regional capital of the northern region of strategic importance in a critical situation with the reliable power supply existing customers, as well as the implementa-

tion of technological connection to the sources of supply of new construction and renovation. This hinders the development of the city.

Worn operation of the electrical networks is much more expensive than new ones. Electricity is widely used in all branches of industry, urban transport, housing and communal services, as well as in everyday life. Therefore, its cost is the most important determinant of prices and has a big impact on the level and quality of life of the population, especially in cold climates. Therefore, all the energy is controlled by the state in accordance with the Federal Law "On state regulation of tariffs for electricity and heat in the Russian Federation." However, it should be recognized that effective mechanisms to regulate sound levels of profitability natural monopolies in the electricity sector is currently in our country is not formed.

For the population have lower rates than for the industry. However, increasing the cost of electricity causes an increase in the cost of goods and services producers. As a result, buyers still make up the difference in rates between the population and industry, and not once for a particular item or service, and with every purchase.

We analyze the formation of tariffs for electricity for example 2011. In accordance with the Federal Law of 26.03.2003 № 35-FZ "On Electric Power Industry", based on the provisions of the Federal Tariff Service (FTS of Russia), approved by the Government of the Russian Federation of 30.06.2004 № 332, it was established tariff ceiling for electrical energy from 01.01.2011. Limit minimum and maximum levels of tariffs for electricity supplied to the population and equalized with the consumer categories for each subject of the Russian Federation (Order of 07.10.2010 № 245-e / 3 "On the threshold levels of tariffs for electricity supplied to the population, and equivalent it consumer categories for 2011 ") are set without regard to their regulation within the social norms and social norms over the consumption of electric energy, and excluding special pricing procedures in respect of electrical energy consumed by the population as provided by the Government of the Russian Federation of 07.12.1998 № 1444 "On the basis of the pricing in the respect of the electrical energy consumed by the population."

19 subjects of the Russian Federation within one week provided the FTS of Russia divisions: 6 (7.14% of the total number of subjects) petitioned for tariff decrease, 12 (14.28% of the total number of subjects) - increase, and the Jewish Autonomous Region - about expanding the range (to reduce the minimum (min) limit of 0.48% and an increase in the maximum (max) limit of 1.41%). In accordance with the provisions of the socio-economic development of the Russian Federation for 2011 and the planning period of 2012 and 2013, and taking into account the additional costs of organizations considered and adopted the FTS of Russia as part of the pre-trial settlement of differences and disputes, rates of 19 subjects have been clarified (order from 07.10.2010 № 246-e / 4 "On the threshold levels of tariffs for electric energy (power) supplied to customers in the retail markets, with the exception of electric energy (power) supplied to the population and equalized with the categories of consumers in areas that are not organized in a price band of the wholesale market in 2011 "). These rates have been specified using the index and are on average for each

subject of the Russian Federation without differentiation by consumer groups, the voltage levels, annual number of hours for use of the power zones (hours) of day and calendar schedule for 2011. Table. 1 fares, according to the order of 07.10.2010 № 245-e / 3, are shown in the numerator, and after verification (Order of 07.10.2010 № 246-e / 4) - in the denominator.

