

REPUBLIC OF AZERBAIJAN

On the rights of the manuscript

ABSTRACT

of the dissertation for the degree of Doctor of Philosophy

**DIRECTIONS FOR IMPROVING THE ORGANIZATION AND MANAGEMENT OF
ECONOMIC ACTIVITIES OF HEAT SUPPLY ENTERPRISES**

Speciality: 5311.01 – “Organization and management of enterprises”

Field of science: Economy

Applicant: Rarif Ali oglu Aliyev

Baku – 2021

The dissertation work was implemented at the Academy of Public Administration under the President of the Republic of Azerbaijan

Scientific leader: Corresponding member of ANAS,
Doctor of sciences of Economics, Professor
Nuriyev Ali Xudu

Official opponents Doctor of sciences of Economics, Professor
Suleymanov Qazanfer Salman

Doctor of sciences of Economics, Professor
Aliyev Tarbiz Nasib

Phd. on Economics, Associate Professor
Nariman Boyukkishi Bahram

FD 2.22 Dissertation Council acting near the Azerbaijan State University of Oil and Industry of the Higher Attestation Commission under the President of the Republic of Azerbaijan

Chief of the Dissertation Council: Corresponding member of ANAS
d.e.s., professor
Imanov Gorkhmaz Jahangir

Scientific Secretary of the
Dissertation Council:

Phd. on Economics, Associate Professor

Rustamov Ilham Samil

Chief of the Scientific Seminar: Doctor of sciences of Economics,
Professor
Safarov Ganimat Asad

İMZANI TƏSDİQ EDİRƏM

ADNSU-nun Elmi katibi

dosent N.Əliyeva



GENERAL CHARACTERISTICS OF THE WORK

Relevance and level of development of the problem. The weapons and energy complex, which is one of the strategically important sectors of the national economy of each country, forms the basis of its stable and sustainable development. The activity and level of development of the heat supply system, which is one of the important structural units of this complex, is of special importance in the development of the country in terms of economic, social, technological, environmental and security factors. It is the unsatisfactory activity of this sphere that can pose a threat to the national security of the country as a whole, creating serious obstacles to both the health and vital activities of the population and the development of the national economic system. Therefore, providing its activities become national and global, the role of the heat supply system in the formation and development of the national economy has also made this system one of the main factors ensuring the welfare of the population, society as a whole and high quality of life. In this sense, the improvement of the fuel and energy complex, including the thermal power generation system, increases the need for reforms in the context of the country's overall development strategy.

Changes in the nature of economic processes and activities in the context of the development of market relations on the basis of the application of market mechanisms and in accordance with the level of scientific, technical and technological development increases the urgency of restructuring activities in the field of heat supply at the level of modern requirements. These processes condition the implementation of the management process based on economic, social and legal principles, as well as technical and technological principles creating the need for significant changes in the organizational and legal structure of the management of the heating system. In this case, along with the technical and technological reconstruction of the heat supply in accordance with the requirements of modern scientific and technical development, it is important to optimally organize and implement all processes related to the production and consumption of thermal energy. This requires a fundamental restructuring of the operating conditions of heat supply companies to meet the growing needs of consumers. Such a situation increases the importance of reforms in the field of thermal energy production, improvement of tariff policy, strengthening the investment climate, and the implementation of incentives for energy saving.

Reforms in the heat supply system should not be a short-term solution to local problems, but a long-term perspective within the framework of the country's socio-economic development and security priorities in general. Reforms in this area can be implemented both in the framework of the main priorities of the country's energy strategy, as well as in the framework of public infrastructure reforms. Because the heating system is a strategically important area of the country's fuel and energy complex, as well as communal infrastructure. In this regard, the reform program aimed at

the development of the heating system makes it necessary to implement both the system itself and the development of the fuel and energy complex, communal infrastructure, housing and communal services, in general, urban planning of the country.

Azeristiliktechizat OJSC, a state-owned company, operates in the field of centralized heating in Azerbaijan. The share of this company in the volume of thermal energy produced in the country in 2017 was equal to 86,1 percent. Therefore, the modernization of the material and technical base of Azeristiliktechizat OJSC, modernization and replacement of heating networks and pumps with new ones, improvement of its management, ensuring the transition of management from the production model to the consumer-oriented model is important for the development of the heat supply system in the country.

In general, the above determines the urgency of studying the issues of improving the organization and management of production and economic activities in heat supply companies in the modern era of economic development.

The issues of organization and management of production and economic activities in heat supply enterprises have been studied in various ways in the works of many prominent scientists of foreign countries. We should mention the names of scholars such as V.A.Butuzov, T.I. Yegorchenko, D.A. Egorova, V.İ.Zakrjevskiy, O.M. Zalavskaya, O.N.Klyuyeva, V.M.Kopko, V.A.Pisarev, A.A.Ionin, L.A.Korshunova, G.M.Krevchenko, A.A.Makarov, U.G.Munts, E.E.Nikitin, N.Popushkin, V.P.Poluyanov, O.A.Sotnikova, V.S.Puzarenakov, L.V.VRijkova , V.V.Kopilov, A.K.Tikhomirov, U.V.Fatneva, M.A.Yuzbekov, U.N.Kharitonov, A.I.Yufa, D.A.Yeqorova, E.N.Jutayeva, E.A.Malıshev, E.M.Marchenko, S. Frederiksen, S. Verner, Brit Aronson , Stefan Helmer, D. Maqnuson, M. Visner, S. Helmer and others among them.

