



About the rational direction of heat supply in the Western districts of Yakutia

Sobre la dirección racional del suministro de calor en los distritos occidentales de Yakutia

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ABSTRACT:

As a result of the research work "Assessment, the main trends in the natural and socio-economic status, human potential of the Eastern Economic Zone of the Republic of Sakha (Yakutia)", this article presents a comparative assessment of thermal energy production and consumption efficiency in the Western economic zone (WEZ) of the Republic of Sakha (Yakutia). Dynamics analysis of heat consumption over the past 5 years revealed that the indices of heat consumption in the WEZ are decreasing. This is due to the systemic absence problems of rational fuel and energy balance. The results of the study justify the rational directions of heat supply in the Western regions of Yakutia.

Keywords: production, consumption, heat supply, Western economic zone.

RESUMEN:

Como resultado del trabajo de investigación "Evaluación, las principales tendencias en el estado natural y socioeconómico, el potencial humano de la Zona Económica Oriental de la República de Sakha (Yakutia)", este artículo presenta una evaluación comparativa de la producción de energía térmica y eficiencia de consumo en la zona económica occidental (ZEO) de la República de Sakha (Yakutia). El análisis dinámico del consumo de calor en los últimos 5 años reveló que los índices de consumo de calor en las ZEO están disminuyendo. Esto se debe a los problemas de ausencia sistémica del equilibrio racional de combustible y energía. Los resultados del estudio justifican las direcciones racionales del suministro de calor en las regiones occidentales de Yakutia.

Palabras clave: producción, consumo, suministro de calor, zona económica occidental

1. Introduction

In order to develop the Energy strategy of the Republic of Sakha (Yakutia) for the period up to 2050, it is necessary to form the conditions for the development of the fuel and energy sector of the Republic of Sakha (Yakutia), taking into account the development of non-traditional and renewable energy for the WEZ, which can have a significant impact on the economic, social and cultural processes in the Republic.

The analysis of production and consumption of fuel and energy resources, taking into account the development of renewable energy to compile a promising fuel and energy balance of the Republic of Sakha (Yakutia) has not been carried out yet.

In our study, the following analytical materials were used: Energy Strategy of the Republic of Sakha (Yakutia) for the period up to 2030 (Petrov, 2005), Scheme for the integrated development of productive forces, transport and energy of the Republic of Sakha (Yakutia) up to 2020 (The Scheme

for Integrated Development, 2006), Fuel and energy balance of the Republic of Sakha (Yakutia) Part. 1 (Petrov , 2005), Scheme and program for the development of the electric power industry of the Republic of Sakha (Yakutia) for 2017-2021 (The Scheme and Program for the Development), General Layout of Power Facilities (General Plan for Energy Facilities, 2017), Annual Reports of PJSC Yakutskenergo for 2011-2016, Annual Reports of Sakhaenergo PJSC for 2011-2016, Official materials of the Ministry of Housing and Utilities of the Republic of Sakha (Yakutia), Official materials of the Ministry of Industry and Geology of the Republic of Sakha (Yakutia), Official materials of the State Committee for Price Policy of the Republic of Sakha (Yakutia), The Scheme and Program for the Development of the Energy Industry of the Republic of Sakha (Yakutia) for 2017-2021, The Russian Statistical Yearbook Rosstat data etc.

The object of the study is utilities and consumers of thermal energy in the WEZ.

The aim of the study is: to make an analysis of the heat supply problems in the context of WEZ areas; to give scientific credence of heat supply effective directions in the Western regions of Yakutia.

2. Methodology

The problem of conditions for effective long-term energy supply is not new for studying the world economy. For example, the problem of the efficiency of electric heating and the development of renewable energy sources of energy were central to previous studies by Elyakova, Koryagin, Petrov et al. (Elyakova and Koryagina, 2015; Elyakova et al., 2016; Petrov et al., 2010).

The study used the following research methods: General scientific methods (systematic and historical method, method of analysis and synthesis); specific research methods (research method, problem-chronological method); theoretical methods with subsequent analysis and generalization of results (statistical, Supervisory and compare, balance and empirical methods).

