UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

# UNIDO EnMS implementation programme on KVART

In February 2015, KVART partnered with UNIDO for energy management system (EnMS) implementation. The company wanted to gain knowledge in sustainable management of energy consumption to reduce costs and mitigate the negative impacts on the environment, in accordance with international energy management standard ISO 50001. The meet the outlined goals, the company has elaborated an Energy policy and committed to responsibilities outlined in the document.

## Status-quo prior to EnMS implementation

- High Initial involvement and commitment of KVART management to achieving EE improvements
- Thorough practices of data collection for all energy resources consumed (electricity, heat, steam, and water). However, all factors affecting energy use were not examined in complex; thus, full energy analysis was lacking.
- Existing energy saving programme was mostly focused on investment measures and did not provide for any low- or no-cost measures, related to analytical approach to energy saving process.
- Efficiency evaluation was based on specific indicators (kWh/unit) and comparison with energy consumption trends of preceding years. However, the management realized that this method of EE measurement is not ideal for grounded decision-making. This understanding played a positive role in later EnMS implementation.

**Key features**
Location: Kazan, Republic of Tatarstan, Russia
Product: mechanical rubber
(product assortment >7000 units)
Annual production output: approx. 29 mln. tons
Number of employees: 1400
Average annual energy consumption:
12.86 GWh of electricity, 36 425 GCal of heat, 116 thous. $m^3$ of water
EnMS implementation period: Feb. 2015 – Feb. 2016

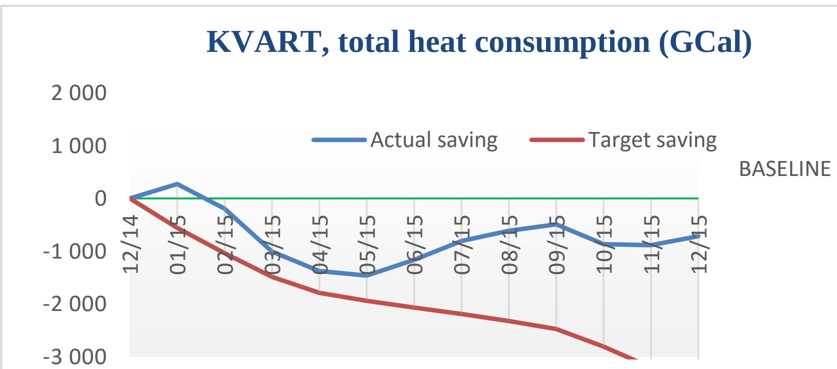
| EE improvements | |
|---|---|
| Energy savings | 866 151 kWh |
| Reduction in GHG emissions | 137 tons $CO_2$ |
| Monetary savings | 1 627 976 RUB (27 132 USD) (incl. water and sewage savings) |
| Non-energy benefits | Optimization of operational parameters on production lines, quality increase, maintenance costs reduction |
| Total investments | 282 000 RUB (4 700 USD) |
| Payback period | 0.17 years |

## Achieved results

When defining EnMS scope and boundaries, only three energy resources were chosen for the analysis: **electricity, heat, and water**. For each energy resource, Significant Energy Users (SEUs), affecting energy consumption the most, were identified. Further on, based on preceding period's data, consumption base line was defined and regression models were built to analyze energy performance.

### ➢ Heat

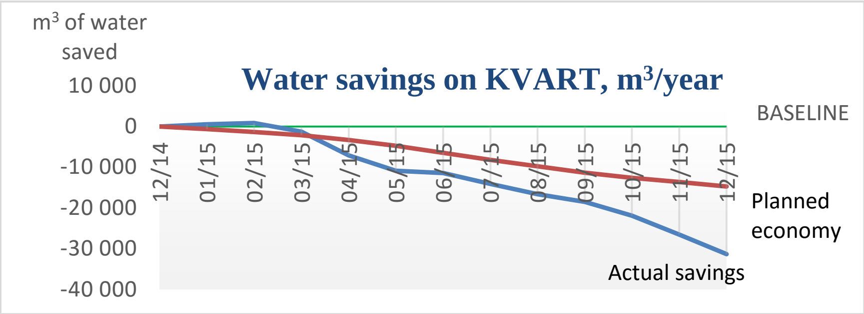
*The company uses heat energy (as steam) mostly in the technology of mechanical rubber production. From the given data one can see that from Feb. to May 2015 there were substantial savings – 1459 GCal, which have almost reached the target indicator. But later on, the dynamics was lost, which can be explained by the adaptation of new rubber compounds for production. After completing this process of approbation there is again positive dynamics in steam savings (Sep. – Nov. period); during this time the best operating parameters were chosen for the experimental part of production. The savings were mostly achieved by zero-cost measures of operational control.* **Overall, throughout the year the company saved 712 GCal of steam, which in monetary terms equals to 1 115 177 RUB.**