Table 1

**Tariff levels for the electricity
on the subjects of the Russian Federation**

№ п/п	The subjects of the Russian Federation		Уровень тарифа, руб/кВтч (с НДС)	
	Name of the subject	FO ¹	min	max
1	2	W	4	5
1	Belgorodskaya region	W ¹	2,59	2,60
2	Bryanskiy region	W	2,40	2,42
3	Vladimirskiy region	W	2,78	2,81
4	Voronejskiy region	W	2,39	2,41
5	Ivanovskiy region	W	2,65	2,68
6	Kalujskiy region	W	2,92	2,97
7	Kostromskoy region	W	2,73	2,75
8	Kurskiy region	W	2,58	2,61
9	Lipezkiy region	W	2,32	2,35
10	Moscow region	W	3,37	3,38
11	Orlovskiy region	W	2,49	2,51
12	Ryazanskiy region	W	2,70	2,73
13	Smolenskiy region	W	2,42	2,45
14	Tambovskiy region	W	2,40	2,42
15	Tverskaya region	W	2,87	2,88
16	Tulskiy Region	W	2,81	2,84
17	Yaroslavskiy Region	W	2,43	2,46
18	Moscow	W	3,76	3,80
19	Republic Karelia	NW ¹	2,00	2,03
20	Republic Komi	NW	<u>2,69</u> 2,9328 ²	<u>2,74</u> 3,0896 ²
21	Arkhangelsk region	NW	<u>3,08</u> 3,3082	<u>3,13</u> 3,6347
22	Nenetskiy Autonomous District (HAO) ⁽³⁾	NW	<u>3,15</u> 2,5791 ³	<u>3,19</u> 2,6963 ³
23	Vologodskiy region	NW	2,79	2,80
24	Kaliningradskiy region	NW	<u>2,69</u> 2,4458	<u>2,72</u> 2,4519
25	Leningradskiy region	NW	2,56	2,59
26	Murmansk region	NW	1,91	1,93
27	Novgorodskiy region	NW	2,77	2,80
28	Pskov region	C3	2,84	2,86
29	Saint Petersburg	C3	2,76	2,81
30	Republic Dagestan	CK ¹	1,67	1,69
31	Republic Ingushetiya	CK	2,34	2,37
32	Republic Kabardino-Balkariya	CK	2,54	2,59
33	Republic Karachaevo-Cherkessiya	CK	2,91	2,94
34	Republic Severnaya Osetiya alaniya	CK	2,66	2,69
35	Chechenskiy republic	CK	1,79	1,80
36	Stavropolskiy region	CK	2,79	2,82
37	Kalmikiya Republic	Ю ¹	2,92	2,95
38	Krasnodarskiy region	Ю	3,06	3,10
39	Adigeya Republic	Ю	3,06	3,10

40	Astrahanskiy region	Ю	2,94	2,97
41	Volgogradskiy region	Ю	2,48	2,53
42	Rostovskiy region	Ю	3,05	3,08
43	Republic Bashkorstan	П ¹	1,90	1,92
44	Republic Mariy El	П	2,35	2,38
45	Republic Morodoviya	П	2,37	2,39
46	Republic Udmurtiya	П	2,40	2,42
47	Republic Chuvashiya	П	2,07	2,09
48	Kirovskiy region	П	2,40	2,42
49	Nijegorodskiy Region	П	2,29	2,31
50	Orenburgskiy region	П	1,85	1,87
51	Penzenskiy region	П	2,18	2,20
52	Permskiy region	П	2,47	2,49
53	Samarskiy region	П	2,55	2,56
54	Saratovskiy region	П	2,28	2,30
55	Uliyanovskiy region	П	2,35	2,38
56	Republic Tatarstan	П	2,43	2,46
57	Kurganskiy region	У ¹	2,80	2,83
58	Sverdlovskiy region	У	2,41	2,42
59	Tumenskiy region	У	1,82	1,84
60	Chelyabinskiy region	У	1,95	1,97
61	Hnti –Mansiiskiy autonomous District ³	У	<u>1,82</u> 8,9914 ³	<u>1,84</u> 9,0162 ³
62	Yamalo-Nenets autonomous District ³	У	<u>1,82</u> 7,1907 ³	<u>1,84</u> 7,2547 ³
63	Republic Altai ³	С ¹	<u>3,14</u> 8,6861 ³	<u>3,17</u> 8,7022 ³
64	Buryatiya republic	С	3,27	3,30
65	Tiva republic	С	2,16	2,18
66	Hakasiya republic	С	1,30	1,32
67	Altaiskiy region	С	2,74	2,82
68	Krasnoyarskiy region ³	С	<u>1,50</u> 1,1277 ³	<u>1,52</u> 1,1816 ³
69	Kemorovskiy District	С	2,18	2,20
70	Novosibirskiy region	С	2,49	2,52
71	Omskiy region	С	2,48	2,51
72	Tomskiy region	С	2,15	2,17
73	Irkiytskiy region ³	С	<u>0,68</u> 9,0066 ³	<u>0,69</u> 9,0312 ³
74	Zabaikalskiy District	С	1,91	1,92
75	Saha republic Yakutia	Д ¹	<u>3,33</u> 3,6314	<u>3,49</u> 3,9256
76	Primorskiy region	Д	<u>2,40</u> 2,6332	<u>2,42</u> 2,6563
77	Habarovskiy region	Д	<u>2,93</u> 2,8071	<u>2,96</u> 2,8352
78	Amurskiy region	Д	<u>2,45</u> 2,5254	<u>2,48</u> 2,5325
79	Kamchatskiy District	Д	<u>4,98</u> 7,5321	<u>5,03</u> 7,5344
80	Magadanskiy region	Д	<u>4,81</u> 3,4185	<u>4,85</u> 3,4492
81	Sakhalinskiy Region	Д	<u>4,77</u> 3,6318	<u>4,84</u> 3,7338
82	Evreiskaya Autonomous District	Д	<u>2,64</u> 2,6274	<u>2,67</u> 2,7076
83	Chukotskiy Autononomous District	Д	<u>6,20</u> 9,5151	<u>6,26</u> 9,5391
84	Baykonur ³	Д	<u>2,78</u>	<u>2,86</u>

