# YOURTUBE

#2 (45) 2025

# GROWTH THROUGH SUSTAINABILITY

TMK'S BEST PRACTICES AS A LONG-TERM INVESTMENT IN THE COMPANY AND THE COMMUNITIES IT SERVES

CORPORATE MAGAZINE

06

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**COVER PHOTO**
The bioengineering system at the Seversky Pipe Plant replicates natural self-purification processes found in the environment. It uses cattails and water lettuce to filter out harmful metal compounds, chlorella algae to remove nitrogen and phosphorus, and silver carp to absorb residual contaminants. Ribbed dams divide the reservoir into separate sections, ensuring continuous water circulation.

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# WAY UP NORTH

TMK has supplied specialized equipment for a new thermal power plant under construction in Russia's Republic of Sakha (Yakutia). The shipment included around 3,000 tons of pipes and pipeline fittings, which will be used to build a system of circulating water conduits delivering and removing cooling water for turbine condensers, hydro-coolers, and other key heat-exchange units at the plant.

The order featured non-standard diameters ranging from 1,620 to 3,500 mm, requiring custom-made engineering and manufacturing solutions. The project brought together enterprises from TMK's pipe and mechanical engineering divisions, whose metallurgists and engineers applied innovative design, technological, and logistical approaches.

All the pipes underwent additional ultrasonic quality inspection. TMK applied special tented end caps to protect them during transportation. The entire batch was shipped to the customer via the Lena River during the limited navigation season — ensuring on-schedule delivery despite the remote Arctic conditions.

## Fighting Corrosion, One Pipe at a Time

TMK Oilfield Services (TMK NGS) has launched a new facility for anti-corrosion coating of fittings and couplings for tubing at its Truboplast plant in Yekaterinburg. The production line will help meet growing demand for durable coatings, extend the service life of tubular systems, and reduce customers' maintenance costs.

Special attention has been given to bends, tees, reducers, and tubing couplings, which are most exposed to aggressive environments. After treatment, couplings are installed on internally coated pipes at other TMK NGS sites, while the shaped fittings are shipped directly to customers or supplied under cooperation projects.

The new unit enhances Truboplast's capabilities and strengthens the market position of TMK's Oilfield Services division as a leading supplier of integrated, corrosion-resistant solutions.



## Robotics Meet Steel

The Seversky Pipe Plant (STZ) has doubled the speed and accuracy of pipe marking following the modernization of its robotic marking complex. The upgraded system features a more powerful robot and an advanced printing module, which have increased marking efficiency twofold.

Installed at Pipe Rolling Shop No. 1, the new system can apply markings to the full range of products with diameters from 168 to 351 mm, handling up to four pipes simultaneously on the marking table. The robot can print 17 characters in just 20 seconds, whereas the previous system processed only one pipe at a time, marking a maximum of 10 characters in 42 seconds.

Earlier this year, STZ also implemented a digital recognition system that automatically reads pipe markings directly in the production flow. The project is part of TMK's large-scale Digital Manufacturing Program, which is being rolled out across the company's facilities to enhance efficiency, traceability, and quality control.

## GOING BIG, AND WIDE

TMK Steel Technologies has completed its first-ever order for welded tees with a diameter of 2,620 mm, almost twice the standard size of typical press-welded pipeline fittings, which usually reach up to 1,420 mm.

The total weight of the products delivered to the customer exceeded 300 tons. The components are designed for use in process pipelines at advanced hydrocarbon conversion plants.

The enterprise's specialists carried out a full production cycle — from the creation of design documentation and manufacturing technology to the core fabrication operations at TMK Steel Technologies. The project showcases the company's engineering competence and flexibility in producing large-diameter, high-specification equipment.

# ONE SHARE – ONE TEAM

TMK HAS EMBARKED ON A LARGE-SCALE TRANSFORMATION OF ITS CORPORATE STRUCTURE. BY THE END OF 2025, EIGHT OF THE COMPANY'S KEY ENTITIES WILL BE MERGED INTO PJSC TMK AND CONTINUE OPERATING AS ITS BRANCHES. THIS MARKS AN IMPORTANT MILESTONE ON THE COMPANY'S PATH TOWARD A SINGLE SHARE STRUCTURE — AN APPROACH THAT HAS ALREADY PROVED SUCCESSFUL FOR MANY LEADING RUSSIAN CORPORATIONS.


Today's market demands agility, flexibility, and leaner operations. When a business is divided among several independent legal entities — each with its own management, reporting, and administrative functions — decision-making slows down and costs inevitably rise.

TMK's consolidation of its shares is a logical next step in its strategy to enhance efficiency and streamline corporate governance. Once the process is complete, six of the company's largest production sites — the Volzhsky, Seversky, Sinarsky and Pervouralsk Pipe Plants, Taganrog Metallurgical Plant, and Chelyabinsk Pipe Rolling Plant — together with TMK Pipeline Solutions and TMK Trading House, will operate as branches of PJSC TMK.

This new structure will simplify management, eliminate duplicate functions, ensure unified reporting, and speed up decision-making.

### BUSINESS AS USUAL – WITH GREATER EFFICIENCY

TMK's plants will continue to operate in their existing locations, under their established brands and with their current teams. All obligations to regional communities, partners and employees will remain unchanged. Social and charitable projects will continue in full.

Internal processes, however, will become much simpler. The need for intercompany contracts within the TMK Group will disappear, making it easier to coordinate procurement, plan production, replicate best practices across sites, and optimize costs.

For employees, the move to a single share will not affect working conditions or social benefits. On the contrary, a unified structure will enable TMK to allocate resources more effectively between facilities, accelerate the rollout of best practices, and respond faster to changing market dynamics. Career opportunities will also expand: transfers between branches will become easier and inclusion in the company's talent pool more accessible.