From the economic scientists of Azerbaijanç such as Z.A.Samadzada, A.K.Alaskarov, A.Kh.Nuriyev, T.N.Aliyev, G.S.Suleymanov, N.B.Boyukkishi, A.B.Abbasov, K.M.Abdullayev, R.H.Mammadbayova, H.G.Feyziyev, R.N.Nuraliyeva, J.P.Mammadova, M.M.Aghamalıyev, I.A.Mirzaliyev, R.T.Ismayılov, M.F.Jalilov and other conducted precious researches about the economy of the country and its management, also, published reputable monographs. They also covered the issues of the heating supply system of the Republic in their works. However, the problems of development of the heat supply sector in the country and the issues of improving the organization and management of production and economic activities in the enterprises operating in this field have not been sufficiently studied. From this point of view, conducting scientific research on improving the organization and management of production and economic activities of consumer supply enterprises is of great theoretical and practical importance. Thus, the urgency of the problem and its insufficient study led to the choice of the dissertation topic.

Objectives and tasks of the research. The purpose of the research is to provide a

scientifically substantiated proposal to improve the organization and management of heat supply in market conditions on the basis of a comprehensive analysis of the production and economic activities of the enterprise and development of recommendations.

To achieve this goal, the following tasks are set:

- study of the features of the organization and management of production and economic activities in heat supply enterprises;
- study of methodological bases of assessment of economic efficiency of economic activity of heat supply enterprises;
- Analysis of the current state of development of the heat supply sector in the country;
- assessment of efficiency of heat supply schemes and systems;
- study of the control mechanism in heat supply enterprises;
- determining the prospects for the development of heat supply in the country;
- development of proposals and recommendations on increasing the efficiency of economic activities in heat supply enterprises and improving their management mechanism.

Research methods. Methods of deduction, analysis, logical generalization, comparative and economic-statistical analysis, program-oriented approach were used in the research work.

The main provisions of the defense are as follows::

- effective organization of economic activity of heat supply enterprises in modern times requires taking into account market conditions at all stages from the production of thermal energy to its delivery to consumers and in the process of their management;
- the efficiency of the heat supply enterprises is comprehensively assessed on the basis of taking into account the technical-technological, financial, economic and social aspects;
- existing technical-technological, financial-economic, organizational-legal problems in the heat supply system in the country limit the opportunities for its restructuring and reduce the efficiency of enterprises operating in this field;
- tariffs for the sale of thermal energy by heat supply companies to consumers should be determined taking into account all the conditions for their cost and profitability;
- prospects for the development of the heat supply system in the country should be identified and implemented in the context of the strategic development of the country, as well as the development of the fuel and energy complex, utilities infrastructure, housing and communal services, urban planning in general taking into account technical, technological, economic, social, legal, environmental and security factors;
- organization of heat supply enterprises on the basis of market principles requires the creation of a healthy competitive environment in the market of heat supply services,

the introduction of a flexible tariff mechanism, the improvement of the financing mechanism in this area, increasing investment attractiveness;

- improving the management mechanism of the heat supply system, taking into account economic, social, legal and security issues, as well as technical and technological aspects

The scientific novelty of the research is as follows:

- Features of the organization and management of the heat supply system in the national economy have been identified;
- The current state of the heat supply sector in the country was analyzed and the development trends of this sector were identified.
- Features of the control mechanism in the heat supply enterprise are defined;
- Existing problems related to the organization and management of production at the heat supply enterprise were revealed;
- Prospects for the development of heat supply in the country have been identified;
- Proposals and recommendations on improving the efficiency of economic activities in the heat supply company and improving their management mechanism have been developed.

The theoretical and practical significance of the research is that the use of the main provisions and results of the study, the proposals and recommendations put forward in the work will help to form a regulatory mechanism in the field of heat supply in accordance with market requirements, implementation of effective tariff policy, increase of efficiency of economic activity in heat supply enterprises and improvement of their management mechanism.

Approbation and application. The main provisions of the research, substantiated proposals and recommendations were reported at scientific-practical conferences held in the country, 10 scientific articles and theses with a volume of 5.28 printed pages on the topic were published. The results and proposals of the dissertation work were submitted to “Azeristiliktechizat” OJSC of the Republic of Azerbaijan and the relevant reference on their future use was obtained. In addition, the main provisions of the dissertation can be used in the preparation of policy documents and the teaching process to improve the regulatory mechanism in the field of heat supply in accordance with the requirements of the market mechanism.

Name of the organization where the dissertation work is studied. The dissertation was completed at the Academy of Public Administration under the President of the Republic of Azerbaijan.

The total volume of the dissertation with a sign, indicating the volume of the structural units of the dissertation separately. The dissertation consists of an introduction, three chapters, a conclusion and a list of references.. The dissertation consists of 161 pages, 14 tables and 13 figures .

Introduction consists of 5.5 pages, 10802 characters, Chapter I - 40 pages, 76393 characters, Chapter II - 48 pages, 88269 characters, Chapter III - 42 pages, 86493 characters, result - 11.5 pages, 23784 characters, list of used literature – 12,5 pages, 18277 characters, the total volume of the dissertation is 161 pages, 304018 characters.

THE TOTAL CONTENT OF THE DISSERTATION WORK INTRODUCTION

I CHAPTER. Theoretical and methodological bases of organization and management of economic activity of heat supply enterprises

- 1.1. Features of the organization of production and economic activities in heat supply enterprises
- 1.2. Organizational and economic mechanisms of heat supply enterprises management
- 1.3. Methodological bases of assessment of economic efficiency of economic activity in heat supply enterprises

II CHAPTER. Current state of organization and management of heat supply enterprises in Azerbaijan

- 2.1. Analysis of the current state of development of the heat supply sector in the country
- 2.2. Evaluation of the efficiency of heat supply schemes and systems by enterprises
- 2.3. Evaluation of the management mechanism in heat supply enterprises

III CHAPTER. Improving the organization and management of economic activities of heat supply enterprises in Azerbaijan

- 3.1. Prospects for the development of heat supply in the country
- 3.2. Ways to increase the efficiency of economic activities in heating systems
- 3.3. Directions for improving the management mechanism in heating systems