3. Results and discussion.

3.1. Heat supply general characteristics in WEZ

There are seven Western Republic districts in the Western economic zone of the Republic of Sakha (Yakutia), where the industrial hubs of Mirninsky and Lensky districts, groups of Viluytsky agricultural areas and Olekminsky district are combined, they are: the Mirninsky, Lensky, Suntarsky, Nyurbinsky, Verkhnevilyuysky, Vilyuyskiy and Olekminsky districts.

Heat supply to consumers of the Western economic zone is carried out by 502 boiler houses which are powered by coal, natural gas, gas condensate, electricity, oil and wood. Diesel fuel is used as a backup fuel for gas boilers. The main share in the structure of heat production by boiler houses are: SUE "HCS of RS (Y)" (State Unitary Enterprise "Housing and Communal Services of The Republic of Sakha (Yakutia)", SK "ALROSA" (PJSC), JSC "Teploenergoservis", LLC «HCS of Vitim", LLC "Teplostroykompleks". 3156 thousand Gcal of thermal energy were produced and 2460 thousand Gcal of thermal energy were consumed in 2017.

3.2. Thermal energy production

The thermal energy production in the WEZ amounted to 3156 thousand Gcal in 2017.

Heat supply of consumers is provided from 502 boiler houses. Boilers are powered by coal, natural gas, gas condensate, electricity, oil and wood. Diesel fuel is used as a backup fuel for gas boilers. There are also installed backup power supplies (DPPs).

The main share in the structure of heat production by boiler houses are: SUE "HCS of RS (Y)" (State Unitary Enterprise "Housing and Communal Services of The Republic of Sakha (Yakutia)", SC "ALROSA" (PJSC), JSC "Teploenergoservis", LLC «HCS of Vitim", LLC "Teplostroykompleks". The structure of thermal energy production in 2017 is presented in table 1 and figure 1.

Table 1
Structure of thermal energy production in WEZ for 2017

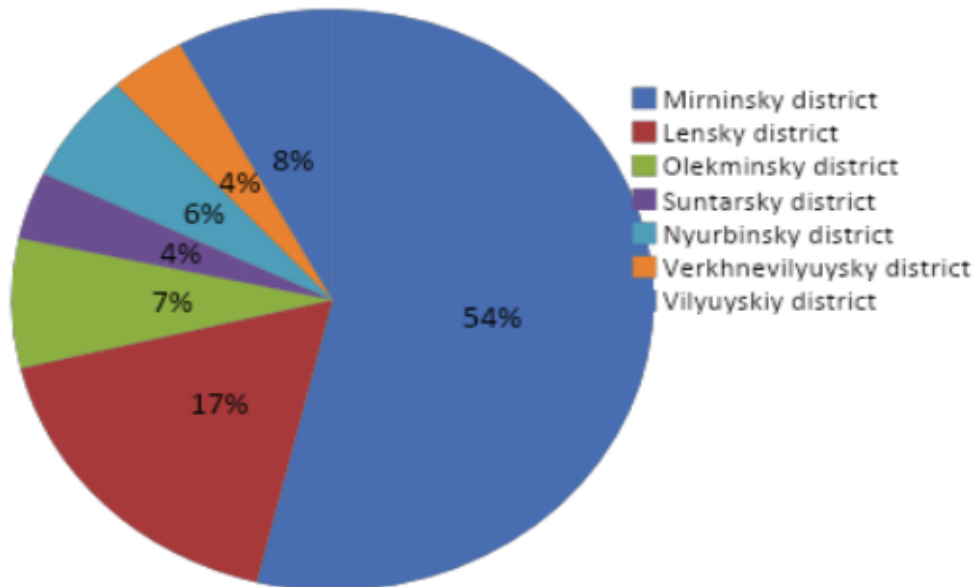
Source of thermal energy	Production of thermal energy, thousand Gcal	Number of boilers	Type of fuel
Total in the Western Economic Zone	3156	502	
Mirninsky district	1698	28	