> TMK plans to complete the consolidation of its shares by January 1, 2026

### TRANSPARENCY FOR SHAREHOLDERS

Shareholders of the merging entities will have their shares exchanged for PJSC TMK securities. Conversion ratios were calculated for each entity on a market basis, following an independent valuation in line with Russian legislation.

Shareholders who disagreed with the merger had the right to request a buyout of their shares. To facilitate the exchange, TMK will issue additional shares — the total number of new shares placed will not exceed 5% of the company's authorized capital. Any shares not used in the exchange will be cancelled.

The merger was approved by TMK's General Meeting of Shareholders on July 31, 2025, followed by similar approvals from the shareholders and participants of the eight subsidiary companies involved. The step-by-step integration process is now under way and is expected to be completed by January 1, 2026. All procedures are being carried out strictly in accordance with Russian law.

### FOLLOWING A PROVEN PATH

The single-share model is not new to Russian business. The first company to adopt it was LUKOIL in 1995. Others soon followed, including Surgutneftegaz, Nornickel, Gazprom, the United Aircraft Corporation, and, most recently, Rosseti, which merged with the Federal Grid Company in 2023. The latter case is especially illustrative: the merger allowed Rosseti to cut administrative costs by more than 5 billion rubles ($62 million).

For TMK, this transformation represents another stage in its evolution — a move from legal fragmentation to a unified management center, while preserving operational decentralization and a strong regional presence. By focusing on transparency, efficiency, and consistency, TMK reinforces its status as an industry leader and an employer committed to progress. **YT**

**Sergey Chikalov,**
**CEO of TMK:**

"The consolidation of TMK's shares is more than a legal reorganization — it's a step toward making TMK even more resilient, flexible, and competitive. The company is becoming one team with a transparent structure, faster management system, and shared goals. This is vital not only in the face of current challenges, but also for the long term — strengthening our market position, investing in technology, advancing engineering solutions, and supporting the regions where we operate."

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# FROM ECOLOGY TO DIGITALIZATION: TMK'S ROADMAP FOR SUSTAINABLE GROWTH

TMK HAS RELEASED ITS FIRST PUBLIC SUSTAINABILITY REPORT, SUMMARIZING THE COMPANY'S 2024 PERFORMANCE AND SETTING OUT ITS LONG-TERM PRIORITIES. **VLADIMIR OBORSKY,** TMK'S DEPUTY CEO FOR MARKETING, EXPLAINS WHY SUSTAINABILITY TODAY IS NOT JUST A PRIORITY FOR INDUSTRIAL GIANTS, BUT A SHARED RESPONSIBILITY FOR ALL BUSINESSES.

**How important is the publication of TMK's first public sustainability report, and what strategic priorities does it reflect?**

This report is a key step in building an open dialogue with our stakeholders: employees, customers, partners, local communities, and public authorities. It provides a transparent overview of what we're working on, systematizes our progress, and demonstrates measurable results across all key areas.

The report covers every priority outlined in TMK's Sustainability Strategy through 2027 — environmental protection and climate action, occupational health and safety, human capital development, business ethics, and support for the regions where we operate.

In 2024, we focused particularly on environmental matters: we approved a Low-Carbon Development Strategy and an Environmental Strategy, as well as dedicated programs on waste management and air emission reduction.

Socially, our priority was attracting and retaining talent. We indexed salaries, invested in employee skills development, and held career guidance programs for students. We also continued to build responsible supply chains — assessing key suppliers against sustainability criteria and participating in similar initiatives led by our customers.

**How does TMK ensure the transparency and reliability of the data presented?**

All our reports undergo independent verification for compliance with the Global Reporting Initiative (GRI) standards. The audit is performed under the International Standard on Assurance Engagements (ISAE) 3000 (revised). For two years running, auditors have confirmed

that TMK's report meets the GRI's highest disclosure level — a distinction that not all sustainability leaders can claim.

We also follow the Russian Ministry of Economic Development's 2023 reporting guidelines and are ready to apply the forthcoming national sustainability reporting standard once adopted. This multilayered approach ensures both transparency and international comparability.

**Many companies align their strategies with the UN Sustainable Development Goals (SDGs). How does TMK integrate these global priorities?**

When designing our sustainability strategy, we aligned it with the UN SDGs and selected nine goals where TMK can make the most meaningful contributions. These include



good health and well-being, quality education, clean water and sanitation, affordable and clean energy, decent work and economic growth, industry and innovation, sustainable cities, responsible consumption, and climate action.

This alignment enables us to measure our progress against global benchmarks and adopt best practices from international leaders.

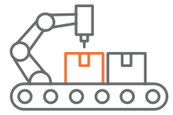
**The industrial sector is often seen as a source of environmental impact. How does TMK minimize its footprint?**

For TMK, this is a systematic effort. We use the best available technologies to reduce our impact on

TMK is building a comprehensive environmental management system to reduce its ecological footprint



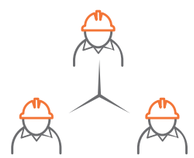
# TMK AT A GLANCE INNOVATION. INTEGRATION. EFFICIENCY.



**PIPE AND METALLURGICAL DIVISION**
Core strength of TMK's industrial base. Manufactures tubular billets, a wide range of pipes and components for key sectors — from energy and construction to mechanical engineering.

**ENGINEERING AND PIPELINE EQUIPMENT DIVISION**
Smart solutions for complex infrastructure. Delivers comprehensive engineering services and supplies high-performance fittings and connection systems for pipeline networks.