RESULT

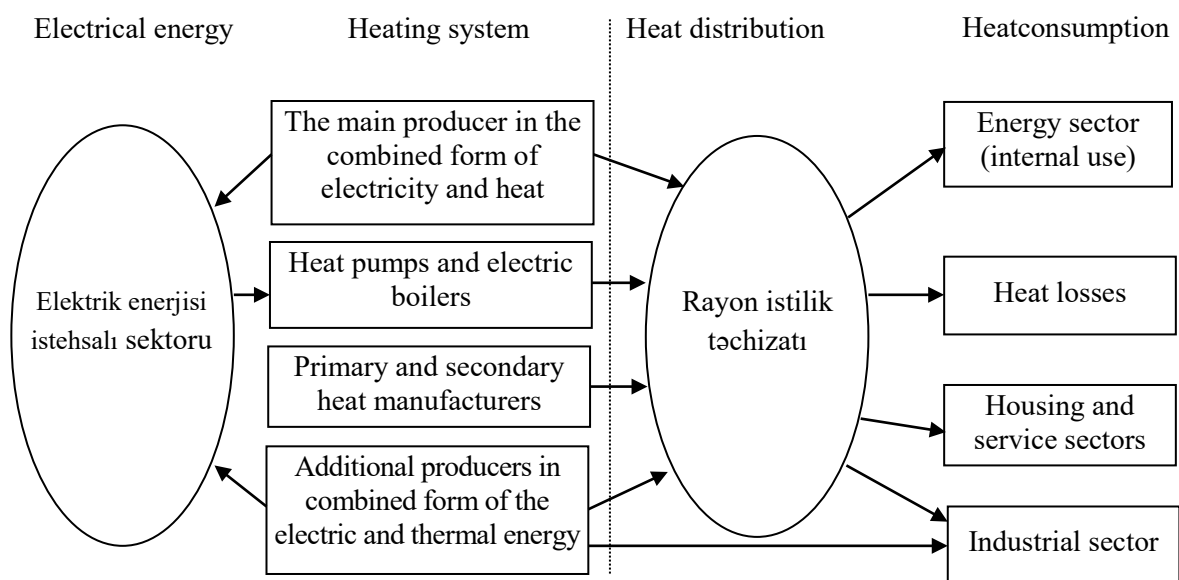
LITERATURE

THE MAIN PROVISIONS OF THE DISSERTATION SUBMITTED FOR DEFENSE

1. In modern times, the efficient organization of economic activities of heat supply enterprises requires consideration of market conditions at all stages from the production of thermal energy to its delivery to consumers and in the process of their management. Being a set of technical devices, units and their subsystems that carry out the processes related to the preparation, transportation and distribution of heat carriers, the heat supply system has a direct impact on the level of socio-economic development of the country, sanitary and hygienic cleanliness, environmental security of the country, meeting the needs of residential and industrial

enterprises for thermal energy and hot water. In this system, the processes of heat production, its transportation, distribution and delivery to consumers are carried out directly by heat supply companies.

The centralized heating system allows the efficient use of available capacity during peak periods of heat demand, as it has access to a variety of heat sources. In addition, compared to the production of thermal energy in buildings, district heating systems allow to save on scale. This form of guarantee does not require consumers to take significant measures to maintain and operate the heating system. Each heating network serves the population of an area in accordance with the master plan prepared taking into account the geographical location and perspective development of the area.



Pic 1. Elements of central heating supply

Source: Compiled by the author.

Unlike the central heating supply, autonomous heat supply systems implemented in a short distance, in a small space, and in many cases the network is not installed to transfer heat from the heat source to consumers. Heating of this system is carried out on the basis of small powers, through autonomous heat generators and furnaces.

Sources of heat supply include thermal power plants, thermal power stations, energy produced in district and local boilers, additional heat energy generated in industrial enterprises, energy generated in waste incineration plants and etc. Heat supply can also be provided through heat supply units and individual heating systems at individual enterprises and buildings.

Historically, two models of heat supply have been developed in developed countries. The first model was developed in Denmark, Finland, and partly in Germany and Sweden. In these countries,

there are thermal power plants included in the unified energy system, and central heat supply systems based on thermal power stations. The second model was developed in England, the Netherlands, Spain and France. These countries are supplied with gas and have decentralized heating on the basis of gas-fired mini-thermal power plants. In France, there are both municipal and privately owned heating companies.

The heat supply company carries out maintenance of the main activities such as generation of thermal energy, transportation and distribution of thermal energy to consumers, repair in case of accidents and elimination of the consequences of the accident, material and technical supply, exploitation of buildings, organization of the main activity, coordination of business processes.

Central heat supply is a natural monopoly, and one of the factors that distinguishes it from other natural monopolies is the structure of total costs. Thus, natural monopolies are mainly capital-intensive sectors, and fixed costs are high in these areas. Although central heating systems also require a significant amount of capital, the share of variable costs in the formation of total costs is high.

Although the central heating sector is a natural monopoly, there are a number of factors that limit the level of tariffs in this area. This is due to the availability of alternative heat supply options. It is necessary for the heat supply company to determine the amount of demand for thermal energy in order to accurately determine the tariffs. As a result, it is possible to precisely regulate tariffs throughout the year. If this regulation is implemented by the state, it is necessary to have information on the amount of expected demand for the establishment of such tariffs. Thus, since the heat supply company operates mainly seasonally, the inclusion of fixed costs generated during the year in the cost of thermal energy and its consideration in tariffs requires accurate information about the heat energy to be sold. It is also necessary to pre-determine heating tariffs for the next season.

Accurate information on the volume of demand also allows you to make informed decisions to determine production capacity.

The management of the heat supply system depends on its form. Thus, central heating systems supply heat to consumers using various sources. The organizational and economic mechanism of the management of the heat supply enterprise reflects the system of organizational and economic measures that ensure the uninterrupted, harmonious and stable operation of the units (heat generating units and heating networks) of the enterprise, in addition to performing the task of providing consumers with heat energy. The main factors influencing the sustainable development of the heat supply enterprise: organizational mechanism (organizational and production structure of the enterprise, management functions, operational management and marketing, labor organization) and economic mechanism (forecasting and planning, foreign economic and internal relations, taxation, financial credit system, price formation, labor stimulation).

