

RESEARCH ARTICLE

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Project Management in Strategic Planning of Enterprises at the Present Stage

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Abstract

In this article, the authors consider project management in the strategic planning of energy industry enterprises. The purpose of the article is to analyze and calculate indicators in order to identify the effectiveness of energy enterprise modernization. The authors thoroughly analyze the literature review on project management in the enterprise's strategic planning. The authors also revealed that strategic planning in the project management framework is considered a dynamic set of six interrelated management processes that logically follow each other. Results: the authors calculated the degree of factors influenced to identify the decreased degree in the enterprise efficiency by the method of chain substitutions. As a result, heat energy was underdeveloped due to the reduction in the number of operation hours of boiler units. As a result of the conducted research, it was revealed that a change in the values of the main factors, namely the number of boiler units operating and due to heat losses from external pipelines affecting the production process, entails a change in the generated power of boilers, the amount of load and the valuable heat released, and hot water transferred to the consumer. Conclusion: the presented data and their analysis make it possible to effectively assess that a well-chosen and successfully implemented business management strategy is the key to its effective functioning in a market economy. Of course, a good strategic plan and its good execution do not guarantee that the company will be able to completely avoid periods of recession and uncertainty.

Keywords: Project Management, Strategic Planning, Enterprises, Sustainable Development, Factors, Modernization, Enterprise Goals, Resources, Analysis, Economic, Business

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1. INTRODUCTION

Ensuring energy security is one of the main tasks. The pace of energy consumption in Kazakhstan is growing from year to year. However, the new energy sources being launched must match the growth rates. The country's development directly depends on the stability of the energy industry. Kazakhstan is one of the most energy-intensive countries in the world. Kazakhstan's economy is 3 times more energy intensive compared to the OECD countries. Even though the services sector occupies the leading share in the structure of our GDP. This suggests that fixed assets and equipment at industrial enterprises do not meet the modern standards of the OECD and other advanced countries. Often there is an imitation and not a fundamental modernization of the fixed assets of our industry (Akorda, 2021). Therefore, today it is essential for the country to modernize energy enterprises, which is carried out within the framework of project management in strategic planning at the enterprise.

Today, strategic planning development is one of the most critical tasks for a top manager. Strategic planning provides the basis for all management decisions. The organisation's functions, motivation and control are focused on the strategic plans development. The dynamic process of strategic planning is the umbrella under which all management functions are sheltered; taking strategic planning advantage is necessary for organizations and individuals to assess corporate enterprise's goals and direction.

Today, project management is a set of tools and methods of effective management at the enterprise, which differs from the traditional management model in flexibility and consistency. It is worth noting that today the technology of project implementation should be based on the effective use of material, labor and financial resources and rational management decisions to ensure the most excellent effectiveness in project management (Polunin, 2020; Tumpa, 2023).

Strategic planning is becoming increasingly relevant for Kazakhstani enterprises that conduct or seek to conduct a fierce competition, both among themselves and with foreign corporations. At the same time, a feature of the strategic approach will be the ability to combine specific goals of the enterprise into a single, all resources divided by activity type during the production process implementation (Tatenko, 2017; Akbar et al., 2023). At the present stage, strategic planning is becoming increasingly important for Kazakhstani companies trying to compete aggressively both with each other and with foreign companies. Consequently, creating an enterprise's organizational plans is closely connected with adopting current and long-term decisions. The different solution is to optimize tasks and choose an effective action plan with resource constraints.

One of the significant directions contributing to an accelerated exit from a difficult economic situation is foreign experience study in project management of innovative processes with the further determination of its effective application in enterprises' practical activities. Since strategic planning is one of the most important tools that ensure the sustainable development enterprise and takes into account the combination of various business problems' interests and the identification and measures company's development, the development of various methods and programs, the development of projects by current needs and long-term development strategy in the company (Soltangazinov et al., 2019; Tanwar, 2022).

To date, much attention is paid in the literature to project management in the strategic planning of energy enterprises. Unfortunately, this topic has not been given attention in Kazakhstan for a long time. Therefore, one of the critical study aspects is effective project management from the point of view of strategic planning at the enterprise. The primary study aims to substantiate the transition of energy industry enterprises to methods based on strengthening innovation and investment activities using project management tools.