SC "ALROSA" (PJSC)	1506	17	coal, oil fuel, natural gas, electricity, diesel fuel
JSC "Teploenergoservis"	166	8	natural gas, electricity
Other sources of thermal energy	27	3	oil fuel, electricity
Lensky district	549	37	
LLC "Lenskoe" Lensky enterprise of thermal and electric networks	276	8	coal, oil fuel, diesel fuel, natural gas
JSC "Teploenergoservis"	133	8	natural gas
LLC «HCS of Vitim»	53	6	oil fuel, diesel fuel
LLC "Teplostroykompleks"	47	2	oil fuel, diesel fuel
Other sources of thermal energy	40	13	coal, oil fuel, diesel fuel, natural gas wood
Olekminsky district	228	61	
SUE "HCS of RS (Y)"	152	22	coal, oil fuel, diesel fuel, wood
Other sources of thermal energy	76	39	coal, oil fuel, electricity, wood
Suntarsky district	119	58	
SUE "HCS of RS (Y)"	96	41	coal, oil fuel
Other sources of thermal energy	23	17	coal, oil fuel, natural gas liquids
Nyurbinsky district	191	183	
SUE "HCS of RS (Y)"	173	172	coal, oil fuel, diesel fuel
Other sources of thermal energy	18	11	coal, oil fuel, natural gas liquids
Verkhnevilyuysky district	122	62	
SUE "HCS of RS (Y)"	110	58	natural gas, natural gas liquids, coal, diesel fuel
Other sources of thermal energy	12	4	natural gas, coal, oil fuel, wood
Vilyuyskiy district	249	73	
SUE "HCS of RS (Y)"	171	53	natural gas, natural gas liquids, diesel fuel

Other sources of thermal energy	78	20	natural gas, diesel fuel
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Source: Compiled by the authors based on data of the State Committee for Price Policy of the Republic of Sakha (Yakutia) (Official materials of the State Committee for Price Policy of the Republic of Sakha (Yakutia), 2018)

Figure 1
Structure of thermal energy production by WEZ areas for 2017.
(Official materials of the State Committee for Price Policy of the Republic of Sakha (Yakutia), 2018)



Beginning in 2007, according to the departmental target Program "Transfer the boiler houses, that are heated from of SUE "HCS of RS (Y)", of social, residential and industrial facilities in Suntarsky and Nyurbinsky uluses (districts) of Sakha (Yakutia) to the electric heating for the period 2007-2012" and subsequent resolutions of the government of RS (Y) heat to residential Fund of the number of settlements in all seven districts of the Western economic zone of the Republic of Sakha (Yakutia) transferred to the electric heating. The population pays the tariff for electric heating on the tariffs for heating subsidized from the Republican budget [10].

The balance of production and consumption of thermal energy in the Western energy zone is made according to the tariff decisions of the State Committee for Price Policy of the Republic of Sakha (Yakutia) (table 2, figure 2).

Table 2
The production and consumption balance of thermal energy, thousand Gcal

Index	years						2017/ 2012	2017/ 2016	share %
	2012	2013	2014	2015	2016	2017			
Total in the Western energy zone									
Thermal energy production, total	3328	3345	3312	3269	3211	3156	95	98	100
Net supply	2710	2663	2636	2605	2550	2376	88	93	75
In-house needs of boilers	75	86	84	81	78	76	101	97	2
Network losses	543	595	591	583	583	704	130	121	22
Mirninsky district									