2. The efficiency of heat supply companies is comprehensively assessed on the basis of technical, technological, financial, economic and social aspects. The efficiency of economic activity of heat supply enterprises is closely related to their technical and economic condition and is determined on the basis of various indicators. This is especially due to the fact that the heat supply system is an important structural component of the fuel and energy complex, as well as a large technical and technological system. Obsolescence of the heat supply network, the decline of its technical and economic level reduces the efficiency of production and economic activities of the heat supply enterprise by increasing the loss of thermal energy in the network. It should be noted that the production and supply of thermal energy is a relatively large area. On the other hand, as one of the strategically important and energy-intensive sectors of the economy, it is an industry with production potential, which carries out energy production, which provides the basis for the development of the national economic system as a whole. The organization and management of these enterprises, as well as their improvement are closely linked with the attraction of large amounts of financial resources. At the same time, the results of the activities of heat supply companies do not directly affect the quality of life and welfare of society and the population. From this point of view, the results of economic activity of heat supply enterprises and its efficiency show themselves in various technical-technological, economic, social and ecological aspects.

3. Existing technical-technological, financial-economic, organizational-legal problems in the heat supply system in the country limit the possibilities of its restructuring and reduce the efficiency of enterprises operating in this field. The analysis shows that the production of thermal energy in Azerbaijan decreased by 2000. Until the 90s of the last century, a significant part of thermal energy was produced at the Baku Thermal Power Station No. 1 and 2, Sumgayit Thermal Power Plant No. 1 and 2, and the Ganja Thermal Power Station. After 2000, the production of thermal energy began to increase. Thus, in 2006, thermal energy emissions increased by about 1.4 times compared to 2000, by 18.2 percent in 2016 compared to 2007, and by 98.7 percent in 2018. This increase in recent years has been mainly due to heating centers (boilers). Thus, the share of boilers in the production of thermal energy increased from 28.4% in 1990 to 41.1% in 2000, 83.4% in 2015, and 90.9% in 2017.

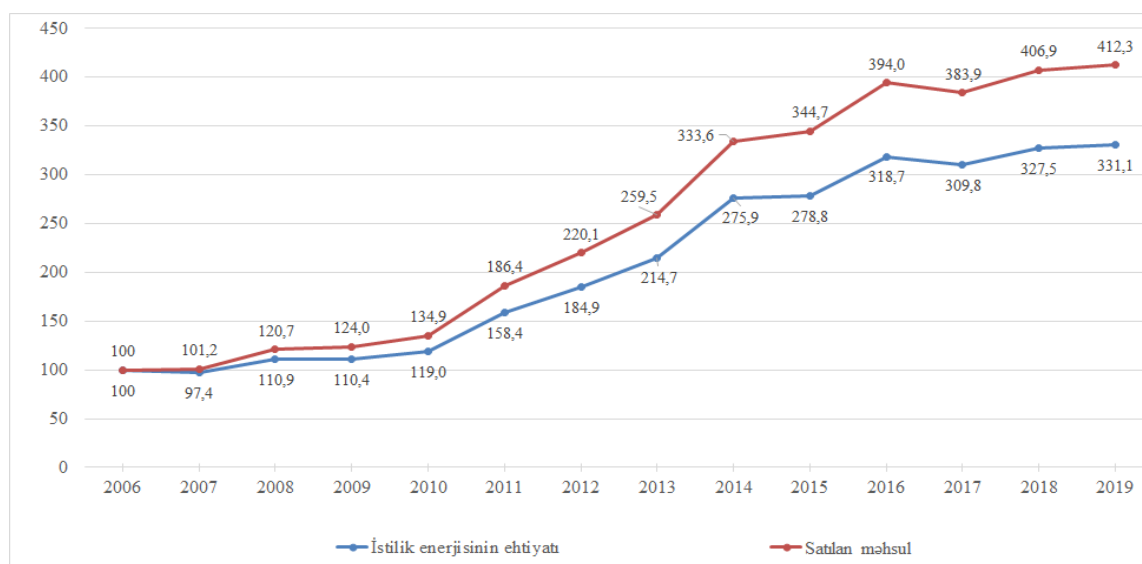
At the same time, in recent years, the use of alternative and renewable energy sources in the production of thermal energy in the world is expanding. In this regard, 548.1 Gcal of thermal energy was produced in Azerbaijan in 2016 due to alternative energy sources.

While energy consumption in the country increased 1.4 times during 2007-2018, the increase in heat energy consumption was 3.9 times. Due to this increase, the share of thermal energy in total energy consumption increased from 1.0% in 2007 to 1.4% in 2015 and 2.9% in 2018. The total share of natural gas, electricity and oil products in the volume of final energy consumption in the

country was 97.5% in 2015, 98.1% in 2016 and 96.7% in 2018.

The level of development of central heating in Azerbaijan remains low. Thus, in 2001, the share of those provided with central heating in the total number of households in the country was 6.9 percent, and in cities - 12.1 percent, these indicators were 13.0 percent and 22.2 percent, respectively, in 2010 and 21.6 percent and 33.7 percent, respectively, in 2018. As can be seen, although the share of users of this service has increased in recent years due to positive changes in the central heating system in the country, it has not been so widespread.

Today, the state-owned Azeristiliktechizat OJSC operates in the field of central heating in the country. If in 2007 31.8% of the thermal energy produced in the country was distributed at the expense of “Azeristiliktechizat” OJSC, in 2018 it was equal to 53.9%. In 2019, the company's thermal energy reserves and the volume of thermal energy sold increased by 3.3 times and 4.1 times, respectively, compared to 2006. This increase was provided by the increase of state investments in the field of heat supply in recent years and the transfer of existing boilers to the balance of "Azeristiliktechizat" OJSC.



İstilik enerjisinin ehtiyatı -Thermal energy reserve; satılan məhsul - product sold

Pic. 1. volume of thermal energy generated and sold in “Azeristiliktechizat” OJSC (2006=100).