2. LITERATURE REVIEW

It should be noted that for a short period of time of the country's development, a sufficient number of domestic and foreign scientists' papers in business planning and strategic enterprise planning field have been written, which address the issues of project management in enterprises' strategic planning. At this point in time, "strategic planning" concept at the enterprise has become widespread. Strategic planning is one of the essential responsibilities of the enterprise's top managers. Since managers ensure the achievement of the company's mission, goals and objectives, achieving real advantages over competitors (Vorobyev, 2021). Today, analysing and assessing organizations' readiness to adopt strategic planning is a significant modern aspect of strategic changes. For example, Ansoff and Alferova wrote in their works that strategic planning is a set of interconnected management processes that logically follow one another. It is worth noting that for strategic planning, it is necessary to have feedback through the stage of evaluation and control of previous stages to establish inconsistencies (Alferova et al., 2018; Ansoff, 2009). To date, the success of the company depends on how well the choice and application of such methods are made, taking into account the changes at the moment and the near future of the company's work.

In the works of Fomchenkov and Katkalo, the concepts of strategy are considered from the evolution of strategic management theory (Fomchenkova, 2019; Katkalo, 2008), which ultimately changes analytical goals and objectives. At the present stage, this concept represents the unity of its content, process and context, including the possibility of creation and further development during the project implementation. It is worth noting that today the strategy and plan, which are characterized by goals, deadlines, degree of complexity, and one-off, can be defined as a long-term project with its characteristics (see Table 1).

TABLE 2. The main characteristics of the strategy as a project management object

Characteristic	Essence	Strategy as a project implementation
The sign of the final goal	Set of project goals	The strategy focuses on the company's mission and goals for the long term
Sign of changes	Transfer of the project from the current state to the desired one	The process of strategy development during its implementation
A sign of limited resources needed	The existing need of the costs enterprise of variable, monetary, material, human and information resources for the project implementation, where it is not always possible to accurately allocate	In the process of conducting a strategic analysis, the company's resources are evaluated, which are necessary to ensure the further development and competitiveness of the company in the long term.
A sign of consistency	The implemented project is a system of interrelated activities	A strategy is a dynamic system that contains the structure, the process itself, and the content
A sign of novelty	The project is characterized by uniqueness and singleness	Availability of unique solutions that are strategically important and ensure the competitiveness of the enterprise

Note: compiled by authors

In turn, Kirillova noted that the project approach in strategic planning is used with process, system and situational approaches. Within the framework of strategic planning, the process approach is a process of continuous actions in the company, which consists of control and regulation to achieve the goal. In turn, the system approach is a methodology for studying the external and internal environment, affecting the final goal's achievement. Also, it considers the

factors of influence from a single system (Kirillova, 2022). The situational approach allows for a more rational use of management methods, depending on the situation in the company.

In turn, Karkavin believed that "strategic planning is a set of actions and decisions taken by top managers that will lead to the development of strategies designed to achieve the goals set" (Karkavin, 2011). The fundamental principle of strategic planning is the principle from the future to the present, where the analysis of the company's prospects is of particular importance, in which the necessary trends, possible risks, opportunities, threats, force majeure that can change the established situation are established. Kurmayeva in her works, explores what is meant by the logic of strategic planning as an ordered sequence and the validity of procedures that are associated with solving planning problems, finding a starting point for making the necessary decisions: defining goals in the planning period, finding the initial level of company's development; determining the volume and structure of the company's needs in the planning period; consistency of necessary needs and resources on ranking basis and preparation of management decision projects (Kurmayeva, 2014).

Thus, many researchers note the importance of considering project management as part of strategic planning for an enterprise. Within the framework of this approach, many scientists note such standard characteristic features as a sign of unity, control, the evolution of strategic planning, the creation of possibility and further development, etc. However, it is worth noting that there are also differences in the consideration of project management within the framework of strategic planning at the enterprise; for example, ranking and preparation of management decision projects, some authors take into account ranking and preparation of management decision projects, etc.

2. METHODOLOGY

When writing the work, the methodological basis was the works of Kazakhstan and foreign scientists, whose works are devoted to the basics of the theory and practice of project management in the strategic planning of enterprises. This research is considered the example of LLP "NPP Sogrinskaya Teploelectrocentral". The enterprise main activity includes the process of electric production and thermal energy by a station with a combined generation scheme, also including the transmission and distribution of thermal energy to the end customer. The company carries out its work according to the thermal schedule. At the same time, the maximum load falls in winter. JSC Ust-Kamenogorsk Titanium-Magnesium Combine, a non-ferrous metallurgy enterprise (96%), can be attributed to the primary customer of electric energy.

