Resource Efficiency in the Ferrous Foundry Industry in Russia

BENCHMARKING STUDY
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EXECUTIVE SUMMARY

Russia’s ferrous foundry industry could save up to RUB100 billion ($3.3 billion) annually, and improve individual foundry profitability by up to 15 percent, by matching European Union (EU) standards in the more efficient use of natural resources.

The first ever cross-sector benchmarking study undertaken in Russia, this Resource Efficiency in the Ferrous Foundry Industry: Case Study report compares the Russian and European foundry sectors, showcasing efficiency potential and providing practical guidelines to individual foundries as well as to the broader sector.

The results of this research will enable financial institutions (particularly banks and leasing companies) to develop specialist financial products to support improved resource efficiency in Russian enterprises, as well as helping suppliers, service companies, and engineering firms to identify and develop technical solutions to meet the most immediate needs of the sector. Policymakers and senior management involved in the strategic development of the sector will also find the study helpful in identifying those areas in most urgent need of reform, and in developing the strategies necessary to support this.
Why is resource efficiency so important for Russia’s ferrous foundry industry?

Given the low costs of labour, energy, and raw materials, Russia’s ferrous foundry industry should benefit from a theoretical cost advantage of around 36 percent. However, poor resource efficiency means this advantage is almost entirely lost.

Thus far, Russian foundries have enjoyed highly competitive cost advantages in comparison with countries in Western Europe (for example, Germany):

► energy costs are 54 percent lower;
► labour costs are 92 percent lower; and
► overheads and service costs are 71 percent lower.

These advantages do not translate to competitive prices for finished products, however.

► **Lower labour costs are negated by low levels of productivity.**
  Any competitive advantage in low labour costs is entirely theoretical, since the personnel resources needed to produce an equivalent amount of good-quality castings are 3.3 times higher than in Europe.

► **Low energy costs are negated by high volumes of consumption.**
  Any competitive advantage in low energy prices is similarly lost, due to high levels of consumption throughout the production process: basic procedures (such as, for example, smelting) use twice as much energy as analogous processes in Europe, and overall energy consumption levels are as much as three times higher.

![Figure 1: Poor resources management is costing Russian foundries their competitive advantage](image-url)

**Figure 1:** Poor resources management is costing Russian foundries their competitive advantage.

<table>
<thead>
<tr>
<th>Prices</th>
<th>Germany</th>
<th>Russia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>100%</td>
<td>46%</td>
</tr>
<tr>
<td>Labor</td>
<td>100%</td>
<td>8%</td>
</tr>
<tr>
<td>Services/overhead</td>
<td>100%</td>
<td>29%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Costs</th>
<th>German Foundry</th>
<th>Russian Foundry</th>
<th>Russian foundry operating at German efficiency levels*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating at German efficiency levels</td>
<td>100%</td>
<td>96%</td>
<td>64%</td>
</tr>
</tbody>
</table>

As a result, while the benefits of low-cost energy, labour, and natural resources should, as indicated above, give Russian foundries a theoretical competitive advantage in the order of 36 percent, poor resources management eliminates any price advantage, making Russian products (perceived as offering lower quality and value) uncompetitive in terms of quality–price ratios, and putting them at a further disadvantage in export markets. While prices edge ever nearer to international levels, quality does not meet EU standards.

The current poor quality of castings means Russian producers are denied access to export markets, while falling demand puts even local markets at risk.

Only a few Russian foundries have any experience of exporting beyond the countries of the Commonwealth Independent States (CIS). Foundries producing goods for domestic customers or for export to customers in the CIS have never been subject to the more stringent quality controls in force in the international markets. The volumes of scrapped and rejected products at Russian foundries show considerable variation. While leading producers waste less than one percent of production, the volume of wasted and rejected product can reach between 15 and 30 percent at foundries throughout the country. Waste levels in Russian foundries (i.e., as a percentage of total production) are twice as high as those in European enterprises, and EU quality standards far exceed those in Russia. If Russian foundries were required to adhere to the more stringent quality standards of the European markets, waste volumes would be, on average, four times higher.

It is therefore extremely important that foundry owners recognise the importance of improved quality as a strategic objective in the capital refurbishment of existing foundries, and the construction of new ones. Higher quality castings will result in higher added value throughout the market, leading to higher profit margins: better efficiency in resources management (particularly in containing raw materials and energy consumption levels and costs, as well as in improving labour productivity) will also be essential in improving and maintaining profitability.

Figure 2: REJECTION RATES AT RUSSIAN FOUNDRIES ARE BETWEEN TWO AND FOUR TIMES HIGHER THAN THOSE AT EUROPEAN ENTERPRISES

<table>
<thead>
<tr>
<th>Rejection rate (industry average)</th>
<th>EU</th>
<th>Russia (national standards)</th>
<th>Russia (EU standards)</th>
</tr>
</thead>
<tbody>
<tr>
<td>South</td>
<td>3.4%</td>
<td>6.7%</td>
<td>13.4%</td>
</tr>
<tr>
<td>South</td>
<td>x 4</td>
<td>x 2</td>
<td>x 4</td>
</tr>
</tbody>
</table>

Where does the greatest potential for better resources management lie?

Matching the efficiency of the best-performing EU plants would save enough energy to power a typical Russian city of 1.5 million people: and matching EU standards in water efficiency would result in savings equivalent to total residential consumption in the Netherlands.

For each tonne of good-quality castings produced, Russian foundries, in comparison with EU plants, use:

- three times more energy;
- 3.6 times more sand; and
- 161 times more water.

On the basis of Russia’s current annual production of 6.1 million tons, matching the efficiency of European plants would save 19,882 gigawatt hours (GWh) of energy, 5.7 million tons of sand, and 879 million cubic meters of water, per year.

