



UNITED NATIONS  
INDUSTRIAL DEVELOPMENT ORGANIZATION



Электротранспорт  
трамвайный транспорт Набережных Челнов

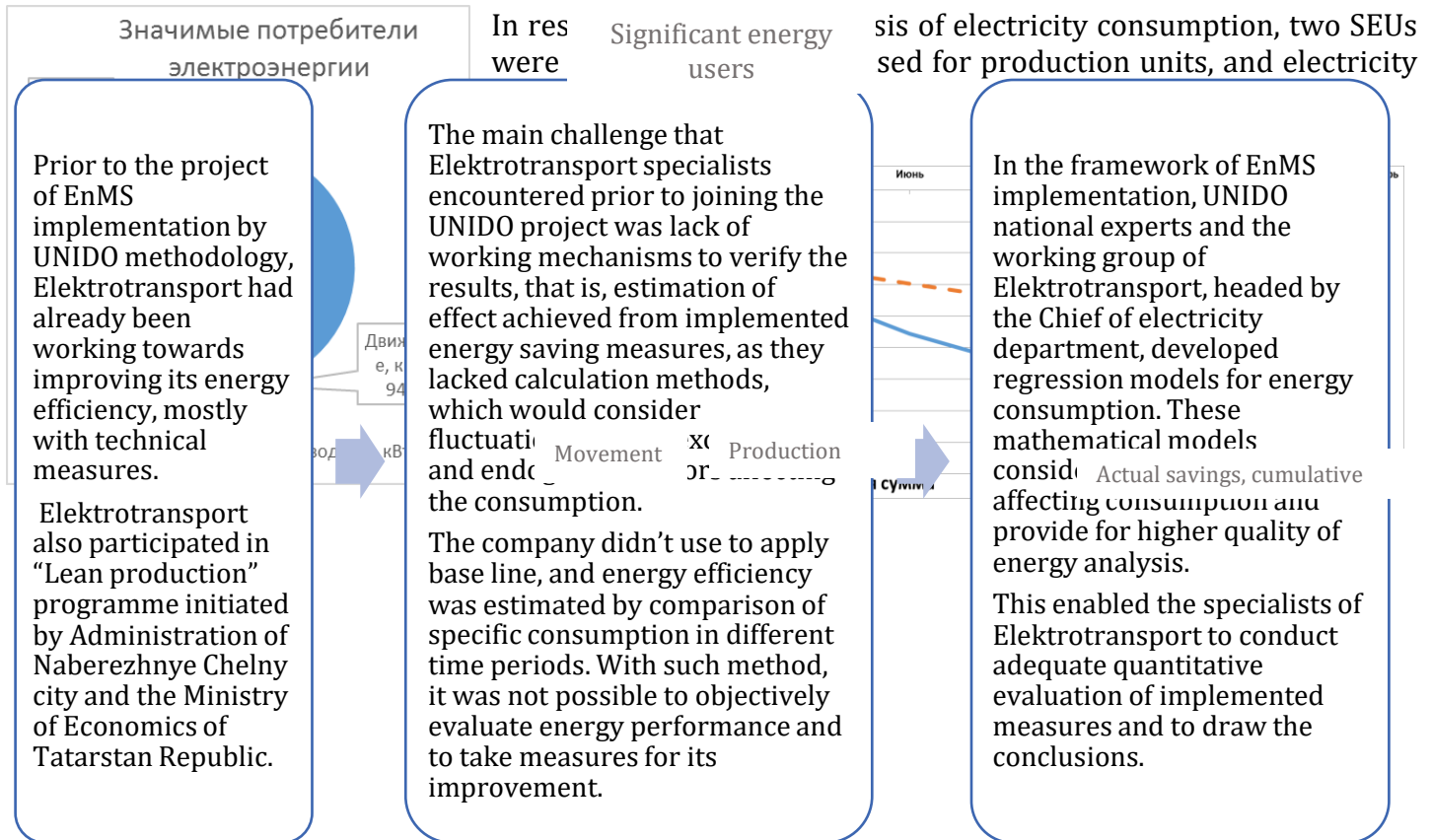


## Energy management system implementation by UNIDO methodology on SME in the city of Naberezhnye Chelny **Elektrotransport LLC**

Results of EnMS implementation	
Savings in monetary terms (heating season: Oct.2015 – Apr.2016)	7 194 574 RUB ≈ USD 119 900
Energy savings	1 798 000 kWh (-14%)
Non-energy benefits	Better corporate image, the personnel gained new computer skills, the management became more susceptible to energy saving initiatives
Reduction in GHG emissions	1079 tons CO <sub>2</sub> -eqv.
Total investments (equipment and other capitals costs)	100 000 RUB ≈ USD 1670
Average payback period	0.013 years



Elektrotransport, LLC focuses on operation and maintenance of trams – the only type of city electric transport in Naberezhnye Chelny. The Depot performs the following functions: storage of trams, daily check-up, technical maintenance, planned and ad hoc repairs, small repairs of the line, and contact maintenance. As of 2016, the company has 1065 employees in staff, and annual energy consumption is 17 889 743 kWh of electricity, and 45.52 GCal of heat.



used directly for moving the trams.

Total electricity savings in the period from January to December 2016 were the following:

- **In physical terms - 1 798 mWh (14% of total consumption in 2016 of 18 799.9 mWh)**
- **In monetary terms - 7 194 574 RUB.**

Data analysis for electricity use clearly showed that electricity consumption was the highest in the period from October to April. Moreover, the difference in consumption levels in summer and winter are up to 50%.

It means that heating accounts for a substantial part of energy used, which is related to the fact that trams are equipped with electric heaters for maintaining a comfortable temperature in the tram cars.

Since the heaters are switched on and off manually by the drivers, which is a human factor, the hypothesis was that there might be a large saving potential for electricity by means of more accurate temperature regulation

In the framework of UNIDO project, Elektrotransport specialists developed a vast list of measures (List of Opportunities), aimed at higher electricity efficiency. These measures included organizational actions and measures of operational control, zero-, low-, and high-cost technical measures. For each action an implementation timeline was set, a responsible person was assigned, cost estimation was done, as well as impact estimation in physical and monetary terms, and payback period determined.

Examples of implemented low-cost operational measures aimed at energy consumption decrease:

- ⑩ Optimized operation of traction substations, switching on rectifying units according to schedule;
- ⑩ Switching off heating system of tram cars during stand-by time and lunch breaks;
- ⑩ Tram movements on the line are to be tightly adhered to the driving modes indicated in the route maps;
- ⑩ Turning off fan heaters for certain tram models, when outdoor temperature is above -8°C;
- ⑩ Setting the maximum temperature in the tram car at +18°C;
- ⑩ Tram drivers are to turn on heating units in tram cars in accordance with outdoor temperatures, closely following the guidelines developed within EnMS implementation (process flow diagram).
- ⑩ Monitoring electricity flow against the expected consumption indicators, and undertaking prompt corrective actions in case of actual values exceeding the expected ones.

inside the cars.