Thermal energy production, total	1865	1874	1832	1777	1749	1698	91	97	100
Boilers, including:	1546	1526	1486	1447	1406	1337	86	95	79
- SC "ALROSA" (PJSC)	1393	1373	1350	1310	1277	1212	87	95	71
- JSC "Teploenergoservis"	136	136	120	120	113	110	81	97	6
Other sources of thermal energy	17	16	16	17	15	15	89	100	1
In-house needs of boilers	37	46	45	44	44	43	115	97	3
Network losses	283	302	301	287	299	319	113	107	19
Net supply	1546	1526	1486	1447	1406	1337	86	95	79
Lensky district									
Thermal energy production, total	570	561	554	560	552	549	96	99	100
Boilers, including:	476	457	460	450	448	440	92	98	80
- LLC "Lenskoe" Lensky enterprise of thermal and electric networks	236	221	224	220	230	225	95	98	41
- JSC "Teploenergoservis"	108	108	107	104	107	102	95	96	19
- LLC «HCS of Vitim»	29	29	45	45	41	41	142	100	7
- LLC "Teplostroykompleks".	39	39	42	42	39	40	103	101	7
Other sources of thermal energy	64	61	42	38	32	32	50	101	6
In-house needs of boilers	16	16	15	15	12	12	74	99	2
Network losses	79	88	79	96	93	98	124	106	18
Net supply	476	457	460	450	448	440	92	98	80
Olekminsky district									
Thermal energy production, total	201	201	203	222	219	228	113	104	100
Boilers, including:	161	162	162	176	177	178	111	101	78
- SUE "HCS of RS (Y)"	108	109	109	124	121	118	109	98	52
Other sources of thermal energy	53	53	53	53	56	60	113	107	26
In-house needs of boilers	5	6	6	7	7	7	121	91	3

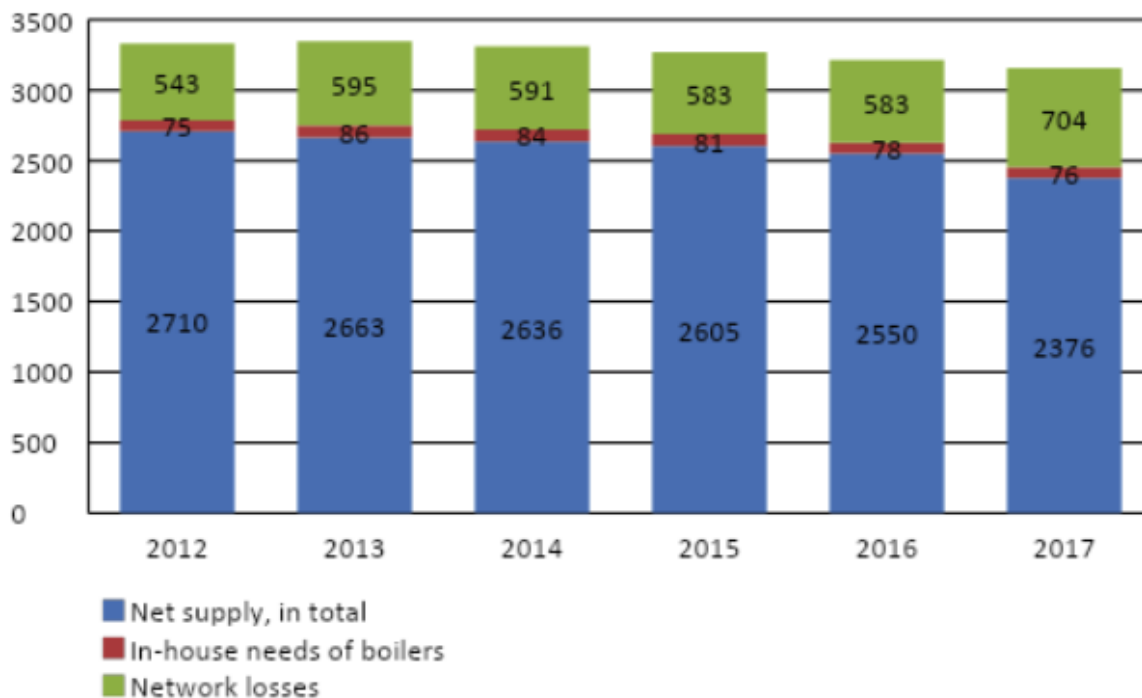
Network losses	35	34	36	39	35	43	125	126	19
Net supply	161	162	162	176	177	178	111	101	78
Suntarsky district									
Thermal energy production, total	120	129	135	137	127	119	99	94	100
Boilers, including:	95	96	102	103	101	94	99	93	79
- SUE "HCS of RS (Y)"	76	78	77	78	77	75	99	98	64
Other sources of thermal energy	19	18	25	25	24	19	97	77	16
In-house needs of boilers	4	5	5	5	4	4	89	92	3
Network losses	20	28	29	29	21	21	101	98	17
Net supply	95	96	102	103	101	94	99	93	79
	2012	2013	2014	2015	2016	2017			%
Nyurbinsky district									
Thermal energy production, total	203	206	209	192	195	191	94	98	100
Boilers, including:	154	152	155	155	150	145	95	97	76
- SUE "HCS of RS (Y)"	135	134	139	140	135	130	96	96	68
Other sources of thermal energy	18	18	16	15	15	15	83	103	8
In-house needs of boilers	8	8	8	6	6	6	75	98	3
Network losses	41	46	46	32	39	124	299	316	65
Net supply	154	152	155	155	150	145	95	97	76
Verkhnevilyuysky district									
Thermal energy production, total	121	122	123	126	123	122	101	99	100
Boilers, including:	99	94	95	97	95	94	95	99	77
- SUE "HCS of RS (Y)"	86	82	84	88	86	84	98	98	69
Other sources of thermal energy	13	12	11	10	9	9	71	100	7
In-house needs of boilers	2	2	2	2	2	2	101	99	2
Network losses	20	26	26	26	26	26	133	101	22

