MMK. CARING ABOUT THE FUTURE
Magnitogorsk Iron and Steel Works (MMK) is a reliable supplier of high-quality metal products with an acute awareness of environmental responsibility and striving to enable present and future generations to live in a clean environment.
MMK is one of the world’s largest steel producers and a leading Russian iron and steel company. We are one of the world’s largest metallurgical complexes on a single production site.

MMK is implementing an ambitious modernisation programme – outdated production facilities are decommissioned, while new, environmentally friendly facilities are put into operation, and the best available technologies are introduced. One of the most remarkable results of this programme has been a significant reduction of the human impact on the environment.

At present, while we maintain high production volumes, gross air pollutant emissions have decreased fourfold compared to the highest figures during 1989.

The discharge of water pollutants has also significantly reduced. MMK’s redesign of a circulation water supply system is the key project, which includes the construction of a separation dam and culverts in the Magnitogorsk reservoir. The implementation of this project in 2018 should reduce the volume of discharged water by 11 times, and the mass of pollutants released by 7 times. Systematic large-scale investments to reduce and prevent the release of water pollutants, as well as the redesign of the circulation water supply system will enable the plant to switch to a closed water system in the near future, which should completely eliminate the release of pollutants into the Magnitogorsk reservoir by 2020.

MMK’s total investment into environmental initiatives from 2018 to 2025 is anticipated to exceed RUB 38 bln and will turn Magnitogorsk into a truly clean city.

MMK became the only iron and steel company in Russia featured in the top ten in environmental initiatives implemented by Russian companies ratings, which are updated every six months by the TV channel “Living planet” and the Institute of Modern Media.
MMK’s environmental policy

SUCCESS FACTORS

• Development of production capacity through the introduction of the best available technologies, taking human impact on the environment into account.

• Continuous reduction and prevention of harmful effects on the environment.

• Transparency and accessibility of information on environmental impact. Environmental impact assessment for all stakeholders during the redesigning and construction of new facilities.

Environmental safety of production processes is not only guaranteed by advanced technologies, but also by modern environmental management methods, competent and engaged personnel who have formed a production culture. Thus, the Environmental Management System, certified under ISO 14001, has been implemented and improved.

MMK is a high-performance steel company encompassing the entire production chain, which operates in line with the requirements of Russian and international standards in the area of environmental protection and compliance.
Clean City is an environmental initiative to be developed until 2025

**THE CLEAN CITY INITIATIVE IS AIMED AT:**
- clean air;
- clean water;
- clean soil;
- favourable environment.

**THE IMPLEMENTATION OF THE PROGRAMME INCLUDES:**
- implementation of the best available technologies in all production processes;
- construction of new and redesigning of existing environmental facilities;
- redesigning of first production stage with the decommissioning of outdated equipment.

**2025 GOALS:**
- Reduce gross air emissions by 24,500 tonnes.
- Reduce emissions of substances in hazard classes 1-2 (extremely and highly hazardous) by 10 times.
- Reduce the release of pollutants by 37,500 tonnes.
- Annually recycle no less than 2.3 mln tonnes of waste.
- Annually recultivate 20,000 m² of waste pits.
- Landscaping of Magnitogorsk with the planting of 11,000 trees and shrubs.

**Investment in environmental initiatives from 2018 to 2025**

<table>
<thead>
<tr>
<th>Year</th>
<th>Waste disposal, recycling and recultivation</th>
<th>Measures towards preventing air pollution</th>
<th>Measures towards preventing water pollution</th>
<th>Waste disposal, recycling and recultivation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>21.7</td>
<td>5.5</td>
<td>10.9</td>
<td>RUB 38.1 bln</td>
</tr>
</tbody>
</table>

**Between 2000 and 2018, costs for the implementation of the Environmental Programme exceeded RUB 58 bln.**

**Total investment in the environmental activities from 2000 to 2018, mln RUB**

<table>
<thead>
<tr>
<th>Year</th>
<th>Investment in the construction of environmental facilities</th>
<th>Current operating costs of environmental initiatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>5,846</td>
<td>3,122</td>
</tr>
<tr>
<td>2017</td>
<td>4,158</td>
<td>2,754</td>
</tr>
<tr>
<td>2016</td>
<td>2,482</td>
<td>2,960</td>
</tr>
<tr>
<td>2015</td>
<td>2,288</td>
<td>2,758</td>
</tr>
<tr>
<td>2014</td>
<td>2,240</td>
<td>2,758</td>
</tr>
<tr>
<td>2013</td>
<td>1,373</td>
<td>867</td>
</tr>
<tr>
<td>2012</td>
<td>1,229</td>
<td>928</td>
</tr>
<tr>
<td>2011</td>
<td>710</td>
<td>217</td>
</tr>
<tr>
<td>2010</td>
<td>383</td>
<td>327</td>
</tr>
</tbody>
</table>