			4,0097 ³	4,0312 ³
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Notes: 1 - Federal District (FD): Central - C (18 subjects), the North West - NW (11 subjects), North-Caucasian - UK (7 subjects), South - S (6 subjects), Volga - P (14 subjects), the Urals - I (6 subjects), Siberian - C (12 subjects), Far East - D (10 subjects of);

2 - The rates after verification;

3 - to the extent not referred to the territories within which formed the equilibrium price.

On the part of the Arkhangelsk region, it was noted that the tariffs, according to the order of 07.10.2010 № 245-e / 3, do not include all the costs of production and delivery of electric power. Analysis of the data tab. 1 indicates that the representatives of the Arkhangelsk region, fought to increase the lower and upper limits of 7.41 and 16.1%, respectively. In this case, the NAO said step has managed to reduce tariffs, respectively, by 18.1 and 15.5%. As a result, the NAO rates lower than in the Arkhangelsk region, by 28.3 and 34.8%. Only 9 of the 84 subjects of the Russian Federation (№ 61-63, 73, 75, 79, 81, 83, 84 in Table 1.) The upper limit of the electricity tariff is higher than in the Arkhangelsk region.

In the setting rates for the next financial year the executive authorities of the Russian Federation in the field of tariff regulation must take into the account the macro-economic indicators approved by the Government of the Russian Federation of the socio-economic development of the Russian Federation in 2011 and the planning period of 2012 and 2013, as well as changes in the structure, volumes and prices of fuels used to produce electricity, including due to natural factors. Also take into account changes in the volume of electricity purchased by power supply companies and delivered to consumers, including by increasing the purchase of electricity from the wholesale market of electric energy (power). If necessary, provide a breakdown of their calendar. One of the features is the unevenness of its electricity consumption and production over time. Therefore, in accordance with applicable law differentiation of tariffs made by consumer groups, the voltage levels, annual number of hours for use of the power zones (hours) a day.

Agency on tariffs and prices of the Arkhangelsk region has adopted a resolution on 28.12.2010 № 70-e / 1 "Electricity tariffs for the households and consumers equivalent to the category of the population, in the Arkhangelsk region, except Koryazhma." The following rates for the supplied electricity for the urban population living in homes without a fixed electric stoves and electric heating systems (up to 1 kW with VAT): one-part - 3.13 rubles., The two zones of the day: a day (from 7:00 am to 23 : 00) - 3.26 rubles., night - (23:00 to 7:00) - 0.81 rubles. For people living in rural areas, similar rates were, respectively, 2.19, 2.28 and 0.57 rubles.