**OILFIELD SERVICES DIVISION**
Partnering with the energy industry. Provides integrated service solutions that support the entire lifecycle of tubular products used in oil and gas operations.



**INFRASTRUCTURE DIVISION**
Innovation behind the scenes. Offers a wide range of support services, including digital technology development, industrial safety, energy supply, and business process management.

bsd studio, Icon Designers/Shutterstock/FOTODOM

## Our goal is to create comfortable living conditions for employees in all regions where the company operates

water, soil, and air. Thanks to major environmental initiatives including AQA Genesis, AQA Crystal, and AQA Balance at our plants in Pervouralsk and Chelyabinsk, we have achieved a 96% water recycling rate. These projects employ closed-loop water systems, multistage filtration, and water reuse after purification.

At Seversky Pipe Plant, a unique bioengineering facility uses microorganisms to break down pollutants. In waste management, 92% of waste is reused, 2% is neutralized, and only 6% is sent to landfills. Our Volzhsky landfill features encapsulation technology that prevents contaminants from entering soil and groundwater — a similar facility will soon be built in Pervouralsk.

We are also cutting air emissions through modern gas-cleaning and filtration systems. Although TMK's operations have minimal impact on biodiversity, we are proactive here as well. At Taganrog Metallurgical Plant, for example, a system of pumping stations and fish protection devices redirects fish shoals to safe zones — a project recently recognized at the ECOTECH LEADER 2025 awards, a national award focused on recognizing best initiatives in ecology, environmental management, and green technology.

**Which social initiatives are currently in focus?**
TMK operates in nine Russian regions, and our mission is to enhance quality of life for our employees and their families. In 2024, a new medical center opened in Pervouralsk with TMK's support: we financed renovations and purchased advanced equipment. The center will serve more than 20,000 patients annually, while TMK employees can receive care through our voluntary health insurance program.

Together with the Sinara Charitable Foundation, we also support projects in education, culture, sports and urban development. For example, TMK helped renovate a children's sports playground in Volgograd and sponsored a street art festival in Chelyabinsk — initiatives that strengthen communities and create a vibrant urban environment.

**From a business perspective, what are the tangible benefits of sustainability?**
Sustainability is about long-term vision. Take, for instance, the switch to electric arc furnaces as part of TMK's Strategic Modernization Program. This has increased efficiency, improved environmental performance, and reduced greenhouse gas emissions.

TMK's strategic goal is to minimize industrial impact on the environment while producing and delivering high-tech products



## 2024 RESULTS

### CARING FOR EMPLOYEES AND LOCAL COMMUNITIES

SOCIAL INVESTMENTS:
$ **36** MILLION
↑ 2023: $30 million

EMPLOYEE TRAINING HOURS:
**3.1** MILLION
≈ 2023: 3.1 million

SHARE OF WOMEN AMONG EMPLOYEES:
**36%**
≈ 2023: 36%

LTIFR*:
**0.58**
↓ 2023: 0.60

FATALITIES:
**0**
↓ from 1 in 2023

OCCUPATIONAL HEALTH AND SAFETY SPENDING:
$ **38** MILLION
↑ 2023: $23 million

** Lost Time Injury Frequency Rate*

### REDUCING ENVIRONMENTAL IMPACT

ENVIRONMENTAL PROTECTION SPENDING:
$ **57** MILLION
↑ 2023: $55 million

GREENHOUSE GAS EMISSIONS (SCOPES 1 + 2):
**3.3** MILLION TONS OF $CO_2$ EQUIVALENT
↓ 2023: 3.6 million tons of $CO_2$ equivalent

SHARE OF RECYCLED WATER SUPPLY:
**96%**
≈ 2023: 96%

### UPHOLDING BUSINESS ETHICS

HOTLINE REPORTS ACCEPTED FOR REVIEW:
**357**
↓ 2023: 1,275

BREACHES OF CODE OF ETHICS:
**4**
≈ 2023: 4

## Sustainable development is a forward-looking commitment and a long-term investment in the future

# ADVANCED WASTEWATER TREATMENT

**The Chelyabinsk Pipe Rolling Plant is one of TMK's frontrunners in sustainable water use initiatives. Back in 2020, the plant became the first within the company to commission the AQA Crystal treatment complex — the first stage in a large-scale modernization of industrial wastewater facilities.**

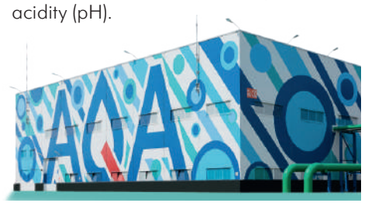
**In 2024, commissioning work continued on the second facility, AQA Balance, designed to treat both industrial and stormwater runoff.**

**AQA BALANCE**
**Industrial and stormwater treatment complex**

The system will create a unified water recycling cycle at the plant, completely eliminating the discharge of insufficiently treated wastewater. It purifies effluents generated during pipe rolling, as well as stormwater formed by precipitation and snowmelt. The water is treated to remove petroleum products, suspended and organic matter, metals, and salts.


**AQA CRYSTAL**
**Industrial wastewater treatment complex**

The complex eliminates the discharge of acidic effluents from pickling operations nearby Lake Shelyugino. Its multi-stage purification process brings the treated water close to distilled quality — free of hardness salts and organic inclusions, with minimal concentrations of oil products and heavy metals, and neutral acidity (pH).