*Investment in construction of environmental facilities was 15 times higher in 2018 compared to 2000*
KEY MMK PROJECTS AIMED AT THE REDUCTION OF POLLUTANT EMISSIONS INTO THE ATMOSPHERE IMPLEMENTED IN 2000-2018:

- Both the construction of electric arc furnaces and the transition to continuous casting of steel, allowed the decommissioning of all open-hearth furnaces.
- The construction of aspiration systems for casting beds and blast furnace stock houses with an overall capacity of 7.2 million m$^3$/hour.
- The redesign of sulphur capture systems of all sinter plants with an overall capacity of 4.1 million m$^3$/hour.
- The redesign of the gas-cleaning unit of double-hearth furnaces to incorporate a system for collecting unplanned emissions with a total capacity of 1.245 million m$^3$/hour.

Currently, MMK operates 274 gas treatment units.

Trend towards lowering emissions of pollutants into the atmosphere from 2000 to 2018

Gross emissions reduced by a factor of 1.6 (by 38%). Specific emissions reduced by a factor of 2.1 (by 53%).

Results of the redesign of sulphur capture systems

Reduction of sulphur dioxide emissions by more than 3 times

In 2017, MMK became equipped with the best available technologies in line with the world’s leading companies.

<table>
<thead>
<tr>
<th>Year</th>
<th>Emissions of sulphur dioxide (SO$_2$), tonnes/year.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>30.12</td>
</tr>
<tr>
<td>2005</td>
<td>29.57</td>
</tr>
<tr>
<td>2010</td>
<td>17.25</td>
</tr>
<tr>
<td>2017</td>
<td>9.4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Company</th>
<th>Specific emissions of sulphur dioxide (SO$_2$), kg/tonne of steel.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baosteel</td>
<td>0.89</td>
</tr>
<tr>
<td>Voestalpine</td>
<td>0.75</td>
</tr>
<tr>
<td>MMK</td>
<td>0.72</td>
</tr>
<tr>
<td>Posco Yorknam</td>
<td>0.56</td>
</tr>
</tbody>
</table>

MMK is currently equipped with the best available technologies.
Implementation of the best available technologies

**NEW SINTER PLANT**
Commissioning in 2019.
Capacity - 5.5 million tonnes/year of agglomerate.
Decommissioning of the sinter plant no. 4.

**ENVIRONMENTAL EFFECT:**
• Reduction of dust emissions – 2,100 tonnes/year, sulphur dioxide – 3,500 tonnes/year, benzo(a)pyrene – 0.03 tonnes/year (23%);
• Reduction of waste released into the circulation water supply system by 600 tonnes/year;
• Reuse of the slurry from the desulphurization units along with production of market gypsum, exclusion of disposal of 13,750 tons of wastes per year in Slurry Depository No.2.

**ENVIRONMENTAL PROTECTION FACILITIES OF THE NEW SINTER PLANT:**
1. Bag filter for the intake iron ore component.
2. Bag filter for the intake lime component.
4. Bag filter for dosing charges.
5. Bag filter for the finished agglomerate bunker.
6. Bag filter for screening of the finished agglomerate.
7–8. Two bag filters and electric filters for charge preparation.
9–10. Two electrostatic sulphur capture systems.
11–12. Two sulphur capture system absorption towers.
15. Bag filter for screening and crushing coke.
16–17. Two sintering gas recirculation systems.
18. Installation of sludge disposal sulphur capture systems.
19. Cooling tower and pump-filter station for the circulation water supply system.

**NEW COKE FURNACE BATTERY**
New coke furnace battery complex consisting of:
• coke battery;
• biochemical plant;
• unit for capturing and processing chemical products.
Capacity – 2.5 million tonnes/year of coke.
Emissions from the work of 5 old coke furnace batteries.