Net supply	248	251	256	255	247	249	101	101	204
Vilyuyskiy district									
Thermal energy production, total	248	251	256	255	247	249	101	101	100
Boilers, including:	180	176	178	177	173	173	96	100	69
- SUE "HCS of RS (Y)"	101	105	110	111	109	111	110	102	45
Other sources of thermal energy	79	71	68	66	64	62	78	96	25
In-house needs of boilers	3	3	3	3	3	3	109	105	1
Network losses	65	71	75	75	70	73	112	103	29
Net supply	180	176	178	177	173	173	96	100	69

Source: Compiled by the authors based on data of the State Committee for Price Policy of the Republic of Sakha (Yakutia) (Official materials of the State Committee for Price Policy of the Republic of Sakha (Yakutia), 2018)

Figure 2

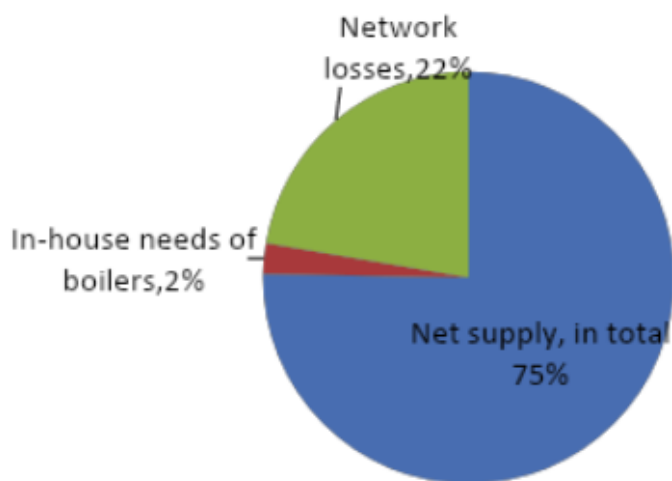
Balance of thermal energy production for 2012-2017.
(Official materials of the State Committee for Price Policy of the Republic of Sakha (Yakutia), 2018)



In the whole Western energy zone the production of thermal energy has decreased by 5% for the period from 2012 to 2017, and the supply was 75% in 2017 of the total production of thermal energy, losses in networks was 22%, and own needs of boiler - 3% (figure 3).

Figure 3

Structure of thermal energy production in the WEZ for 2017.
(Official materials of the State Committee for Price Policy of the Republic of Sakha (Yakutia), 2018)



A comparative assessment of the use of different types of fuel for 2016 was made in the areas of the WEZ (table 3). The share of fuel costs at average tariff for the WEZ is 45%, for each district - from 24% to 59%. The highest proportion of fuel costs in Olekminsky district (59%) due to the high cost of oil and the cost of its delivery, and the lowest share in Verkhnevilyuysky and Vilyuyskiy regions due to the low cost of natural gas.