The chain substitutions and indexes method determines the degree of primary factors influence acting as multipliers. The essence of the chain substitution method is that when determining the absolute influence of a factor, its reporting and planned values are compared with the reporting values of previous factors and the planned values of subsequent ones. At the same time, the factors are arranged in a certain sequence following their significance: first, quantitative, according to the priority of the influence on the result, and then qualitative, according to the priority of the influence on the factor. When calculating the degree of factors influence, it is necessary to take into account this requirement (Samsonov, 2012).

The calculation of the degree of factors influenced by the method of chain substitutions is carried out in the analytical Table 2.

TABLE 2. Working form for calculating the degree of primary factors influence on the generalizing indicator of the production program

Name of indicator s,	Sy mb ols	Initial data	Calculation of absolute influence	Calculation of relative influence
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units of measurement		plan	report		
Factor 1	P_u	P_u^P	P_u^0	$\Delta E_{El(P_u)} = (P_u^0 - P_u^P) * Ch^P * (1 - K_p^P)$	$J_p = \frac{P_u^0}{P_u^P}$
Factor 2	Ch	Ch^P	Ch^0	$\Delta E_{El(Ch)} = (Ch^0 - Ch^P) * Ch^P * (1 - K_p^P)$	$J_{ch} = \frac{Ch^0}{Ch^P}$
Factor 3	K_p	K^P	K_p^0	$\Delta E_{El(K_p)} = [(1 - P_u^0) - (1 - K_p^P)] * P_u^0 * Ch^0$	$J_{K_p} = \frac{1 - K_p^0}{1 - K_p^P}$
Generalizing indicator	E_{El}	E_{0El}^P	E_{0El}^0	$\Delta E_{El(P_u)} + \Delta E_{El(Ch)} + \Delta E_{El(K_p)} = \Delta E_{El}^0 - \Delta E_{El}^P$	$J_e = J_p * J_{ch} * J_{K_p}$ $J_p = \frac{E_{El}^0}{E_{El}^P}$
<i>Note:</i> compiled by authors					

Also, to identify the degree of decrease in enterprise's efficiency, an assessment of the calculation of the factors' influence degree by the method of chain substitutions was carried out. The sum of the absolute factors influences should be equal to the absolute change in the generalizing indicator ($E_{El}^0 - E_{El}^n$), which is produced by the factors' indices – this is the index of the generalizing indicator:

$$J_e = J_p * J_{ch} * J_k \quad (1)$$

Based on the data, conclusions were drawn about factors that have a significant impact on the change in the generalizing indicator. The authors also calculated the factors that determine the change in the release of heat energy:

$$\Delta E_{El} = \Delta E_p + \Delta E_{ch} + \Delta E_k \quad (2)$$

When writing the article, such methods as: empirical, abstract-logistic, economic-mathematical assessment, SWOT analysis were used, visual, graphical, statistical, etc. were also used in the study. The empirical part of the study consisted of analyzing the available enterprise's statistical information, which was then compared to whether they contributed to achieving the goals set.

3. FINDINGS AND DISCUSSIONS

Today, project management is a particular type of management that can be applied to managing project objects and other enterprise objects to one degree or another. It is worth noting that the formation of new opportunities and niches in the market is a temporary phenomenon - most projects have deadlines for creating and developing a specific product or service (Lyubushin et al., 2000; Shafiee et al., 2023). Therefore, strategic planning within the framework of project management can be considered as a dynamic set of six interrelated management processes that logically follow from each other. At the same time, there is constant feedback, and each process has an impact on the others.

LLP "NPP Sogrinskaya Teploelectrocentral" operates according to the thermal schedule. The maximum load falls on the winter period. The main consumer of electric energy is the non-ferrous metallurgy enterprise JSC "Ust-Kamenogorsk Titanium-Magnesium Combine" (96%). Consumers of thermal energy are JSC "Ust-Kamenogorsk Titanium-Magnesium Combine" – 68.8%, as well as the population, budget organizations and other consumers located in the residential settlements of Novaya Sogra, Solnechny and Raduzhny. Annual consumption is mainly accounted for by: JSC "Titanium Magnesium Plant" - 70%: in hot water - 112,750 Gcal, in steam - 97,000 Gcal; population - 59,964 Gcal - 25%; other -15,167 Gcal -5%.

The first steam boiler and turbine at the LLP "NPP Sogrinskaya Teploelectrocentral" were put into operation in December 1961, the final construction of the station, with the launch of the fourth boiler type E-160-14, was completed in July 1987.