Russia’s ferrous foundries could save up to $3.3 billion per year.

Matching the resource efficiency of the best-performing EU plants could save RUB100 billion ($3.3 billion) per year (excluding capital expenditure).¹ The study also showed that, in moving towards European best practice, matching even average levels of European efficiency could achieve cost savings in the order of 25 percent (Figure 3).

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¹ On the basis that total annual production of 6.1 million tons of castings incurs an estimated total cost of RUB350 billion.
The study also suggests that Russian foundries lag significantly behind their European peers on certain key performance indicators (KPIs), with a direct impact on profitability. In comparison with European foundries, Russian enterprises:

- use 14 percent more metal per tonne of finished product;
- achieve average production volumes per employee 3.6 times lower than those in the EU; and
- utilise equipment and machinery for twice as long as plants in Europe, while utilising only 50 percent of total production capacity.

Matching the efficiency of the leading Russian enterprises could achieve savings in the order of 19 percent across the sector as a whole, while individual enterprises could increase operational profitability by up to 15 percent.

The study showed that many leading Russian companies are already actively implementing best international practice in production and resource efficiency. While KPIs for the best Russian enterprises currently only match average efficiency standards in Europe, achieving these standards could, in addition to raising the overall efficiency of the Russian ferrous foundry industry, result in cost savings in the order of 19 percent — or RUB65 billion per year.

Even on the basis of current operating costs and profit margins, better resource efficiency could potentially increase the operating profit of individual enterprises by up to 15 percent.

* ARP = average Russian performance

Saving **879 million cubic meters** of water per year would be enough to:

- supply **3.5 million** Russian citizens for one year; and
- supply **30 percent** of all households in Belarus.

This volume is also **more than four times** the total groundwater uptake of all industrial enterprises in the Netherlands.

If Russian foundries were able to match the efficiency of the best-performing EU plants, the energy saved would be sufficient to power a typical Russian city of **1.5 million** people.
How can the benefits of better resource efficiency be optimised?

More than half of the savings and benefits that might be achieved through better resource efficiency could be realised through better management practices and various low-cost initiatives alone, with no need for major capital expenditure.

Of the total potential for better resource efficiency in the Russian foundry sector, around 57 percent could be achieved solely through the implementation of low-cost initiatives and improved management practices: less than half (43 percent) would require any capital expenditure or refurbishment.

Opportunities for low-cost initiatives and economically viable resource efficiency projects are often missed because of enterprises’ failure to monitor resources consumption.

The study found that 42 percent of Russian foundries have no formal or systematic procedures in place to monitor resources consumption during production: and a substantial majority experience difficulties in monitoring and tracking KPIs. Only one third have certified quality management or management accounting systems in place. Recognised environmental management systems are extremely rare, and training in “lean” management occurs only at the largest enterprises.²

² “Lean” management refers to the cost-driven production management systems initially developed in Japanese industry in the latter half of the 20th century.
The introduction of appropriate process management practices and better monitoring of resources consumption would enable Russian foundries to close the gap on their European peers without, necessarily, incurring significant capital expenditure.

**Russian foundries could achieve their optimum potential – in terms of resource efficiency, competitiveness, and profitability – by:**

**A. Improving operational efficiency and productivity.**
1. Attention needs to be most closely focused on those KPIs relating to operational procedures and technological processes since these, more than any others, have the greatest influence on cost reduction.
2. Taking every available opportunity to improve energy efficiency can improve profitability levels by five percent or more. Improved management processes and investment in more energy-efficient plant and machinery can be vital here: minimising energy costs must be a priority in the face of the inexorable rise in energy prices.

**B. Making change management an ongoing process.**
1. Benchmarking techniques should be used to gain a clear understanding of an enterprise’s competitiveness against peers in both Russia and Europe.
2. Clear objectives should be set. Viable cost-reduction and consumption targets should be made clear, as well as the timeframe over which these might realistically be achieved.
3. An environment of continuous improvement is essential. A 2008 report by consultancy firm McKinsey argues that only one third of change-management programs actually succeed – largely because success depends predominantly on the behavior and motivation of individuals.\(^3\) Establishing an environment conducive to the implementation of optimum resource efficiency depends not only on setting key objectives and determining the best way of achieving these, but also on educating and engaging individuals in developing appropriate skills and behaviors. Setting up a dedicated project team (with both internal and external specialist advisors) can be a good first step here: the involvement of external experts acts as a catalyst in eradicating redundant processes and habits, as well as generating new ideas.

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C. Making full use of available resources.


1. Compendium of Key Performance Indicators

The Compendium of Key Performance Indicators includes reference tables of potential KPIs for enterprises in Russia and Europe, including:

- best-performance and average standards, according to various criteria;
- 32 separate classifications covering specific aspects of iron and steel production; and
- KPIs specific to the ferrous foundry industry.

2. Self-diagnostic Guide

Based on the methodologies used in conducting this study, the Self-diagnostic Guide enables individual enterprises to collate information and analyze results against various KPIs. With recommendations on data collection, and on the evaluation and analysis of information, resulting conclusions may then be benchmarked against best practice and average standards in Russia and Europe.


This guide includes a number of strategies for improving performance, and analyzes cross-sectoral experience and best practice in the implementation of new technologies. It includes practical advice on the continuous improvement of new production processes, as well as strategies for the analysis of potential investment in new technologies.

4. Resource Efficiency in the Ferrous Foundry Industry in Russia: Benchmarking Study

The full text of this report brings together the key findings from the benchmarking study, together with recommendations on how the industry’s full potential might be realised.