At the Seversky Pipe Plant, a bioengineering treatment system uses specialized microorganisms to break down pollutants

TMK has achieved a **96%** level of water recycling thanks to major environmental projects

The modern ECO HOUSE TMK laboratory complex is located at the Volzhsky Pipe Plant

We also invest heavily in people. TMK employs over 50,000 professionals, and we want every one of them to see real opportunities for career growth. Creating comfortable working conditions has earned TMK a place among Russia's best employers: in 2024, we received Forbes "Gold" status for the fourth time. This matters, as younger generations are increasingly attentive to corporate responsibility and environmental impact.

Another great example is Horizons, our corporate innovation forum that's been running for over 20 years. It encourages employees to share ideas that enhance efficiency. In 2024 alone, these initiatives generated over 2 billion rubles in economic effect — and more than 80 billion since the forum's inception.

**What role do digital technologies play in TMK's success?**
Digitalization is one of our most powerful tools. The TMK Digital Production program automates key processes across our plants. A flagship project, POTOK ("Flow"), collects real-time data on technological processes, tracks product movement, optimizes equipment loading, and identifies production bottlenecks.

In 2024, POTOK was implemented at the Seversky, Volzhsky, Sinarsky, and Taganrog plants, and work is now under way at Chelyabinsk and Pervouralsk. These tools directly support resource efficiency, product quality, and risk reduction.

**What are TMK's key goals in the coming years?**
Our priorities include further reducing emissions, developing water and resource-saving technologies, expanding digital solutions, and constructing a new waste disposal site in Pervouralsk. We will continue to strengthen sustainability management, industrial safety, and social engagement.

**Can TMK's experience be useful for others in the industry?**
Absolutely. We are open to sharing our experience: whether it's in environmental innovation, digital transformation, or social responsibility. The more companies embrace sustainability, the greater the collective benefit for the economy and society. This isn't a passing trend, it's the foundation for a competitive, responsible business of the future. **YT**


Deemerwha studio/Shutterstock/FOTODOM

# NON-FINANCIAL REPORTING IN BIG BUSINESS: FASHION OR NECESSITY?

AS SUSTAINABILITY MOVES FROM BUZZWORD TO BUSINESS IMPERATIVE, RUSSIAN COMPANIES ARE CATCHING UP WITH GLOBAL STANDARDS — AND DISCOVERING THAT TRANSPARENCY CAN BE A SOURCE OF STRENGTH.

The idea of sustainable development has been around for decades, but it took shape in earnest with the launch of the Global Reporting Initiative (GRI) in 1997. Since then, non-financial reporting — covering environmental, social and governance (ESG) factors — has become standard practice for major corporations worldwide.

In Russia, progress has been slower. Less than half of the country's major corporations publish sustainability reports, compared with over 80% in Europe. Yet that gap is steadily narrowing as investors, regulators, and employees demand more transparency.

## "SUSTAINABILITY HAS BECOME STRATEGIC"

According to Sergei Grishunin, Associate Professor at the HSE School of Finance and Managing Director of the National Rating Agency, sustainability disclosure is now essential for competitiveness.

"Transparency strengthens a company's reputation and attracts responsible customers, partners and employees," he said. "Investors increasingly assess long-term risks through ESG criteria. Meanwhile, sustainability reporting helps companies identify inefficiencies, reduce costs and manage risks more effectively. It turns sustainability from a slogan into a tool of strategic management."

Grishunin also notes that detailed reporting helps attract Generation Z talent, who prefer working for responsible and transparent employers. It supports dialogue with stakeholders, strengthens supply chains and raises public awareness of sustainable practices.

"ESG reporting also improves access to global markets," he adds. "Within BRICS, companies that demonstrate high sustainability standards often enjoy better entry conditions."

## FROM VOLUNTARY TO REQUIRED

Until recently, sustainability reporting in Russia was largely voluntary. That changed in 2024: companies listed in the first and second quotation lists of the Moscow Exchange must now publish non-financial reports by August 31 of the following year.

The Bank of Russia and Ministry of Economic Development are drafting unified guidelines for disclosure, forming the basis of a forthcoming national standard for sustainability reporting.

At the same time, the state plans to use ESG data indirectly in regulation. A new "social capital standard" will measure corporate contributions to social wellbeing and national development. The results will inform federal and regional incentives that reward responsible practices.

"We're developing indices of shareholder value and inclusive growth to compare BRICS companies' sustainability practices," Grishunin says. "The goal is for businesses to speak the same sustainability language — which ultimately boosts trust and company valuations."

## WHAT MAKES A STRONG REPORT?

Market participants evaluate non-financial reporting by several key criteria:

- Compliance: adherence to international and Russian reporting standards.
- Strategic alignment: clear linkage between sustainability goals and corporate strategy.
- Comparability: consistency across time and with peers.
- Materiality and relevance: focus on what truly matters to stakeholders.
- Clarity: accessible, straightforward communication.

"TMK's sustainability reports, in our view, meet these criteria and reflect best practices not only in Russia, but across the BRICS community," Grishunin noted.

## NEW TRENDS IN SUSTAINABILITY DISCLOSURE

As reporting evolves, several trends are reshaping the landscape:

1. Integrated reporting — combining financial and non-financial indicators to show how both create long-term value.
2. Digitalization — data analytics and interactive dashboards make information easier to access and interpret.
3. AI tools — used to collect ESG data, assess risks and enhance transparency.
4. Expanded environmental metrics — including waste management and emissions reduction.
5. Social focus — investment in human capital, regional projects and national development goals.
6. Independent assurance — more companies now undergo third-party audits to strengthen trust.

A growing number of firms also publish specialized ESG reports — on climate change, biodiversity, or human rights — and structured data books with visual dashboards summarizing results.

## THE BIGGER PICTURE

Sustainability reporting builds trust, strengthens reputations and supports the transition to a circular, efficient economy. It also contributes to one of Russia's broader economic goals — doubling the capitalization of the national stock market.