The installed thermal and electrical capacity of the LLP "NPP Sogrinskaya Teploelectrocentral" is 315 Gcal or 1320 GJ/h and 50 MW, respectively. The available capacities are 216 Gcal and 50 MW, which are summarized in Table 3.

TABLE 3. LLP "NPP Sogrinskaya Teploelectrocentral", 2022

Indicator	Electric power, MW	Thermal power, Gcal/h
Design capacity	50	315
Installed capacity	50	315
Available power	60	216
<i>Note:</i> compiled by authors		

To identify the degree of decrease in LLP "NPP Sogrinskaya Teploelectrocentral" efficiency, we will perform calculations using the method of chain substitutions the degree of factors influence according to formula 1.

$$E_{EI}^P = 216 \text{ Gcal/h} \times 1597 \text{ h} \times (1 - 0,0306) = 334457,4 \text{ Gcal};$$

$$E_{EI}^0 = 216 \text{ Gcal/h} \times 1552 \text{ h} \times (1 - 0,03572) = 323322 \text{ Gcal}.$$

The total deviation for the release of heat energy was:

$$\Delta E_{EI} = 323322 - 334457 = - 11135 \text{ Gcal}$$

That is, it is possible to observe a decrease in the release of heat energy. Now let's determine the factors that determine the change in heat output according to formula 2. It is also necessary to determine the absolute effects of each factor:

1) at the expense of P_u :

$$\Delta E_p (P_u) = (216 - 216) \times 1597 \times (1 - 0,0306) = 0$$

As a result, it is worth noting that neither growth nor decrease in installed capacity is observed in the organization.

2) by changing the number of hours of operation of boilers H:

$$\Delta E_h (H) = 216 \times (1552 - 1597) \times (1 - 0,0306) = -9422,568 \text{ Gcal}$$

Thus, due to the reduction in the number of hours of operation of boiler units, there was an under-production of thermal energy.

3) due to changes in losses in heating networks K_p :

$$E_k(K_p) = 216 \times 1597 \times (1 - 0,03572 - 1 + 0,0306) = -1713,15 \text{ Gcal}$$

4) total deviation for thermal energy:

$$0 - 9422,568 - 1713,15 = - 11135,8 \text{ Gcal}$$

Thus, the reduction ΔE_{EI} it occurred by reducing the number of boiler operating hours (by 9422.568 Gcal) and increasing the number of losses in heating networks (by 1713.15 Gcal). As a result of the combined influence of factors, there is a general decrease in the usefully released heat energy by 11135 Gcal.

As a result of the conducted research, it was revealed that a change in the values of the main factors, namely the number of boiler units operating and due to heat losses from external pipelines affecting the production process, entails a change in the generated power of boilers, the amount of load and the valuable heat released and hot water transferred to the consumer.

Already today, with the latest examinations on hand, it is safe to say that the turbine unit № 1 will not pass the metal control tests. The consequence will be a ban on further operation of the turbine unit. Decommissioning of turbine unit № 1 will reduce the volume of electric energy production by more than 40%. Without doing anything, the station will be forced to continue working on one turbine unit № 2 without possibly putting it into repair, which significantly reduces the station's reliability, especially in winter. In turn, turbine unit № 2 currently has an excess of the park resource by 29 thousand hours and insufficient data on the control of the metal of the main parts.

Given the current situation with the leading equipment, the only way out is the new turbine unit's construction of greater capacity by replacing generating equipment and part of the auxiliary equipment. Therefore, based on the results, replacing the turbogenerator № 1 with a PT-40/50-90/10 turbogenerator was decided. Also, before the new turbine unit is put into operation, it is planned to reconstruct the boilers in order to bring their capacity to nominal. This will be the first stage of replacing the equipment of LLP "NPP Sogrinskaya Teploelectrocentral". After the replacement of the turbine generator № 1, it is planned to carry out the second stage of equipment replacement within the framework of which an analysis the thermal and electric energy market will be carried out and, depending on analysis' results, a decision will be made on the station's further development strategy. This may be the replacement of the turbogenerator № 2 with a turbogenerator of the PT or P type, or a decision to restore the boiler № 4 if the possibility of selling thermal energy increases.