Table 3
Comparative assessment of fuel types use in the areas of WEZ for 2016
Mirninsky, Lensky, Suntarsky, Nyurbinsky,
Verkhnevilyuysky, Vilyuyskiy and Olekminsky districts.

Index	Unit	Total in the WEZ	Mirninsky district	Lensky district	Olekminsky district	Suntarsky district	Nyurbinsky district	Verkhnevilyuysky district	Vilyuyskiy district
Consumption of raw-materials (fuel) on types:									
Coal	Thousand tons	89	1,9	2,2	20	29	28	7,9	
Oil fuel	Thousand tons	52	4,3	12	17	5,1	13	0,2	
Diesel fuel	Thousand tons	1,2	0,1	0,9	0,003		0,04	0,004	0,2
Natural gas liquids	Thousand tons	6,1				0,1	0,8	1,1	4,2
Natural gas	thousand cub. m	274	171	59				12	32
Wood	thousand cub. m	26		6,3	20			0,3	
Electricity	Million kWh	505	501		0,7		3,4		
electric energy consumption on technology	Million kWh	123	66	20	8,2	5,8	9,4	4,4	9,1
Fuel costs in terms of transportation, including:	Million rub.	4833	2546	740	510	242	456	124	216

	Volume	Revenue	Tariff	Volume	Revenue	Tariff	Volume	Revenue	Tariff
	thousand Gcal	million rubles.	Rubles / Gcal	thousand Gcal	million rubles.	Rubles / Gcal	%	%	%
Total in the WEZ	2710	8871	3274	2460	11197	4551	91	126	139
Mirninsky district	1546	5217	3375	1337	4947	3701	86	95	110
Lensky district	476	1424	2993	440	2082	4735	92	146	158
Olekminsky district	161	418	2601	178	955	5364	111	228	206
Suntarsky district	95	370	3896	94	673	7166	99	182	184
Nyurbinsky district	154	613	3991	145	1026	7062	95	167	177
Verkhnevilyuysky district	99	319	3229	94	552	5905	95	173	183
Vilyuyskiy district	180	509	2831	173	962	5561	96	189	196

Compiled by the authors based on data of the State Committee for Price Policy of the Republic of Sakha (Yakutia). (Official materials of the State Committee for Price Policy of the Republic of Sakha (Yakutia), 2018).

The growth of tariffs rate is due to the fact that heat consumption is reduced, and the prices affecting the volume of revenue are growing every year. The highest average tariff for thermal energy (7166 rubles/Gcal) is in the Suntarsky district due to the low growth of the useful output of thermal energy and the high rate of revenue growth. The lowest average rate in the Mirninsky district (3701 RUB/Gcal) due to the high consumption and low rate of revenue growth. In Olekminsky district, the growth rate of revenue is twice the growth rate of useful heat output.

3.3. Thermal energy consumption

Thermal energy consumption in the Western energy zone amounted to 2460 thousand Gcal in 2017, which is 4% lower than the previous year. Table 3.8.20 presents the dynamics of changes in heat consumption in the regions of WEZ for the period 2012-2017 (table 5).

Table 5
Dynamics of thermal energy consumption
by districts of WEZ, thousand Gcal

Index	years						2017/ 2012	2017/ 2016	share 2017
	2012	2013	2014	2015	2016	2017	%	%	%
Total in the districts of WEZ	2710	2663	2637	2606	2550	2460	91	96	100
Mirninsky district	1546	1526	1486	1447	1406	1337	86	95	54,3
Lensky district	476	457	460	450	448	440	92	98	17,9
Olekminsky district	161	162	162	176	177	178	111	101	7,2
Suntarsky district	95	96	102	103	101	94	99	93	3,8
Nyurbinsky district	154	152	155	155	150	145	95	97	5,9

Verkhnevilyuysky district	99	94	95	97	95	94	95	99	3,8
Vilyuyskiy district	180	176	178	177	173	173	96	100	7,0

Compiled by the authors based on data of the State Committee for Price Policy of the Republic of Sakha (Yakutia). (Official materials of the State Committee for Price Policy of the Republic of Sakha (Yakutia), 2018)

The analysis of dynamics of heat consumption for the last 5 years shows that indicators of heat consumption in General on ZEZ decrease.

