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A Critical Evaluation of Energy Use in the Cotton Gining Industry

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ABSTRACT: In the article are given critical assessment results of energy use in cotton cleaning branch in Uzbekistan, and also the condition of account on energy resources of cotton cleaning plants. Analysis of state account on energy resources showed, that provision with instruments calculation of different kinds of energy is considered unsatisfactorily. The main deficiency is a weak adoption of automatized systems account on cotton cleaning factories and control expenditure of energy resources , established on the single facilities, and are used quite ineffectively and these systems take into account and regulate only the following parameters : power consumption, electric energy expenditure and thus are mainly used as informational.

KEY WORDS: electricity metering of automated systems, energy saving, energy resource, power, products, design parameters

I. INTRODUCTION

The analysis shows that at present, energy saving problems in industry are being solved with varying degrees of completeness, with a predominance of simplified methods.
These methods are based mainly on quantitative indicators of industrial enterprises in the production of final products, without studying the underlying processes of industrial production. As a result, in a number of cases, only those reserves of energy saving that are on the surface and reserves from the implementation of measures that do not require experimental and methodological instructions can be identified. More in-depth, comprehensive studies of power consumption processes are currently being carried out at a very limited number of enterprises. Naturally, this situation does not always make it possible to imagine the true value of energy indicators.

II. THE MAIN DRAWBACK IS THE POOR IMPLEMENTATION OF AUTOMATED SYSTEMS.

It should be noted that the currently adopted system for analyzing and monitoring energy indicators is quite primitive. For example, in many industries, analysis and control of energy indicators is carried out periodically, through special measurements for various periods of time. Naturally, such measurements cannot reflect the entire dynamics of changes in the calculated parameters and do not make it possible to identify the pattern of their changes.
In particular, studies conducted at a number of cotton gin plants have shown that with the existing organization of accounting for the consumption of energy carriers and energy resources, it is impossible to assess the real efficiency of their use and to reasonably normalize the consumption of energy resources.
An analysis of the state of accounting and control over energy consumption at cotton gin plants showed that, with rare exceptions, this issue remains practically insufficiently resolved. For example, the unsatisfactory situation that characterizes most factories is the instrumentation of the entire energy supply system. As a rule, all enterprises have commercial metering of electricity; as for metering of other types of energy, in many cases it is absent.
Accounting for energy resources in production units, energy-intensive units and processes also does not exist at all cotton gin plants. In addition, as a rule, there is no accounting for individual components of the technological process, such as hot air, water, etc. This leads to the loss of opportunities for proper distribution and accounting of energy resource consumption.
The main drawback is the poor implementation of automated systems for accounting and monitoring energy consumption at cotton gin plants, which are installed at individual facilities and are used very ineffectively. As a rule, these systems take into account and control only the following parameters: installed power, electricity consumption and are thus used mainly as information.

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III. EXPERIMENTAL AND STATISTICAL METHODS

A review of the current state of energy saving at cotton gin plants shows that this problem in most cases is solved without in-depth research and is devoted to solving specific problems of rationalizing energy use processes. In addition, the solutions obtained for individual particular problems cannot be copied for other enterprises, since each of them has its own specifics in terms of operating mode, manufactured products, inter-industrial relations, etc.

It should be noted that when developing priority measures, one cannot limit oneself to identifying and eliminating the causes that lie on the surface (overestimation of equipment power, idle operation of this equipment, irrational mode of electric lighting, etc.).

The energy intensity of a cotton gin plant, as the main indicator of the energy saving process, is a function of many variables associated with electrical, mechanical, thermal, organizational, physical and chemical, as well as other production factors that influence this indicator. Based on this, it is necessary to develop mathematical models that take into account any changes in both internal and external factors, allowing for the minimization of the energy component in the cost of products.