Project advantages:

- The safety of people and power plant equipment is ensured
- The risks of social and political pressure are excluded, since when turbine № 1 is put out of operation in winter, there is thermal power shortage within 30%. This will negatively affect the heat provision in winter to 4,000 subscribers (about 12,000 people) receiving heat from the station, as from a monopolist, as well as other heat consumers.
- Repair costs will decrease from 0.05 tenge/kWh to 0.02 tenge/kWh.
- A modern fire extinguishing system will be installed on the new turbine unit, increasing the facility's fire safety due to the possibility of early fire detection and higher efficiency in fire elimination.
- Installing a modern microprocessor protection system and a vibration monitoring system for the turbine unit will minimize the risk of prolonged equipment failure in an emergency.

- Due to the use of modern systems and a user-friendly interface will simplify the operator's work and reduce the time spent on managing the turbine unit.

- The use of modern technologies will increase the inter-repair turbine unit period from 4 to 5 years.

- Switching to air cooling of the generator (instead of hydrogen-air) removes the need for oil shaft seals and the need to use hydrogen at the station, which leads to a reduction in fire hazard.

- The specific fuel consumption for electricity generation is reduced from 450 to 415 g.u.t. per Kwh.

Electricity generation is increasing from 240 to 277 million. Kwh per year without increasing emissions into the environment:

Eliminates the risks of receiving compensating tariffs from regulatory authorities in the future since the station already uses the marginal tariffs approved by the program of the Government of Kazakhstan "Tariff in exchange for investment".

List of equipment to be replaced:

1. Replacement of the turbine with a more efficient capacity of 40 – 50 MW;

2. Replacement of turbine auxiliary equipment "regenerative heaters, oil system, pipelines and fittings within the turbine";

3. Replacement of the DP – 225 high-pressure dearator;

4. Replacement of the generator with a more powerful 50 MW;

5. Installation of a modern generator excitation system;

6. Introduction of a modern automated process control system providing full control of all parameters of the turbine and generator technological process;

7. Complete replacement of relay protection devices and generator automation with microprocessor devices;

The payback period for full investment costs is 6.7 years from the start of the project.

Table 4 shows a SWOT analysis of the project for LLP "NPP Sogrinskaya Teploelectrocentral".

TABLE 4. SWOT analysis of the project

Strengths	Weaknesses
<ul style="list-style-type: none"> - Qualified personnel with special experience; - Experienced general contractor; - Strong owner control over subcontractors; - Powerful management tool (risk map); - Strong support from the Global Sourcing China team; - Strong support from AES senior management in Kazakhstan. 	<ul style="list-style-type: none"> - Language barrier; - Weak management of general contractors over local subcontractors; - A new/unfamiliar market for the general contractor; - Codes and standards.
Threat	Capabilities
<ul style="list-style-type: none"> - Getting work experience under an EPC contract; - Working with Chinese equipment suppliers; - Obtaining modern equipment and mastering new technologies; - Staff development. 	<ul style="list-style-type: none"> - Difference of cultures - Local laws and regulations - Busy schedule - Effects of TA-№2 - Transportation of equipment
<i>Note: compiled by authors</i>	

Thus, considering the current situation with the leading equipment, the only way out is to construct a new turbine unit of greater capacity by replacing generating equipment and part of the auxiliary equipment. Therefore, based on the results, replacing the turbogenerator №1 with a PT-40/50-90/10 turbogenerator. Also, before the new turbine unit is put into operation, it is

planned to reconstruct the boilers in order to bring their capacity to nominal. This will be the first stage of replacing the equipment of Sogrinskaya NPP CHP LLP. After the replacement of TG №1, it is planned to carry out the second stage of equipment replacement within the framework of which an analysis of the thermal and electric energy market will be carried out and, depending on the results of the analysis, a decision will be made on the further development strategy of the station. This may be the replacement of the turbogenerator №2 with a turbogenerator of the PT or P type, or a decision to restore the boiler №4 if the possibility of selling thermal energy increases.

After the SWOT analysis of the LLP "NPP Sogrinskaya Teploelectrocentral" project, we will consider the CHP's leading technical and economic indicators as a whole before and after the project implementation, the data of which are presented in Table 5.