In the Myrninsky district there is a significant decrease in heat consumption, in other areas the indices are reduced by no more than 10%. In Olekminsky district we can observe the increase. As the proportion of consumers of Mirninsky district is 54,3%, the change in their consumption significantly affect the dynamics of heat consumption in the whole WEZ, which decreased from 2012 by 9%.

Basically, the reduction in heat consumption is due to changes in the number of consumers and the actual shutdowns of heat supply facilities. Annual planned reduction of heat consumption due to the installation of metering devices also plays a role.

The dynamics of heat consumption for the main groups of consumers for the period 2012-2017 is presented in table 6. Reduction of heat consumption is observed in local, Federal budgets, other consumers and domestic consumption. On the contrary, the Republican budget and the population are growing.

High consumption of thermal energy in the Myrninsky and Lensky districts is due to the presence of large industrial consumers. In other areas, the main consumers are the population.

Table 6
Dynamics of heat consumption by main groups of consumers in WEZ, thousand Gcal

Index	years						Complete growth	Average growth rate, %	Average growth rate from 2017
	2012	2013	2014	2015	2016	2017	2017/ 2012	%	
Total in western energy zone									
Total net supply, including:	2710	2663	2637	2606	2550	2460	-249	-10	100
Population	774	892	1299	1307	1296	1303	529	41	53
Financing from the budget, including:	479	469	476	467	449	430	-49	-11	17
<i>Local budget Institutions</i>	373	310	305	296	287	274	-99	-36	11
<i>Republican budget Institutions</i>	67	117	129	130	122	122	54	45	5
<i>Federal budget Institutions</i>	40	42	42	42	40	35	-5	-14	1
Other consumers	1190	914	509	682	666	620	-570	-92	25

Internal consumption of organization	266	389	354	150	138	108	-159	-147	4
Mirninsky district									
Total net supply, including:	1546	1526	1486	1447	1406	1337	-209	-16	100
Population	176	299	689	685	670	671	495	74	50
Financing from the budget, including:	118	117	114	105	98	92	-25	-27	7
<i>Local budget Institutions</i>	76	55	49	40	39	37	-39	-103	3
<i>Republican budget Institutions</i>	27	48	50	50	46	43	16	37	3
<i>Federal budget Institutions</i>	14	15	15	14	13	12	-3	-21	1
Other consumers	1052	780	383	560	550	509	-543	-107	38
Internal consumption of organization	200	330	300	98	88	64	-136	-212	5
Lensky district									
Total net supply, including:	476	457	460	450	448	440	-36	-8	100
Population	313	301	304	300	303	301	-12	-4	68
Financing from the budget, including:	53	48	52	54	55	53	-1	-1	12
<i>Local budget Institutions</i>	36	32	30	31	33	31	-4	-14	7
<i>Republican budget Institutions</i>	9	8	13	13	13	12	3	27	3
<i>Federal budget Institutions</i>	9	9	9	9	9	9	0	3	2
Other consumers	82	80	76	73	68	66	-17	-25	15

Internal consumption of organization	27	28	27	23	21	21	-7	-32	5
Olekminsky district									
Total net supply, including:	161	162	162	176	177	178	17	10	100
Population	80	83	86	96	99	105	25	24	59
Financing from the budget, including:	54	54	54	53	49	50	-4	-8	28
<i>Local budget Institutions</i>	44	39	37	36	35	35	-9	-25	20
<i>Republican budget Institutions</i>	6	10	13	12	10	10	4	40	6
<i>Federal budget Institutions</i>	4	4	4	4	4	4	1	14	3
Other consumers	17	18	18	18	20	19	2	10	11
Internal consumption of organization	10	8	4	9	9	4	-6	-123	3
Suntarsky district									
Total net supply, including:	95	96	102	103	101	94	-1	-1	100
Population	28	30	33	35	35	34	6	17	36
Financing from the budget, including:	59	59	60	60	59	55	-4	-7	59
<i>Local budget Institutions</i>	51	44	45	45	44	43	-8	-18	46
<i>Republican budget Institutions</i>	3	10	10	10	9	11	8	72	12
<i>Federal budget Institutions</i>	5	5	5	5	5	1	-4	-295	1
Other consumers	3	3	4	6	6	3	0	-2	3

