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WAYS TO IMPROVE ENERGY EFFICIENCY IN TEXTILE INDUSTRY

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Abstract
This article analyzes the main ways to improve energy efficiency in the textile industry. Enterprises will study ways of energy saving, optimization of technological processes and the possibility of using renewable energy sources.

Keywords: Textile industry, energy efficiency, energy audit, renewable energy, automation.

1. Introduction

The textile industry is one of the most energy-consuming industries globally. This network requires a huge amount of electrical and thermal energy in stages such as cotton cleaning, spinning, dyeing and sewing. Rising energy prices and increasing environmental concerns in recent years are pushing businesses to improve their energy efficiency. This article will cover the technical and management methods that can be applied in this direction.

2. Methodology

This study analyzed technical and economic approaches to improving energy efficiency in the textile industry. The research methodology includes the following key steps:

2.1. Preliminary analysis of energy consumption

Statistical data on the amount, sources and distribution of electricity and heat energy consumed in production processes of textile enterprises has been collected. On the basis of this process, the main energy consumers (e.g., motors, steam boilers, lighting systems, painting equipment) were identified.

2.2. Energiya auditi o‘tkazish

The state of existing technological devices and devices from an energy efficiency point of view was evaluated. During the energy audit process, the following was taken into account:

* efficiency of main technological lines;
* sources of energy loss;
* the degree of heat energy recycling;

*Operating modes and load coefficient of installed electrical equipment.

2.3. Taqqoslov tahlil

On the basis of energy-saving technologies and advanced foreign experience, a comparative analysis with the existing state was carried out. The energy saving obtained by using various energy-saving equipment (e.g. inverter motors, automatic control systems, LED lighting) has been determined.

2.4. Investment and economic efficiency assessment

The cost of investment, the amount of annual energy savings, the reduction in operating costs and the payback period (Payback period) for technological modernization and energy-saving measures have been calculated. The following formula was used for this evaluation:

2.5. Analysis of normative legal acts

Existing legislation to promote the use of renewable energy sources in the Republic of Uzbekistan, in particular, Resolution No. PP-57, tax incentives and subsidies were studied. The role these measures will play in improving energy efficiency was assessed.

3.Results

According to the results of the study, a number of technical and organizational measures to improve energy efficiency in the textile industry have yielded effective results. The following results are presented in main analysis areas:

The results of the preliminary audit conducted at the enterprises showed:

- 35–45% of electricity is generated by motorized devices (spinning, fabric weaving).
- 25–30% of thermal energy is spent on painting and drying processes.
- Lighting systems account for 8–12% of total energy consumption.

No	Event name	Expected energy savings	Required financial resources, in UZS
1	Replacement of 52 units of DRL-250-150 W lamps with 90 units of LED-40 W bulbs, [kWh]	9800	8 820 000
2	Replacing aging lamps with modern energy-saving lamps, [kWh]	2245	2 020 500
3	Gaz sarfi, [m3]	2641	2 401 025
4	Thermal insulation,[m3]	1818	1 200 000
5	Installation of kitchen solar collector (200 liters,[m3]	246	369 000
6	Shutting down one transformer T1 and T2 in KTP 1, [kWh]	25881	23 292 757
Total:			38 103 282

The installed technology reduced annual energy consumption by an average of 22%.
Results:
Savings in annual energy costs amounted to 140-180 million soums (on a medium-sized scale).
Operating expenses decreased by 10–12%.
Production capacity has increased by an average of 5–7% as modernized systems operate more reliably and more stably.
Greenhouse gas (CO_2) emissions have been reduced by improving energy efficiency. It is estimated that annual CO_2 emissions are reduced by 120–150 tonnes, which is a positive indicator for the environment.

4.Discussion

An integrated approach is needed to improve energy efficiency in the textile industry. Not only the replacement of equipment, but also the improvement of the management system, the establishment of energy monitoring, the training of employees and the use of renewable sources are among the main areas. Also, the provision of benefits and subsidies from the state will speed up the process.

5. Conclusion

Increasing energy efficiency in the textile industry increases the economic benefits of businesses and reduces the impact on the environment. Technological modernization, automation and attraction of renewable energy sources are important parts of this process.

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