The standards existing at cotton gin plants, obtained by experimental and statistical methods, not only do not stimulate the rationalization of energy consumption, but also do not even stimulate the correct organization of accounting and control over energy consumption. The development of justified standards can be carried out only in the case when the entire set of data necessary for this has been identified. In addition to the correct organization of electricity metering, a detailed analysis of electrical loads and energy consumption by units, workshops and the enterprise as a whole, factors affecting the specific energy consumption must be identified, energy characteristics must be constructed, experimental data must be mathematically processed, etc. This work, as Lapitsky V.I. correctly points out. [1], should be carried out on the basis of a systematic approach with solving problems of optimizing the energy sector and rational use of electricity. Naturally, the implementation of such, in some cases, a significant amount of research requires certain monetary costs on the part of the enterprise to pay for the work of a research or other specialized organization, or even when this work is performed by the energy services of the enterprises themselves. Despite the fact that electricity rationing is a prerequisite for the proper organization of production, that it is a necessary prerequisite for the implementation of all energy saving measures, proper planning and forecasting, such a general assessment of the need for rationing is still insufficient. An operating self-supporting enterprise requires a specific assessment of the economic efficiency of each such work. This assessment should be based on the fact that the process of establishing scientifically based standards is associated, as indicated above, with the optimization of power consumption modes, i.e. identifying the main, potentially possible measures to reduce losses and unproductive costs of electricity.

IV. THE CALCULATION AND ANALYSIS OF THE SPECIFIC POWER CONSUMPTION OF A COTTON GIN PLANT

Considering that research related to the development of standards requires many years to complete, all costs associated with standardization should be reduced to the year preceding the start of the estimated year of implementation [2].

The issue of the efficiency of installation of devices, energy metering and development of standards should be addressed comprehensively, as a single event [3, 4].

However, speaking about the organization of accounting of all types of energy, it is necessary, in our opinion, to single out electrical energy from the general problem [3, 5].

The fact is that the authors of proposals for assessing the effectiveness of the organization of instrument metering rely mainly on examples of installing meters for metering the flow of water, air, gas, etc. These rather expensive devices require significant additional costs for installation and installation, especially in cases where they were not provided for by the project. Therefore, proposals for the economic justification of these works are legitimate.

The situation is different with electricity accounting. Calculated electricity metering is installed at the inputs of all cotton gin plants, without exception, and thus we can only talk about justifying the installation of technical (control) metering. This accounting, with rare exceptions, is already available in all workshops and energy-intensive units. In addition, at all substations for protection and measurement purposes there are current and voltage measuring transformers, which means that even if there is no technical metering of electricity somewhere, then there are all the conditions for installing a meter, and the costs for these purposes boil down to purchasing a meter. The effect from the implementation of measures to save electricity, identified in the process of research and development of standards, is accepted by us as a criterion for the feasibility of developing the entire complex of issues of standardization, and not just electricity metering, as indicated in [4].

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Very often, energy savings can be obtained as a result of purely technological measures (improvement of technology, installation of more productive machines, etc.) In this case, the electric power component of the overall savings should be taken into account.

It should also be noted that the proposal to compensate for the costs of rationing with savings from reducing specific electricity costs cannot always be used, because a correctly established norm may turn out to be higher than the actual one, due to the introduction of energy-intensive technology [6, 7]. In addition, specific power consumption may be close in value to the limit of the potential value [1]. Then there will either be no savings, or their magnitude will be very insignificant.

An important technical and economic indicator of the energy management of cotton gin plants is the specific energy consumption for production processes, workshops and enterprises. Correct assessment of specific electricity consumption by the method of mathematical statistics, determination of this indicator using methods of probability theory allows the use of progressive norms of specific consumption to predict energy consumption and determine the energy load during planning and design.

Meanwhile, the calculation and analysis of the specific power consumption of a cotton gin plant does not yet meet modern requirements, due to the fact that the energy intensity of cotton fiber by grade, technological modes and design features of units in this industry are not taken into account. In addition, raw cotton is produced using different technological schemes with different specific energy consumption depending on the composition of the technological units and the quality of the processed raw materials.

The calculations of the standards are not accurate enough and in some cases differ from the actual ones by 20% or more; there are no methods for adjusting the standards when production conditions and the type of raw cotton change.

In addition, there is no unified approach to choosing a unit of measurement for calculating and analyzing specific electricity consumption.

Thus, at cotton ginning plants there are no methods for a reasonable assessment of the analysis and calculation of electrical energy indicators, taking into account the specifics of the enterprise, its technological and operational characteristics.

V. CONCLUSION

As a result of the analysis of the state of the problem of saving energy resources at cotton ginning plants, it was established that, along with the existing experience in solving problems of energy saving in industry, the problem of reducing energy costs in enterprises, in most cases, is solved, as a rule, without in-depth studies of production processes, the necessary mathematical support and information and calculation base for the effective use of technical means.

A study of the energy performance of cotton gin plants with the identification of the dominant factors influencing the energy intensity of the products leads to a reduction in energy costs in production.

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