Internal consumption of organization	5	3	3	3	3	3	-2	-85	3
Vilyuyskiy district									
Total net supply, including:	180	176	178	177	173	173	-7	-4	100
Population	85	84	87	90	90	92	8	8	53
Financing from the budget, including:	70	67	70	69	65	64	-6	-10	37
<i>Local budget Institutions</i>	57	50	51	51	47	46	-11	-24	27
<i>Republican budget Institutions</i>	10	15	16	16	15	15	4	30	9
<i>Federal budget Institutions</i>	2	3	3	2	2	2	0	0	1
Other consumers	14	14	10	7	7	7	-7	-104	4
Internal consumption of organization	11	11	11	11	10	10	-1	-9	6

(Official materials of the State Committee for Price Policy of the Republic of Sakha (Yakutia), 2018).

In Mirninsky district there was a transfer of housing stock of SC "ALROSA" to municipalities, in connection with their heat consumption has passed from the group of other consumers to the population. Figure 4 shows the structure of thermal energy consumption in general for the WEZ for 2012 and 2017.

The largest share in the structure of heat consumption in 2017 is occupied by the population, it amounted to 53%, the share of local budget institutions-11%, the Republican and Federal budgets-5% and 2%, respectively, the share of other types of consumers – 25%. In 2012, the share of the population was 29%, institutions of the local budget-14%, national and Federal budgets-2% and 1%, respectively, other types of consumers – 44%. The share of internal consumption of the enterprise decreased from 10% in 2012 to 4% in 2017.

4. Conclusions

The problems of heat supply are revealed and a rational direction of heat supply of the Western districts of Yakutia is suggested on the basis of this research.

The main system problems of reliable heat supply in the FEZ are:

- high degree of the thermal networks wear that can lead to actual losses of thermal energy and untimely decision of modernization and renewal of legal organizational form.
- high share of transportation costs and seasonal nature of fuel transportation for boilers due to short navigation times;

- suboptimal structure of the fuel balance, leading to significant costs for the operation of boilers on organic fuel.
- exhaustibility of organic fuel, high cost of thermal energy and hydrocarbon fuel, high costs of gas and oil transportation and coal transportation;
- combustion of fossil fuels is the main source of electricity and heat, and their intensive use leads to air pollution due to acid precipitation;
- the increase in carbon dioxide in the atmosphere forms a "greenhouse effect" that affects global warming on the planet, primarily in the Arctic ocean through melting ice and rising ocean levels;
- absence of energy budget in the WEZ, including the districts, in the context of settlements. Preparation of energy budget in the whole Republic of Sakha (Yakutia) only in physical terms produced and used fuel and energy resources;
- insufficient financing and underfunding of investment projects for the development of utilities and energy-saving technologies,
- the absence of a single coordinating and controlling body of the Executive power in the Republic of Sakha (Yakutia) for the preparation of energy balance, including the areas of the WEZ.

In connection accounting the above problems, it is necessary to consider the rational direction of heat supply in the Western districts of Yakutia:

- development of "Programme of transfer the consumers in the Western energy districts of Sakha (Yakutia) to electric heating for the period up to 2030", including the mechanisms and efficiency of transferring to electric heating in each settlement of West energy districts, well-grounded calculations and interconnected with the local budgets for the provision of funds, as well as lead to saving the expenditure side of budgets;
- in the short term, an increase in the share of electric heating. To produce thermal energy at powerful electric boilers of SDPP, due to its efficiency in comparison with boiler houses, working on coal, gas, oil, etc., which will save exhausted organic fuel such as coal, crude oil, natural gas, gas condensate;
- maximum transfer the private residential sector for electrical heating, which uses firewood;
- the use of solar energy as a source of both heat and electricity. The use of solar heat is the easiest and cheapest way to solve individual energy problems. Solar heat capture is realized through the use of collectors. These are very simple devices for capturing, accumulating and retaining heat.

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