Even though much of the disclosure remains technically voluntary, the direction is clear: more companies are embracing ESG principles not because it's fashionable, but because it's necessary for long-term growth and global credibility. **YT**

# 016

# FROM WASTE TO RESOURCE: HOW TMK AND THE STEEL INDUSTRY ARE CLOSING THE LOOP

THE METALLURGICAL INDUSTRY IS ONE OF THE PILLARS OF THE GLOBAL ECONOMY, SUPPLYING ESSENTIAL MATERIALS FOR CONSTRUCTION, ENERGY, TRANSPORT AND ENGINEERING. YET STEELMAKING INEVITABLY GENERATES BY-PRODUCTS — INCLUDING SLAGS, DUST AND SLUDGES — THAT MUST BE HANDLED RESPONSIBLY. TODAY, WASTE MANAGEMENT IS NO LONGER JUST AN ENVIRONMENTAL ISSUE: IT HAS BECOME A CORE ELEMENT OF BUSINESS STRATEGY, SHAPING PRODUCTION COSTS, COMPETITIVENESS, AND CORPORATE REPUTATION.

The Volzhsky Pipe Plant's experience showcases how state-of-the-art landfill can give a steel company control of its waste management

Around the world, steelmakers are transitioning to a circular economy model, in which up to 95–98% of by-products are recycled and returned to production. These technologies reduce emissions, cut natural resource consumption and are transforming the image of the industry itself.

## TURNING BY-PRODUCTS INTO VALUE

Steelmaking generates slags — mixtures of metal oxides such as iron, calcium, silicon and aluminum — which, when processed correctly, become valuable raw materials for cement, road construction, and other building materials.

Equally important is gas-cleaning dust, which contains iron, zinc, and other recoverable metals. In the EU, Japan, and North America, up to 98%, 80% and 65% (respectively) of zinc-bearing dusts are recycled, compared with only about 5% in Russia. Economic factors have long limited recycling technologies, but tighter environmental legislation is now encouraging the industry to recover valuable components and reduce waste stockpiles.

Other secondary materials include water treatment sludge, spent oils, and acids, and refractory waste. The key challenge for modern metallurgical enterprises is to minimize landfill and maximize recycling, converting by-products into marketable products that both protect the environment and conserve resources.

## GLOBAL PROGRESS: FROM DISPOSAL TO FULL-CYCLE RECYCLING

Over the past two decades, the global steel industry has moved from simple waste isolation to advanced reuse.

In the European Union, over 80% of blast furnace slag and more than 70% of steelmaking slag is recycled, as producers strive for "zero landfill." Austria's voestalpine supplies slags and dusts to the cement and zinc industries, while India's Tata Steel produces its own line of slag-based building materials — Tata Aggreto — used in infrastructure across the country.

**In 2024, the recycling rate of metallurgical waste in Russia exceeded 85%**

**Around 630 million tons of recycled materials are used annually in global steel production**

*Source: Bureau of International Recycling, May 2025*

In the United States, U.S. Steel and Cleveland-Cliffs operate new-generation landfills designed as raw material banks for future processing. In China, which produces over half of the world's steel, the recycling rate of industrial by-products has reached 95%, driven by rapid development of hydrometallurgical and plasma-based recycling technologies.

Russia's steelmakers are also progressing fast. According to the Ministry of Industry and Trade, the recycling rate of metallurgical waste in Russia exceeded 85% in 2024 and continues to grow.

## LEADERS OF CIRCULAR METALLURGY

Russian steel major MMK plans to recycle 7.5 million tons of slag in 2025, including stockpiled material, reusing at least 1.8 million tons in sinter production. Severstal, another Russian giant, has set a 98.5% recycling target under its 2030 Sustainable Development Strategy, while Lipetsk, Russia-based NLMK already reuses 100% of its iron-bearing waste and produces 21% of its steel using secondary raw materials.

TMK is also at the forefront. In 2024, the company launched a long-term Program for Industrial Waste and By-product Management, running through 2027. Its goal is to ensure stable recycling levels, expand secondary use, and reduce transport and storage costs.

TMK generated over 600,000 tons of waste in 2024 — but 94% was recycled or reused, while hazardous waste accounted for only 1.2%. Compared with 2023, total waste generation fell by nearly a third.

Most of this material consists of metallurgical slags, which undergo magnetic separation and crushing. Scrap is recovered and returned to production, while remaining fractions are certified as construction materials or used for land reclamation.

TMK invested 1.2 billion rubles ($15 million) in waste management in 2024, funding equipment upgrades, third-party processing services, neutralization technologies, and research.

## SAFE ISOLATION AND ENVIRONMENTAL INNOVATION

Even at high recycling levels, some waste remains unsuitable for reuse. TMK has therefore built specialized eco-landfills using advanced containment technologies.

** S.A. Yakornov, "Technology for Processing Zinc-Containing Dust from Electric Arc Furnaces to Produce Zinc Powder," 2023*

The Volzhsky Pipe Plant (VTZ) landfill, launched in 2013, was among the first in the industry to meet best available techniques standards. Designed for low- and medium-hazard waste (Classes III–V), it uses double filtration barriers and geosynthetic membranes to prevent contamination of soil and groundwater. Only 6–8% of VTZ's waste is sent there, with 92–94% recycled or sold as by-products. After twelve years of operation, the site remains less than one-third full — clear evidence of the plant's recycling success.

A unique feature of the site is the "Carbon Farm" project: trees and shrubs planted on reclaimed sections capture significant amounts of $CO_2$, turning the area into a green zone. The site also serves as an educational hub for university students, industry professionals, and community representatives.