Source: Compiled by the author on the basis of materials of “Azeristiliktechizat” OJSC.

The share of thermal energy reserves formed at Azeristiliktechizat OJSC due to its own production increased from 87.8% in 2011 to about 92% in 2015 and amounted to 91.0% in 2019. Such growth was mainly due to the growth of the company's domestic production.

During 2011-2019, the volume of imported thermal energy increased 1.5 times, while domestic production increased 2.2 times. This was due to the implementation of measures to limit the coverage of central heat sources and the gradual abolition of local boilers. In general, the share

of “Azeristiliktechizat” OJSC in the total volume of thermal energy produced in the country increased from 61.7% in 2011 to 75.4% in 2014, to 79.4 percent in 2015, in 2017 it was 86.5 percent.

In 2019, the heated residential area for the population increased by 4.2 times compared to 2006, the heated volume increased by 1.4 times for budget organizations, and 2.8 times for self-supporting enterprises.

Table

Therman supply to consumers by “Azeristiliktechizat” OJSC

indicators	Years										
	2006	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Population											
heated living area, 1000 m ²	1269,3	2021,8	2689,6	3072,3	3601,5	3632,5	5318,5	5340,9	5417,0	6223,4	6584,1
hot water per person, person	4397	5945	6808	6556	12592	27593	32304	31123	30069	27644	27285
hot water per meter, m ³				51874,8	107636	284498	347669	545034	544441	720270	689341
Budget organizations											
heated volume, 1000 m ³	4978,6	6837,7	6973,2	6560,7	6541,7	6416,5	7182,7	6982,3	6472,2	6881,9	6960,8
hot water, Qcal	3854,4	5482	8861	7548	7103	6919	4611	5296	2336	2545	1391
hot water per meter, m ³									775	4153	3677
Self-employed organizations											
heated volume, min m ³	100,8	50,3	53,1	60	74	88,3	138,1	126,1	169,5	266,7	282,2
hot water, Qcal	167	168	211	124	112	242	297	448	153	221	388
hot water per meter, m ³									2119	4770	8740

Source: Compiled by the author on the basis of materials of “Azeristiliktechizat” OJSC.

In recent years, the country's central heating system has been provided mainly by Baku. Thus, the share of Baku in the total number of boilers of “Azeristiliktechizat” OJSC increased from 53.0% in 2004 to 64.5% in 2018 and to 64.3% in 2019. The residential area covered by "Azeristiliktejhizat" OJSC in Baku is 5387,000 sq.m, and this is about 20% of the general residential area. Meanwhile, if we take into account that the average heat consumption per resident

in the heating season is about 1.9 Gcal, then the total heat energy required in Baku is about 4750 thousand Gcal. From this point of view, the company's current market share in the Baku heat supply market is about 30 percent. Also, the share in Sumgayit is less, about 10 percent. In this case, "Azeristiliktejhizat" OJSC has a great opportunity to increase its market share in the sale of thermal energy by the centralized heating in major cities of the country. However, in recent years, the number of facilities supplied by Azeristiliktechizat OJSC in other regions has also increased. As a result, the share of heated buildings in the regions in the 2004-2005 season increased from 0% to 22.0% in the 2015-2016 season, in the number of schools increased from 30.1% to 36.3%, and in the number of kindergartens from 10.7% to 22.9%, respectively.

4. Tariffs for the sale of thermal energy by heat supply companies to consumers should be determined taking into account all the conditions for their cost and profitability;

The sale of thermal energy plays a key role in the formation of revenues of Azeristiliktechizat OJSC. Thus, in 2006-2019, such an increase in heat sales was 5.3 times, while in hot water this figure was 33 times. However, , production costs in society exceeded sales revenues by 6.6 times in 2014, 5.6 times in 2015, 4.7 times in 2016, and 4.3 times in 2019. As a result, the total loss of the joint-stock company increased from 39830.3 thousand manat in 2014 to 48300.1 thousand manat in 2019, respectively. In 2019, 57.9% of this loss was covered by subsidies from the state budget.

Debts of Azeristiliktechizat OJSC have been increasing in recent years. Thus, the company's debts in 2014 amounted to 9.8 million. manat, and in 2016 - 12.5 mln. manat, in 2019 - 14.6 mln. manat increased. The reason for the loss-making operation of Azeristiliktechizat OJSC is mainly due to low tariffs for its services and high production costs. In addition, the non-measurement of thermal energy and hot water supplied to buildings does not allow an accurate assessment of the qualitative and quantitative aspects of the company's activities. Such measurement and lack of control mechanism does not allow to accurately estimate the losses in the process of production and transmission of thermal energy, and the amount of energy received by buildings.

As the thermal supply sector is a natural monopoly, tariffs in this area in Azerbaijan are set by the Tariff Council operating under the Ministry of Economy. At present, the tariffs for thermal energy provided by "Azeristiliktechizat" OJSC are 1 sq.m. 0.15 manat per month for living area, 0.25 manat for 1 cubic meter of heated volume for non-residents or 30 manat for 1 Gcal. It should be noted that the current tariffs were approved by the Tariff Council on November 24, 2011, which is the first change in tariffs since 1996. The stability of thermal energy tariffs in the context of a significant increase in prices in 1996-2011 was one of the factors limiting the development of this sector. Also, the calculation of tariffs per capita or heated volume or living area does not stimulate the thermal supply company to improve the quality of service and minimize losses in the process of heat production and distribution. This does not encourage consumers to use thermal energy more

efficiently. On the other hand, the technical level of heating systems of Azeristiliktechizat OJSC limits the use of measuring devices. According to the decision of the Tariff Council, the tariff for 1 Gcal of heat energy for non-residents (the highest tariff among consumer groups) is set at 30 manat, while the cost of selling 1 Gcal of heat energy in a joint-stock company in 2015 is 38.9 manat, in 2019 it was equal to 44,4 manat. As already mentioned, the cost of sales at the current tariffs on “Azeristiliktechizat” OJSC was 15.2% of production costs in 2014, 17.8% in 2015 and 23.2% in 2019.