Agency on tariffs and prices of the Arkhangelsk region has adopted a resolution on 17.06.2011 № 38-e/14 "Tariffs for electric energy (power) supplied by JSC" Arkhangelsk Sales Company "customers in areas that are not organized in the wholesale market price zones, except electric energy (power) supplied to the population and equalized with the categories of consumers. "Sampling rates of these major customers are given in Table. 2

Table 2
Basic rates (excluding VAT) of consumers in the electric energy supplied by JSC "Arkhangelsk Sales Company"

№	Indicators	measure.	Voltage rangers ¹			
			BH	CH1	CH2	HH
1	Consumption of less 5500 hours ² (single rate)	rubles./MB r in an hour	3522,97	4173,20	4598,27	5209,94

2	Electricity transmission (power) for two-part tariffs: 2.1. Bet on the maintenance of electric networks	rubles./MB т меcc.	394664,57	407052,50	424128,05	540140,64
	2.2 Bet on the payment of electricity losses	rubles./MB т in an hour	123,15	364,33	466,73	648,38
3	Peak area ³ (in three zones on the area)	руб./МВт in an hour	4140,47	4790,70	5215,77	5827,44
4	Night zone (in 2 zones in the say)	rubles./MB т in an hour	2586,84	3237,07	3662,14	4273,81
5	Peak area (in 2 zones in the day)	rubles./MB т in an hour	3641,87	4292,10	4717,17	5328,84

Notes: 1 BH - 110 kV, CH1 - 35 kV, CH2 - 10.6 kV NN - 0.4 kV.

2 Basic tariff consumers, constituting about 90% of the total electricity consumption.

3 Peak load - between 12:00 - 14:00 h.

In order to enhance energy security of the existing worn-out electrical network in Arkhangelsk was developed innovative project to modernize the electricity grid through the construction of a new substation and cabling infrastructure Elias from it to the inner city and the developing campus of the Northern (Arctic) Federal University named after MV Lomonosov (Safa) [1]. With this solution provides not only energy security but also reduce the cost of the cost of running an electric network, and creates opportunities of technological connection of new customers to it. This will significantly shorten the payback on the implementation of the proposed project.

At the present, the regulatory framework retail market in the area of non-price Arkhangelsk region includes the following documents:

- ✚ The Federal Law of 26.03.2003 № 35-FZ "On Power";
- ✚ Resolution of the Government of the Russian Federation of 31.08.2006 № 530 "On approval of the main provisions of the functioning of retail electricity markets" (PO number 530 of 31.08.2006);
- ✚ Resolution of the Government of the Russian Federation of 26.02.2004 № 109 "On tse-noob Education in respect of electricity and heat in the Russian Federation";
- ✚ order of the FTS of Russia from 10.06.2009 № 125-e / 1 "On Approval of the Procedure for the consolidated pro forma balance sheet of production and supply of electric energy (power) within the framework of the Unified Energy System of Russia on the subjects of the Russian Federation."закон от 26.03.2003 № 35-ФЗ «Об электроэнергетике»;

Existing regulations allow you to create in Arkhangelsk extra element of electricity infrastructure. As an investor in this case, developers may be involved - legal entities and individuals interested in technological connection to electricity. Involvement of the market power of the strategic northern region of a wide range of stakeholders from consumers will realize the state anti-monopoly policy in the energy sector.

The project to build a new section of the distribution network to 10 kV appropriate to implement in stages. At the first stage, the performance of the backbone cable from the transformer station 110/10 kV to the central district of the city of Arkhangelsk. [1] Based on the terms of the further development of the electrical network, a central distribution point should be built at the intersection of the Resurrection and Loginov.

The proposed innovative project will not only solve the problem rationally reliable and economical electricity of NArFU, but to assist in the development of the entire infrastructure of the city of Arkhangelsk by addressing these pressing problems: improve the reliability of electricity supply and energy security of the city;

- ✓ reducing the cost of grid connection to the electricity grid for the applicants;
- ✓ formation of free electrical power in the central part of the city and promising areas of development.

Literature

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