Inspired by this success, the Pervouralsk Pipe Plant (PNTZ) is developing its own modern landfill, scheduled for completion by 2028. It will feature 13 sections, double protective barriers made of bentonite mats and geomembranes, and an incinerator for safe thermal treatment. The project will create over 100 new jobs and strengthen regional environmental safety.

Steelmaking generates slags, which, when properly processed, become valuable raw materials for construction and other industries

The "Carbon Farm" climate project at the Volzhsky Pipe Plant is located on a reclaimed, encapsulated section of the landfill, turning it into a green zone

## DIGITAL TRANSFORMATION AND NEW TECHNOLOGIES

The future of metallurgical ecology lies in innovation. Artificial intelligence is increasingly used to analyze waste composition and optimize recycling flows. Robotic sorting systems deliver higher precision and better-quality secondary materials.

Emerging plasma technologies can decompose complex and hazardous waste — including electronic scrap — with minimal emissions, while bioleaching methods use microorganisms to extract metals from low-grade residues once deemed unrecyclable.

Blockchain-based systems are also entering the sector, bringing full transparency to the waste management chain — from generation to final recycling — and building trust between producers, processors, and consumers of secondary materials.

TMK invested **1.2** billion rubles ($15 million) in waste management initiatives *

* In 2024

## A RESOURCE FOR THE ECONOMY AND SOCIETY

Investment in recycling pays off by reducing raw material purchases and landfill costs. Reusing scrap saves millions of tons of iron ore and coal, significantly lowering the carbon footprint of steel production.

For local communities, projects like these mean new jobs, research opportunities, and improved quality of life.

Across the world — and increasingly in Russia — the steel industry is proving that waste is no longer a by-product. It is a resource: a source of value, innovation, and sustainability. TMK is part of this global movement, already recycling more than 94% of its waste and safely isolating the rest using world-class technologies. **YT**

# 020

# A LIVING MONUMENT TO THE SOUL OF URALS METALLURGY

INDUSTRIAL ARCHITECTURE HAS ALWAYS CARRIED A HINT OF SACREDNESS. FORGED IRON COLUMNS RISE LIKE ORGAN PIPES, BRICK VAULTS GLOW LIKE CANDLELIT CHAPELS — AND INSIDE FORMERLY BUSTLING WORKSHOPS AND MILLS, THE PULSE OF HUMAN LABOR BECOMES ART. TMK'S MOST ICONIC CULTURAL LANDMARK, THE SEVERSKAYA DOMNA MUSEUM COMPLEX, PERFECTLY CAPTURES THIS SPIRIT. FOR 165 YEARS, IT HAS STOOD AT THE HEART OF RUSSIA'S METALLURGICAL STORY, WITNESSING ERAS OF PROSPERITY, DECLINE, AND REVIVAL — AND CONTINUES TO INSPIRE ADMIRATION TODAY.

In 2025, the Seversky blast furnace marked its 165th anniversary

In the 19th century, laborers carried raw materials up the factory's inclined bridge to the furnace's charging platform

SEVERSKAYA DOMNA

The blast furnace at the Severskaya Domna museum complex owes its origin to the Turchaninov dynasty, one of the pioneering industrial families of the Urals. Their story, part legend and part history, still fascinates.

Some say Alexei Turchaninov was the illegitimate son of Elizabeth Petrovna (Empress of Russia from 1741 until her death in 1762), rewarded with state-owned factories. Others tell of a self-made entrepreneur who built his fortune through talent and integrity. Whatever the truth, he became the owner of the Sysert Mining District, which included the Polevskoy, Seversky and Sysert plants — laying the foundation of a metallurgical empire.

By the early 19th century, inheritance disputes had left many factories in decline. That changed in 1832, when Pavel Solomirsky, a descendant of the family, took charge. His bold modernization program — new equipment, paid debts, and secured raw materials — breathed new life into the region's industry.

## THE FIRST BLAST FURNACE

One of Solomirsky's most visionary moves was creating a full-cycle production system in Polevskoy, from ore to finished iron. This called for a new furnace — and so, in 1860, the Seversky blast furnace was born.

Built based on the best German designs of the time, it featured iron hoops reinforcing the brickwork and a cast-iron platform for loading raw materials. Inside, the process unfolded like alchemy:

***Dmitry Markov, Managing Director, Seversky Pipe Plant:***

*"The museum complex has become an important cultural center that attracts not only local residents, but also guests from other regions. It hosts art exhibitions, photography displays, and other creative events. The restored workshops provide space for theater productions, meetings with scientists, actors and writers, as well as corporate gatherings. All this contributes to our spiritual growth and enriches our emotional experience."*

***Anna Trepalova, Head of Industrial Tourism at TMK::***

*"One of TMK's strategic objectives is to promote the development of the regions where the company operates, which includes a strong cultural and educational dimension. To showcase both the tangible and intangible heritage of metallurgy, TMK is actively developing industrial tourism at its facilities. The Severskaya Domna museum complex houses 30,000 artefacts related to the history of Ural metallurgy, and welcomes over 20,000 visitors every year."*