## ➢ Water

*Water savings play important role in KVART EE improvements: the enterprise is in city limits and water use (drinking and technical water, and sewage) costs the company 2.5 mln RUB annually, plus there are high penalties for excess discharge of untreated sewage. For this reasons, KVART decided to analyze its water consumption along with other energy resources.*

**In result, cumulative economy by the end of year accounted for more than 20% decrease against the baseline (target consumption based on 2014 year's data), with savings of 31 364 m3 of water/year, and in monetary terms – 512.8 thousand RUB.**




## Examples of main implemented low-cost measures (how the improvements were achieved)

| No. | Measure | Expected yearly savings | | Costs (RUB) | Payback, years |
|---|---|---|---|---|---|
| | | kWh/ GCal | RUB | | |
| 1 | To study the possibilities for reducing modes for rubber compounds production | 21 805 | 76 317.5 | - | |
| 2 | To study the possibility of switching from rubber compounds with two-stage dyeing to a one-stage | 21 805 | 76 317.5 | - | |
| 3 | To identify the critical operational parameters and optimize the steam supply parameters for all technological processes. | 21 805 | 76 317.5 | - | |
| 4 | To change the technology of rubber composite preparation | 35 866 | 125 531 | 15 000 | 0.12 |
| 5 | To ensure optimal workload for rubber rolling machine | 4 562 | 15 967 | 5 000 | 0.31 |
| 6 | To combine the pipelines of compressors DEN 5.5 and DEN-18 so that it would be possible to use a lower power compressor for the 2nd and 3rd shifts | 23 328 | 81 648 | 30000 | 0.37 |
| 7 | In one of the workshops, to further use heat from exhaust steam in technological processes where lower temperatures would suffice | 1319 GCal | 1379 674 | 80000 | |
| 8 | To install steam traps with non-return valves on the steam pipelines attached to vulcanizing boilers | 997 GCal | 1042862 | 75000 | 0.07 |
| 9 | To install control valves on each direction of the heating system | 106 GCal | 110876 | 50000 | 0.45 |
| 10 | To replace the 80m pipeline section from the compressor station | 28 385 | 99347.5 | 27000 | 0.27 |

An important aspect of system approach to energy management is that the effect from each implemented measure can be traced and verified by the graphs of actual cumulative economy based of regression models of preceding year's data.

## Arising barriers during EnMS implementation and how they were resolved

- The use of specific indicators for EE on all the levels of management has substantially complicated the process of EnMS implementation and further building of regression models to analyze energy performance. After meeting with Chief Engineer – management representative in EnMS working group – the rest of management attained a full understanding of the necessity of regression models.
- The product range of the enterprise is quite extensive (more than 7000 positions) - therefore, on initial stages of building the analytical models it was difficult to find the right variables affecting the consumption for each production workshop. Moreover, the synchronization of production data was complicated (defective goods were partially returned for remodeling, accounting of some products did not match in time with accounting of energy resources spent on it). The solution was to account processed raw materials in weight. This kind of accounting was well organized on the enterprise and easily accessible for analysis.

- After the models were built, the stage of EE monitoring started. At the initial stage of monitoring, analysis on a regular basis and interpretation of graphs were lacking. The company solved the problem – now the working meetings on EE monitoring and elaboration of corrective measures are organized once a month. If actual consumption notably exceeds the target one, working meetings with management representatives are conducted.

## Conclusions

Overall, in the process of EnMS implementation, management and the personnel gained understanding of the importance of operational control measures and an energy savings potential that can be achieved through such low-cost actions. Implemented energy management system has qualitatively improved the process for submission of energy savings ideas and their continual realization, which in its turn, makes the process of reducing energy resource consumption more visible, sustainable and continuously improving. Informative graphs of regression models enable to immediately react to any substantial energy consumption increase and to undertake corrective actions.