**NEW BLAST FURNACE**
New coke furnace battery complex consisting of:
• blast furnace;
• granulation of slag;
• local circulation water supply system.
Capacity – 3.9 million tonnes/year of pig iron.
Decommissioning of 3 blast furnaces.

**Emission of air pollutants**
- **Gross emissions, thousand tonnes**
- **Specific emissions, kg/tonnes of steel product**

**THE MODERNISATION OF PRODUCTION, AIMED AT THE REDESIGNING OF THE FIRST PROCESSING STAGE WILL HELP ACHIEVE THE FOLLOWING RESULTS BY 2025:**
• specific dust emissions in line with the best available technologies;
• low level of air pollution in Magnitogorsk.
100% of industrial waste water is used in circulation water supply system across the MMK production units fleet.

Reduction of pollutant emissions by 2.9 times.

The reduction of pollutant releases into water bodies

Planned reduction of discharge masses by 2.8 timesa

MAIN AREAS OF WATER PROTECTION INITIATIVES FROM 2019 TO 2025:

- Construction of new and redesign of existing local circulation water supply systems.
- Redesigning of the mining facilities’ wastewater system.
- Removal of the impact of water treatment facilities repairs on the circulation water supply system.
IN 2018, A HYDRAULIC STRUCTURE – A SEPARATION DAM – WAS PUT INTO OPERATION, ALLOWING MMK TO SWITCH TO A CLOSED CIRCULATION WATER SUPPLY SYSTEM

Features of the hydraulic structure:
- Length – 2,552 metres.
- Average height – 7 metres.
- Average width of the ridge – 8.2 metres.
- Area of the reservoir cooler – 1.3 million m².
- Volume of the cooler tank – 9.5 million m³.

UPON COMPLETION OF CONSTRUCTION WORKS, THE FOLLOWING ADDITIONAL ACTIVITIES WILL BE CARRIED OUT:

Stocking the reservoir with 796,000 carp fry in 4 stages (from 2018 to 2021)

Landscaping the dam with purple willow saplings, chosen by a public vote of the residents from a selection of local tree species.

Redesigning of MMK’s circulation water supply system with the expansion of the cooler tank

11 times less waste water.
7 times less pollutants
THE CONSTRUCTION OF A DRAINAGE DEPOSIT PLANT FOR THE TREATMENT OF CONVERTER GASES

In 2013-2014, MMK began a project of building plants for drainage deposits formed during the treatment of converter gases. The project made it possible to decommission the hydraulic shaft for sludge deposits and start working on its reclamation.

The plant is able to dehydrate the entire volume of sludge deposits and dispose up to 180,000 tonnes per year of concentrate with an iron content of up to 60%.

PLANT FOR THE ENRICHMENT OF IRON-CONTAINING SLUDGE DEPOSITS, STORAGE FACILITY № 2

In 2017-2018, MMK implemented a project to build a plant for processing more than 20 million tonnes of iron-containing waste accumulated in the sludge deposit storage facility № 2 of mining and processing production.

The plant’s capacity will allow for annual processing of up to 2 million tonnes of waste to produce 500,000 tonnes of concentrate with an iron content of up to 59%.

CLEAN SOIL.

WASTE MANAGEMENT

The use of waste as secondary material resources is MMK’s main effort for waste management. 100% of iron-containing waste is reused.
SLAG
The large proportion of slag at MMK was formed as a result of the production activity from the 1940s to the 1990s. Since 2000, the amount of slag at MMK has stopped increasing, replaced by a systematic annual decline in the volume of accumulated metallurgical slag.

CURRENT METALLURGICAL SLAGS
Annually, MMK produces 5.5 million tonnes of metallurgical slag, which are 100% utilised through:

• extraction and use of metal fraction in technological process;
• consumer sales of fractional and granulated slag;
• use of waste iron ore pits for reclamation.

Trend for slag processing from 2000 to 2025

The main aim of MMK’s recultivation work is restoration of lands disturbed by industrial activity with further returning those lands to economic turnover, as well as improving the environment in Magnitogorsk by creating additional green areas.
From 2012 to 2017, the first stage of biological reclamation was carried out, in which perennial grasses and plants were planted on a plot of around 154,000 m²:

- 5,900 ash, birch and apple tree saplings;
- 6,700 acacia and rose bushes.