Visitors can experience the history of metallurgy at this unique museum complex

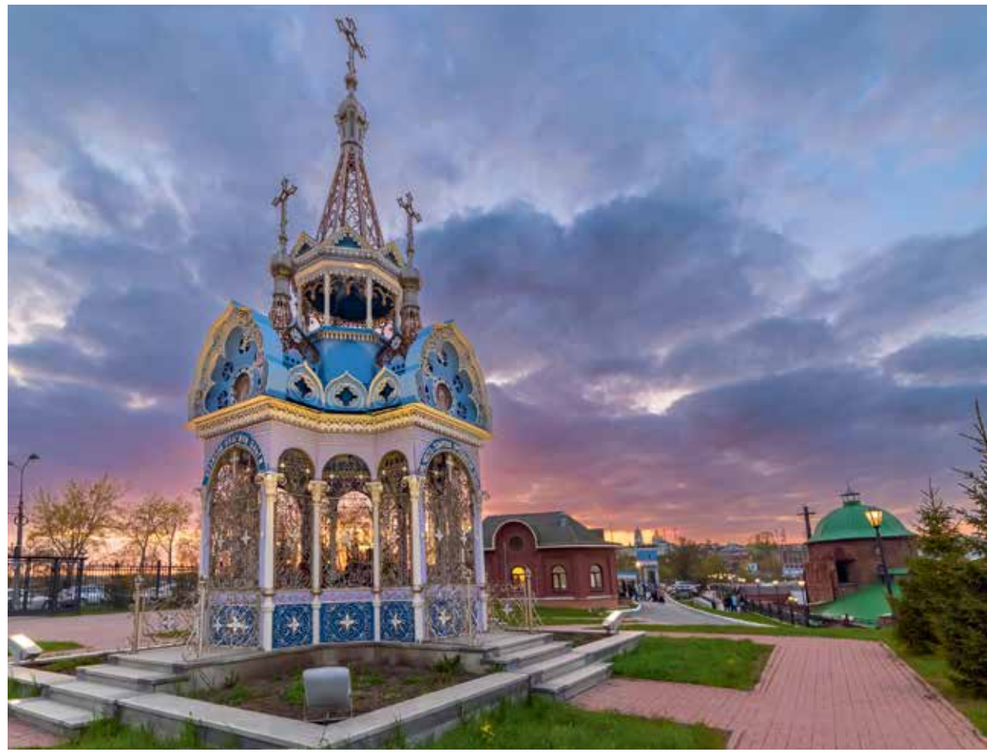
The first Seversky blast furnace produced **10–16** tons of pig iron per day

After modernization in the late 19th century and the introduction of hot blast technology, output rose to **45** tons a day

**FILMOGRAPHY OF THE SEVERSKY BLAST FURNACE**

**Demidovs (1983)**, directed by Yaropolk Lapshin

**The Gloomy River (Ugrium-Reka, 2020)**directed by Yuri Moroz



The Spaso-Preobrazhenskaya Chapel stands on the grounds of the Seversky Pipe Plant

***Daria Ryapusova, Director of the Severskaya Domna museum complex:***

*"The Severskaya Domna museum complex is a unique monument of industrial heritage — unmatched in beauty and in the degree to which its artefacts have been preserved. Our museum offers an opportunity to immerse oneself into the history of metallurgy, trace the evolution of pig iron production, and feel pride in the achievements of earlier generations of metallurgists."*

***Damir Yusupov, pilot and Hero of Russia:***

*"The museum has a wonderful and welcoming atmosphere. I often visit the Severskaya Domna museum complex and discover new details from its history every time. These experiences are endlessly enriching."*

iron ore, charcoal, and flux descended from above, while a current of hot air surged upward, turning stone into metal.

Visitors marveled at this feat of engineering. The academic Pyotr Simon Pallas, who toured the facility, described "a modest workforce and a single furnace, yet one capable of producing remarkable iron."

A second furnace followed in 1887, doubling production. But by 1914, the depletion of local charcoal supplies forced the furnaces to fall silent. The era of cast iron gave way to steelmaking — and with it, the first furnace slipped into decades of silence.

## THE REBIRTH OF AN ICON

For 35 years the old blast furnace stood abandoned — a relic of a bygone era. Yet the people of the Seversky plant never stopped caring. By the late 1960s, a movement to preserve the site gained momentum.

In 1969, a group of enthusiasts led by the plant's director, now known as the Seversky Pipe Plant (STZ), proposed transforming it into a museum. Less than a year later, on April 21, 1970, the furnace was reborn as a museum of industrial heritage.

***Anton Sergeyev, soloist, Yekaterinburg Musical Comedy Theater:***

*"It's a real pleasure to visit this magnificent museum — and I'll certainly come back again."*

***Yevgeny Kozhevnikov, organizer of the first Seversky blast furnace tour (1970):***

*"The Seversky blast furnace is not merely an example of Ural industrial architecture — it embodies the efforts of many generations. I take pride in knowing that the first tour I organized laid the foundation for the museum's future tourism route."*

Curators began collecting artefacts and personal testimonies from workers. The initiative gained national recognition, and the furnace was officially designated a federal cultural monument.

## A CULTURAL LANDMARK IN MOTION

Under Yevgeny Bubnov, who became STZ's director in 1976, the museum expanded with new exhibitions dedicated to the courage and skill of generations of metallurgists. A large-scale restoration followed in the 1980s, renewing the site's interiors and fa ades.

In 1997, the furnace received a new symbol — a delicate heron sculpture placed atop its dome, representing the grace and craftsmanship of local metallurgists.

The Severskaya Domna museum complex soon became a favorite subject for artists and

Light installations inside the Severskaya Domna museum complex have become a beloved tradition

filmmakers, appearing in numerous films and photo projects. Even today, its red-brick silhouette continues to inspire creators who see in it not just history, but poetry cast in iron.

### A NEW CHAPTER UNDER TMK

When the Seversky Pipe Plant joined TMK in 2002, the company embraced the site's cultural legacy. A major reconstruction began soon thereafter, culminating in a grand reopening on January 23, 2009.