5. Prospects for the development of the heat supply system in the country should be identified and implemented in the context of the strategic development of the country, as well as the development of fuel and energy complex, communal infrastructure, housing and communal services, in general, urban planning taking into account technical, technological, economic, social, legal, environmental and security factors. "Azeristiliktejhizat" OJSC should be produce 1660.8 thousand Gcal at least on the account of 198.9 million m³ natural gas in 2019, but it produced 1446,4 thousand Gcal or 214,4 thousand Gcal in total and it also produced less thermal energy as 13% of the thermal energy production. If the received gas is used efficiently, it is possible to earn more than about 6.4 million manats. For this, there is a need to renew heat production sources.

One of the priorities in the development of this sphere in the country is the replacement of district heating boilers with modern technology-based local heating systems and the establishment of local heating stations in order to reconstruct heat sources. Although the energy efficiency of buildings is not within the company's authorities, the losses in heat sources and the heat supply network are within its scope of activity. Currently, the company has a significant number of old boilers that is why, there are radiation losses. Losses in chimneys are the main source of losses in heat sources. In older boilers, the ability to properly regulation opportunities of the temperature is limited, and this increases the loss of heat through the chimneys. Therefore, in order to reduce these losses, the company needs to continue to replace old boilers with new ones.

In general, the Consumer Specific Heat Consumption (SPI) indicator can be used as one of the indicators to appreciate the company's activity efficiency.

$$SPI = Q_i / (S * (20 - t_m) * \dot{I}D)$$

Here, t_m – average temperature during heating;

$\dot{I}D$ – duration of the heating period;

Q_i – heat given to the heated area;

S – Common heated area.

This indicator shows the amount of heat supplied to heat 1 sq.m to 1⁰C per day. We take into

account that the average temperature in Baku during the heating season is about 5⁰C, and the heating period is 150 days (5 months*30 days), it was determined that this figure was the highest in Baku compared to other cities. This case is due to both the low energy efficiency of the buildings and the losses in the heating network, as the temperature is currently controlled only at the boiler room exit.

It should be noted that both heat loss and water loss occur in the heating network of "Azeristiliktejhizat" OJSC. According to the standard, the water loss is 0.1 t/km per km, while for the company this figure is about 0.26 t/km-hour. In 2018, the total water losses in the company amounted to 790.0 thousand cubic meters, which is about 486 thousand cubic meters more than the norm. In 2021, the cost of non-population water loss in excess of the norm with water tariffs will be about 486,000 manats. In this case, along with water loss, there is also heat loss. Thus, due to water loss, the company lost about 42,660 Gcal of heat energy in 2018. Calculations conducted in accordance with the above estimates show that due to excessive water loss, about 26244 Gcal of heat energy was lost, which is equal to about 654,6 thousand manats. As can be seen, the company loses about 1140,6 thousand manats annually as a result of water loss.

Modernization of the material and technical base of Azeristiliktechizat OJSC is an important step in terms of reducing production costs. Thus, about half of the company's production costs are related to the gas purchase costs. In the current legislation, by connecting directly to the main gas pipelines, taking into account the application of certain discounts on the sale of natural gas to enterprises consuming natural gas for production purposes (provided the monthly consumption is not less than 10 million m³), the possibility of Azeristiliktechizat OJSC with an average monthly consumption of more than 16.5 million m³ to take advantage of this discount should also be considered. It should be noted that it is possible to save about 1118.6 thousand manats per thousand cubic meters of gas per month, excluding VAT, and about 13423.7 thousand manats per year. This can be calculated as follows:

$$((200 \text{ man.}/1000 \text{ m}^3 - 120 \text{ man.}/1000 \text{ m}^3) \times 16,5 \text{ mln. m}^3) / 1,18 \times 12 \text{ months} = 13423,7 \text{ thousand manats.}$$

Due to the poor technical condition of the company's heat supply lines and distribution station, the water circulating in the boilers is supplied directly to the radiators of consumers without heat exchangers. This leads to an increase in electricity consumption.

In addition, the modernization and replacement of the existing heating network and pumps in the company will lead to significant savings in electricity consumption. At present, the chemical and aluminum industries, steel smelting enterprises based on mining ore, where the power supply is carried out directly by 35 and 110 kWh lines, the daily load demand is stable, the average monthly energy consumption for production purposes is not less than 5 million kWh. 1 kWh of electricity

costs 5.8 kopecks in the daytime (from 08.00 to 22.00) with VAT, and 2.8 kopecks at night (from 22.00 to 08.00). Thus, if we take into account that in 2019, 56434.0 thousand kWh of electricity was received and the bulk of energy consumption was carried out during the 5-month heating season, then the application of this discount to the company will have a significant impact on reducing production costs. Therefore, currently, the tariff for non-residents is 9 kopecks per kWh-hour. Taking into account the above mentioned, the savings in production costs from this source are as follows:

$$56434,0 \text{ thousand kWh} \times (9 \text{ kopecks} - 4,3 \text{ kopecks}) / 1,18 = 2247,8 \text{ thousand manats.}$$

As can be seen, the purchase of electricity by Azeristiliktejhizat OJSC at relatively low tariffs may cause a decrease about 2,247,8 thousand manats.

Heat losses from distribution in the company are the largest losses in the supply chain. The fact that the distribution network is laid underground and consists of steel pipes with polyethylene-insulated polyethylene lining significantly reduces heat loss.

Non-regulation of the quantity and quantity-quality aspects of the heat carrier at the subscriber (consumer) level has negative consequences both in terms of consumer satisfaction and additional heat energy consumption. Thus, in the event of a change in air temperature, the failure to regulate the temperature at the subscriber level causes the buildings to be either cold or hot. However, to ensure this regulation, the company needs to establish intelligent management and dispatching systems. Keeping records of the thermal energy actually consumed by consumers and paying its cost according to the actual volume of consumption will allow to ensure transparency in this area, to evaluate the company's performance on the basis of results. It also encourages consumers to save energy and implement energy conservation measures in buildings. . From this point of view, it would be expedient to install heat regulators in buildings connected to the central heat supply network.