TABLE 5. The main technical and economic indicators before and after the implementation of the project, 2022

No.	Name of indicators	Unit of measurement	Before the Project implementation	After the implementation of the Project of the station turbine unit No. 1	Including installation of the station turbine unit No. 1
1	Installed capacity				
	-electric	MBT	50	80	50
	-thermal	Gcal/h	293	293	171
2	Available power				
	-electric	MW	60	80	50
	-thermal	Gcal/h	220	220	171
	including turbine selections	Gcal/h	80	138	97
3	Type of fuel		Coal of the Karazhyr / Maykuben section		
4	Maximum hourly thermal load (calculated, excluding losses in t/s)	Gcal/h	68,0	97,0	70,4
	- in a pair	Gcal/h	7,0	7,0	6,0
	- in hot water	Gcal/h	61,0	90,0	63,0
5	Annual electricity generation, total,	million kWh	271,7	428,7	283,6
	including thermal consumption	million kWh	175,4	328,8	183,7
6	Electricity consumption for own needs	million kWh	49,7 (18,3%)	59,9 (14,0%)	28,4 (10,0%)
7	Annual electricity supply from tires	million kWh	222,0	369,0	255,0
8	Useful heat release from collectors, total,	thousand Gcal	319,4	450,0	310,0
	- in a pair	thousand Gcal	52,4	73,8	45,5
	- in hot water	thousand Gcal	267	376,2	264,5
9	Annual consumption of conventional fuel	thousand T.Y.T.	166,2	219,7	146,4
10	Specific consumption of conventional fuel				

No.	Name of indicators	Unit of measurement	Before the Project implementation	After the implementation of the Project of the station turbine unit No. 1	Including installation of the station turbine unit No. 1
	-for the released electricity	g/kWh	476,8	389,2	372,9
	-for the released heat energy	kg/gcal	189,1	169,1	165,3
<i>Note:</i> compiled by authors					

As a result, the results obtained during the work can be applied to solve a significant scientific problem of an applied nature. Also, the obtained research results play a significant role in identifying and promoting promising sectors of economic sciences.

This will improve the reliability of the plant, replace the equipment with more modern, and introduce advanced technologies into the process control system. It will also extend the main equipment's service life, significantly increasing the plant's role as a reliable energy producer in this region. Implementing such projects strengthens AES company's image as a responsible investor. It once again confirms that the corporation, in its activities, is guided by the principles of striving for excellence and fulfilling its obligations to the society in which it operates.

5. CONCLUSIONS

Thus, the presented data and their analysis make it possible to effectively assess that a well-chosen and successfully implemented business management strategy is the key to its effective functioning in a market economy. Of course, a good strategic plan and its good execution do not guarantee that the company will be able to avoid periods of recession and uncertainty altogether. It is important to remember that strategic planning is part of the management process, not a separate event.

It is also worth noting that a good strategy paired with successful execution does not guarantee that the company can avoid periods of recession and instability altogether. Sometimes it takes time for managers' efforts to lead to positive results. Nevertheless, it should be remembered that it is the responsibility of the manager to prepare the company's strategy for unexpectedly harsh conditions through prudent strategic planning – perhaps the essential part of strategic management. It should be remembered that planning is organically included in the management process and does not represent a separate event for two significant reasons. First, although some organizations cease to exist after achieving the goal for which they were originally created, many strive to prolong their existence as long as possible. Therefore, they redefine or change their goals.

Thus, the authors conducted a study on the example of LLP "NPP Sogrinskaya Teploelectrocentral". According to the method of chain substitutions of the degree of influence of factors, the degree of decrease in the efficiency of the work of LLP "NPP Sogrinskaya Teploelectrocentral" was revealed - a decrease in the supply of heat energy. As a result, it is worth noting that neither growth nor decrease in installed capacity is observed in the organization. It is also worth noting that due to the reduction in the number of hours of operation of boiler units, there was an under-production of thermal energy.

It is also worth noting that at the enterprise, the operation of a turbine unit in this condition can lead to the destruction of the turbine housing during operation, which, in turn, will entail, at best, the final failure of the turbine, at worst, people may suffer. Also, due to the wear and tear (moral and physical) of the turbine oil system equipment, turbine oil leaks occur periodically, increasing the risk of environmental safety, as well as the risk of a major fire at the station,

because there are many heated surfaces near the turbine. As a result of the combined influence of factors, there is a general decrease in the usefully released heat energy.

Given the current situation with the leading equipment, the only way out is to construct a new turbine unit of greater capacity by replacing generating equipment and part of the auxiliary equipment. The payback period for full investment costs is 6.7 years from the start of the project. The leading technical and economic indicators for the LLP "NPP Sogrinskaya Teploelectrocentral" are also given before and after the project implementation. This will improve the reliability of the plant, replace the equipment with more modern, and introduce advanced technologies into the process control system. It will also extend the service life of the main equipment, and significantly increase the role of the plant as a reliable energy producer in this region.

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