To increase the sapling survival rate, a further five-year care programme for the reclaimed land was implemented.
MMK has developed a landscaping programme in Magnitogorsk. Throughout the next six years the plan is to allocate RUB 57 million for planting 11,000 seedlings of trees and shrubs in the city.

2017
1,460 ash, maple and Siberian fir seedlings were planted on the land of the city’s educational and social institutions.

2018
2,300 Norway maple, linden, birch, rowan and spruce saplings and 3,250 cotoneaster seedlings were planted in parks, squares, educational and social institutions.

It is impossible to create a comfortable and clean environment without active work towards creating green spaces in Magnitogorsk.

MMK pays great attention to landscaping of not only the land belonging to the business and adjacent land plots, but also to residential areas, social institutions, parks and city squares.
FOCUS ON ENERGY EFFICIENCY

Energy conservation and efficiency is one of the key aims of implementing the best available technologies at production facilities of MMK. The energy facility of MMK produces 70% of the total consumption of electricity and 100% of the total consumption of thermal energy.

MMK’s efforts towards energy efficiency manifest in these key areas:

- Implementation of low-budget high-efficiency projects in the field of energy efficiency with a short return period. Annually, RUB 1 billion is spent on this project. In 2017-2018, 42 such projects were implemented to the effect of RUB 917 million.
- Energy service contracts. In 2017-2018, as part of the contracts, the ceiling lights of the rolling mill were replaced (RUB 47 million), an automated control system was introduced to drive smoke exhausters in the treatment plant for converter gases (RUB 68 million), and frequency converters were installed on raw chemical water pumps at the treatment plant (RUB 97.9 million).
- Implementation of MMK employees’ ideas regarding energy conservation and efficiency. From 2017-2018, 1,487 ideas were successfully implemented as 287 projects to the effect of RUB 99.3 million.

The secondary fuel gases generated in the blast furnace and coke production are fully utilized by MMK as secondary energy resources. Looking towards the future, MMK plans to introduce a large-scale investment project for the utilization of converter gases at additional power generation facilities by 2025.

MMK has certified and successfully operates its energy management system in accordance with the international standards ISO 50001. A digital energy management platform was introduced, which won the all-Russian competition for energy conservation and efficiency projects, ENES-2016 in the category of «Effective Management System in the field of energy conservation and efficiency in an industrial enterprise».

The total cost of the project for energy conservation and efficiency in production processes exceeded RUB 1.2 billion in 2017-2018.
INDEPENDENT ASSESSMENTS OF MMK’S ENVIRONMENTAL EFFORTS.

RATINGS FROM THE LIVING PLANET TV CHANNEL AND FROM THE INSTITUTE OF CONTEMPORARY MEDIA (MOMRI).
In October 2018, MMK became the only iron and steel company in Russia to be rated among the top ten environmental initiatives implemented by Russian companies. This rating is released every six months by the Living Planet TV channel and the Institute of Contemporary Media (MOMRI).

RATING FROM THE ENVIRONMENTAL AND ENERGY RATING AGENCY, INTERFAX-ERA.
In November 2018, the environmental and energy efficiency rating of the 150 largest companies in Russia and Kazakhstan was published, in which MMK came 36th, which is one of the best results among ferrous metallurgy companies.

WORLD WILDLIFE FUND (WWF, RUSSIA) RATING AND THE UNITED NATIONS ENVIRONMENT PROGRAMME (REPRESENTATION IN RUSSIA).
In December 2018, the final environmental responsibility rating of mining and metallurgical companies in Russia was announced based on the analysis of the three key components: the company’s environmental management, environmental impact and disclosure of information. MMK was one of the companies to share first place in the Environmental Impact category.

PRESIDENTIAL ACKNOWLEDGMENT OF MMK’S PARTICIPATION IN PREPARING AND HOLDING ACTIVITIES IN THE FRAMEWORK OF THE YEAR OF ECOLOGY IN RUSSIA.
In July 2018, Russian President forwarded a letter of gratitude to the employees of MMK, in celebration of the Steelmaskers’ Day, highlighting the company’s special contribution to environmental protection.
CARING ABOUT THE FUTURE

“We do not inherit the Earth from our ancestors: we borrow it from our children”

Antoine de Saint-Exupéry