One of the important directions in ensuring the activity of “Azeristiliktechizat” OJSC in the direction of demand is related to the mode of operation of the heating network. Thus, currently the company's heating network operates in a radial mode, and consumers receive heat energy from only one direction. In this system, the backup power is located together with the main source of heat supply, and the use of this backup power is eliminated when the network is damaged. In developing countries, on the other hand, they use a cyclic mode, in which case several heat supply sources operate in parallel in a single network, as a result of which the consumer can receive heat energy from several directions.

Currently, the supply network for the supply of thermal energy to consumers does not meet modern requirements, and in this regard, the use of heat shielding pipes can limit thermal energy

losses. The construction of the heating network is relatively investment-intensive and should be linked to the plan of the area where the heating network will be installed. In such conditions, the service life of such a network plays an important role in terms of the efficiency of the heating system. The total length of the heating network in Baku is 835 km, more than 50 percent of the pipes have been in operation for more than 30 years. Old pipes cause heat and water losses.

While the service life of the current network is about 30 years, the service life of the heating network consisting of polyurethane-insulated polyethylene-lined steel pipes laid underground is about 50-100 years. The use of such pipes reduces the risk of damage to the network pipes by 80 percent, and losses in the network by 2-3 times. The application of such pipes allows the use of operational-remote control system of insulation. In this case, the damage to the pipes is determined by locators, and the accuracy of leak detection is between 0.5-1.0 m.

Keeping records of the thermal energy actually consumed by consumers and paying its value according to the actual volume of consumption will ensure transparency in this area, which will allow the company to evaluate its performance on the basis of results. It also encourages consumers to save energy and implement energy conservation measures in buildings. From this point of view, it would be expedient to install heat regulators in buildings connected to the central heating supply network.

6. Organization of heat supply enterprises on the basis of market principles requires the creation of a healthy competitive environment in the market of heat supply services, the introduction of a flexible tariff mechanism, the improvement of the financing mechanism in this area, increasing investment attractiveness. There is a need to restructure Azeristiliktechizat OJSC. This is because the low technical level of production reduces the importance of measures to be taken to improve the organization of production, labor and management in the company. From this point of view, large-scale investments are required to develop the company and increase the technical and economic level of heat supply. This is because the low technical level of production reduces the importance of measures to be taken to improve the organization of production, labor and management in the company.

At present, no tariffs have been set for connection of subscribers to the heating network of Azeristiliktechizat OJSC. The lack of such tariffs makes it difficult for new buildings to be connected to the district heating network. In our opinion, different approaches can be used to determine the tariffs for connecting subscribers to the heating network. Therefore, the correct definition of the methodology for calculating tariffs for connection of subscribers to the heating network is one of the important issues in terms of the development of centralized heating supply.

According to calculations, if we take into account the internal heating network of the 400-apartment building complex and the work efficiency quantity of the boiler house, then the

centralized heating supply of the building can be about 30-40 percent cheaper than individual supply. From this point of view, "Azeristiliktejhizat" OJSC can take measures to connect new buildings to the centralized heating supply on a commercial basis or to provide services to them by building boiler houses under them.

However, today in our country, including Baku, the cost of natural gas used to heat an apartment is even higher than the cost of heating with a combined heat and power system. This is related to the company's internal losses and the fact that the gas tariff for non-residents is twice the tariff for the privileged part of the population.

Table 2.

Comparison of different sources of heat supply of apartments

Indicators	"Azeristiliktejhizat" OJSC	Combi	Conditioner	Power heater
Annual heating rate (Gcal/m ²)	0,118	0,094	0,094	0,083
Apartment area (m ²)	80	80	80	80
Annual heat consumption (Gcal)	9,4	7,52	7,52	6,64
Gas consumption (m ³)	1260,9	1080		
Cost of gas (man.)	252,18	108		
Electricity consumption (kWh)			3300	8000
Cost of consumed power energy (man.)			297	720
Investments (man.)		1600	2400	100
Share of investment in thermal energy production		60%	50%	100%
Life time (year)		12	12	10
Maintenance costs (man.)		25	15	0
Annual depreciation expense (man.)		80	100,0	10
Consumer costs for apartment (man.)	60	213	412,0	730
Consumer cost of 1 Gcal of thermal energy (including VAT man./Gcal)	6,4	28,3	54,8	109,9

Source: Compiled by the author.

In our opinion, the company should gradually increase the feasibility of production by providing heat supply of new building blocks on the basis of modern technologies. It can also provide heat supply to additional state facilities by "Azeristiliktejhizat" OJSC. This leads to both large-scale savings and a positive impact on the efficiency of production and economic activities of society.

It would be expedient to implement this on the basis of certain projects. Such projects should reflect the plan for the modernization of these facilities and the sources of funding for this modernization. . In many cases, the transfer of heating equipment to the company, which is on the balance of such facilities, has a negative impact on the efficiency of its production and economic

activities.

In recent years, the source of cash flows in Azeristiliktechizat OJSC has been the state budget. These flows were formed mainly due to investments from the state budget and subsidies for current expenditures. Given the growing debt of the joint-stock company and uncertainty about the amount of funds to be allocated from the budget, there are certain difficulties in formulating the company's development strategy. At the same time, the company's ability to ensure financial health and long-term development through tactical steps is limited. On the other hand, a comparison of the costs and revenues of a joint-stock company shows that its ability to raise funds on a commercial basis is limited.

7. Improving the management mechanism in the heat supply system requires taking into account not only technical and technological aspects, but also economic, social, legal and security issues. At present, the company's management structure is mainly focused on the implementation of tactical tasks and performs the functions of production and distribution of thermal energy. It is necessary to adapt such a structure to the principles of strategic development. From this point of view, it is necessary to develop a development strategy of “Azeristiliktejhi-zat” OJSC with the participation of the government and, in this connection, to establish a strategic planning and development department in the joint-stock company.

