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ОАО "ШААЗ"

УГМК UMMC

Shadrinsky Automobile Units Plant

Shadrinsky Automobile Units Plant - is an enterprise of machine-building complex of Ural Metal and Mining Company. The plant is mostly engaged in production of automobile units: radiators for cooling systems of car engines and for heating systems of car cabins, heating and ventilation units, pre-start heaters, jacks, charge air coolers. Product range exceeds 200 positions and is supplied to Russian automobile factories and spare parts markets. Annual consumption of electricity is above 30 GWh, of natural gas – 23 mln.m^3.

Along with other enterprises of UMMC Holding, Shadrinsky plant joined the UNIDO project in January 2015 with a goal of implementing energy management system. In line with UNIDO methodology, international and Russian experts supported the enterprise in implementation of 4 stages of EnMS programme: Commitment, Planning, Implementation and Checking.

Actions towards EE increase prior to UNIDO project

Prior to EnMS implementation, the company has been continuously working towards improving energy efficiency. Hence, capital-intensive energy saving programmes were developed that included energy consumption analysis for 3 preceding years by specific indicators. With implementation of EnMS by UNIDO methodology, the enterprise started to apply system approach to energy management with a focus on identification of low-cost saving opportunities.

Energy management system implementation

Throughout EnMS implementation, along with ISO 50001 requirements, Shadrinsky plant applied UNIDO methodology in the following areas:

1. Application of regression analysis method to forecast energy consumption and to evaluate the impact of each of the production variables.
2. Inventory of energy users and identification of the most significant ones (SEUs).
3. Elaboration of Opportunity lists in relation to SEUs.

To outline EnMS scope, it is necessary to define, which energy resources of the enterprise will be analyzed. It was decided to work on electricity and natural gas consumption, whilst excluding water from analysis due to its low share in energy costs. Then, Significant Energy Users were identified for these energy resources. Together with UNIDO experts, company specialists identified the variables affecting those SEUs, tested and built regression models to analyze Energy Performance Indicators.

In the framework of EnMS implementation by UNIDO methodology, Shadrinsky plant undertook the following activities:

1. Working group responsible for EnMS implementation was formed.
2. Energy Performance Indicators (EnPIs) were identified with multifactor regression models for electricity and gas consumption.
   EnPIs are the foundation of UNIDO methodology, which is based on actual and target consumption graphs, built upon regression model of base year with consideration of all factors (variables) affecting the consumption. Target consumption is formed upon regression model of a base year with further adding the target (consumption decrease in %). The graphs are cumulative.
3. Monthly analysis of energy performance is organized, it applies data from existing system of commercial and technical accounting. Along with earlier adopted system of specific indicators, the enterprise started to evaluate efficiency with weekly analysis of energy performance by multifactor regression models for electricity and gas consumption.
4. EE improvement planning was set up, with emphasis on identification of organizational measures, operational control and low-cost technical measures.

Results of Shadrinsky plant in terms of EnMS implementation in 2015

In the framework of EnMS implementation project in 2015, Shardinsky plant has attained the following results:

1. Low-cost technical measures were put into effect:
   - Conducting regime-and-adjustment testing of gas consuming equipment;
   - Equipment of boiler units with flew gas monitoring system;
   - Replacement of old meters with more precise ones on electricity conveying equipment;
   - Optimization of operation time on all SEUs to increase the workload ration of energy-intensive equipment. Optimization of 1- and 2-shift operation schedules;
   - Systematic control and correction of gas equipment operation.

2. Achieved savings (in comparison with forecasted energy consumption), calculated with regression methods:
   - Electricity savings: 3 578 000 kWh;
   - Natural gas savings: 118 000 m^3;
   - Savings in monetary terms: 15 891 000 RUB.[1] ≈ USD 264 850 (with total investments of 800 000 RUB ≈ USD 13 300).
3. GHG emissions were reduced by 2 800 tons CO_2.
4. Low-cost and no-cost measures of operational control, aimed at energy saving and energy performance increase, have grown in numbers.
5. Planned preventative maintenance of equipment increased in quality and quantity.

Decrease in energy consumption is explained by joint efforts of the enterprise within existing energy saving programme, including constant work towards EE increase by means of operational control. For example, operation time of major workshops was optimized, one- and two-shift operations were combined to increase the workload ratio of energy consuming equipment of the

[1] By 2015 tariffs

SEUs. This led to reduction of non-production downtimes of equipment in “hot stand-by” (or idle) modes. These conclusions are verified by regression models of energy consumption.

Additional benefits

Apart from direct benefits of EnMS implementation, such as energy consumption decrease and related financial savings, there are also reductions in GHG emissions and organizational improvements. Reduced maintenance costs, stronger corporate image and improved monitoring over production quality positively affect overall competitiveness of the enterprise.