In general, there is a need to improve the management structure of Azeristiliktechizat OJSC. The company can move to a two-tier management structure. At the first level, the powers for planning and allocation of economic resources are centralized, strategic decisions are made, and conflicts that may arise between the structural elements of society are managed. At this level, a head company is created and these functions are performed by this company. At the second level of management, a product-based organizational structure is created in the regions. Enterprises established at this level carry out marketing management, creation, production, sales and control of services. This not only increases management flexibility, but also allows for better adaptation to local requirements.

On the other hand, the establishment of subsidiaries by the head company is a matter for the stakeholders in the ownership and management of those companies (municipalities, large heat consumer enterprises, etc.). creates favorable conditions for participation. Establishment of subsidiaries will allow linking the heating system with the development of individual regions. Thus, the construction of the heating network is related to the planning of the area.

In addition, according to the Charter of Azeristiliktechizat OJSC, the company's supervisory board and management board should be established. In our opinion, the powers of the company's board of directors are broader than the powers of its supervisory board. In this case, it would be expedient to define some of the board's activities, the structure and staffing of the company, the

level of wages in coordination with the Supervisory Board. In addition, it is advisable to expand the board to at least five people.

At present, one of the important ways to improve the management mechanism of Azeristiliktechizat OJSC is to focus on providing comprehensive services to customers. From this point of view, at the current stage of development, the society should not build to diversify its activities, but to expand the geographical scope of its services, to increase the range of services related to the supply of thermal energy. In view of the above, it is expedient to establish a subsidiary under the company to provide additional services related to the supply of heat and hot water to consumers.

At the same time, “Azeristikliktechizat” OJSC spends a lot of money during the year to prevent water leaks in the event of an accident in the low distribution and indoor heating systems of residential buildings. Carrying out these non-social activities in order to prevent the loss of softened water in the network further complicates the already unsatisfactory financial situation. For this purpose, it would be good to establish paid services or to include these services in the tariffs.

At present, the company does not carry out significant work in the field of modernization of the internal heating network of buildings. In our opinion, if the consumption of thermal energy is not measured, it would be expedient to provide certain discounts to consumers who use modern devices that allow to save energy in existing buildings. In addition, the company must inform consumers about new devices and create opportunities for their purchase.

One of the main issues to be considered when determining thermal energy tariffs is the consumption of thermal energy by the consumer at the time of delivery. In this case, an accurate calculation of the fixed costs of the heat supply company and the variable costs incurred during the year is required to determine the tariffs. In this regard, the application of one-component and two-component heat tariffs should be clarified.

As a result of the transfer of indoor heating systems to the entrances, it would be possible to install individual meters and not to interrupt the heat supply to individual apartments, provided that they do not interfere with other neighbors individually. In order to increase the level of payment for utilities that cannot be stopped individually, it is possible to establish single collection centers under ASAN utility centers or separately. In this case, each apartment is given a single code for all utilities, and if the service fee is not paid in full, the utility supply (for example, electricity), which can be stopped individually, is stopped and the apartment is forced to pay.

The main provisions of the dissertation, the results obtained and suggestions are reflected in the following published articles and theses of the author:

1. Methodological issues of assessing the economic efficiency of economic activities in heat supply enterprises // - Baku: News of the Azerbaijan National Academy of Sciences, Humanities

series, - 2015-6 (November-December), - p.40-48.

2. Some issues of formation of organizational-economic mechanism of management in heat supply enterprises // Scientific news of Azerbaijan State University of Economics, 2015, Year: 3, Volume 3, October-December, - p. 98-108.

3. Evaluation of the management mechanism in heat supply enterprises // Materials of the Academy of Public Administration under the President of the Republic of Azerbaijan, Scientific-Practical Conference of PhD Students and Dissertants, - Baku: - 2016, - p.172-179.

4. Formation and activity features of the heat supply system // Nakhchivan branch of the Azerbaijan National Academy of Sciences, News, Social and humanitarian sciences series, - 2016. №3, -p.348-358.

5. Theoretical aspects of the formation of thermal energy tariffs // Materials of the XX Republican Scientific Conference of PhD Students and Young Researchers of the Ministry of Education of the Republic of Azerbaijan, - Baku: Volume I, 2016, - p.387-389.

6. Development of heat supply schemes and their efficiency. Institute of Economics of the Azerbaijan National Academy of Sciences, Scientific works, - 2017-4 (July-August), - p.78-83.

7. Features of the development of the heat supply industry in Azerbaijan // Economy and Entrepreneurship, - 2017. No. 7 (84), - pp. 354-357.

8. Improving the economic activity of heat supply enterprises in the conditions of market relations // Ministry of Labor and Social Protection of Population of the Republic of Azerbaijan, Scientific Research and Training Center for Labor and Social Problems, Collection of Scientific Works, 2018. №1 (21), - p.125-131 .

9. Prospects for the development of the heat supply system in the Republic of Azerbaijan - as one of the goals of the Strategic Road Map // Azerbaijan Cooperation University "Cooperation" scientific-practical magazine, - 2018. №1 (48), - p.236-242.

10. The main directions of improving the heat supply system in Azerbaijan // "Global scientific potential" scientific and practical journal, - 2018. No. 3 (84), - p. 102-104.

The defense of the dissertation will be held on 18 June 2021 at 13⁰⁰ at the meeting of the Dissertation Council FD 2.22 acting under the Azerbaijan State University of Oil and Industry.

Address: 16/21 Azadlig Avenue, Baku, Azerbaijan, AZ 1010

The dissertation is available in the library of the Azerbaijan State University of Oil and Industry.

Electronic versions of the dissertation and abstract are posted on the official website of the Azerbaijan State University of Oil and Industry.

The abstract was sent to the necessary addresses on 18 May 2021.