The latest transformation, completed in 2022, turned the museum into a modern, interactive complex that bridges the past and present. Visitors can explore preserved 19th century workshops, an open-air machinery yard, the Spaso-Preobrazhenskaya Chapel, and the blast furnace itself — almost unchanged since 1860.

### WHERE HERITAGE LIVES ON

In 2024, the Severskaya Domna museum complex was awarded the title: Treasure of the Middle Urals. This recognized its contribution to preserving Russia's national industrial heritage.

Today, more than 20,000 visitors a year come to experience the story of Urals metallurgy through exhibitions, tours, and creative events. To celebrate its 165th anniversary, the museum launched a new route, Metallurgy Through the Ages: From the Forge Hammer to the Digital Plant.

The museum also takes part in major nationwide events such as Night of the Museums, when visitors explore interactive zones, attend lectures and concerts, and immerse themselves in the sounds and textures of industrial art.

### A MONUMENT TO THE HUMAN SPIRIT

From its first roaring flames to the quiet hum of museum halls, the Severskaya Domna museum complex remains a living witness to the evolution of Russian industry.

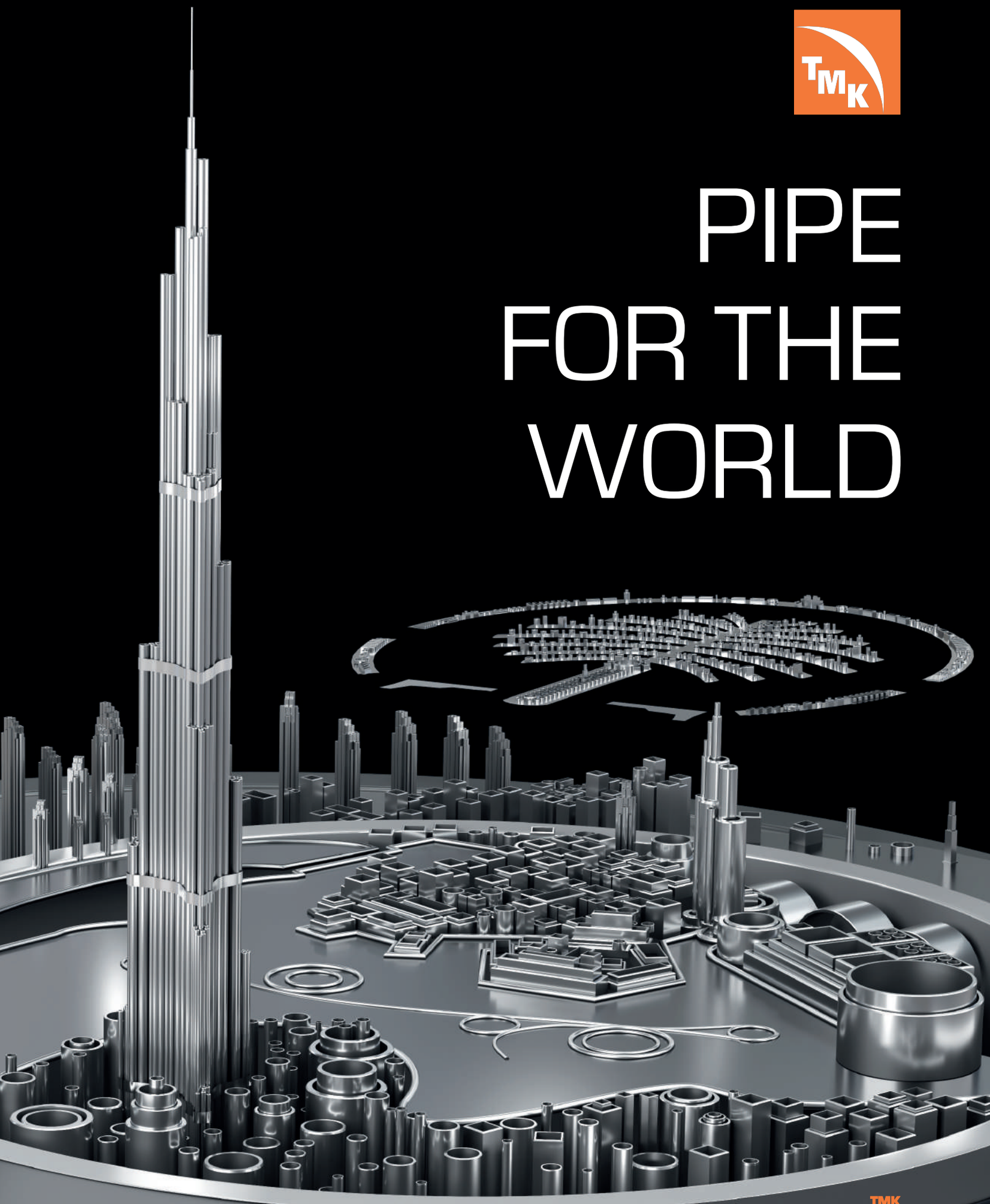
It is more than brick and iron — it is a cathedral of human ingenuity, where the devotion of generations continues to burn bright. **YT**

***Vladimir Shveykin, Doctor of Technical Sciences, Director of the Institute of Engineering Science, Urals Branch of the Russian Academy of Sciences:***

*"I express deep gratitude to the plant's management, local historians, and creative professionals for their tremendous work in preserving our heritage. The exhibitions presented here go above and beyond international best practices."*

***Konstantin Bugrov, Doctor of Historical Sciences, Deputy Director of the Institute of History and Archaeology, Urals Branch of the Russian Academy of Sciences:***

*"The Severskaya Domna museum complex is both a symbol of industrial Russia's pride and the pride of the Urals. This unique structure holds immense importance for our country. It would be wonderful if other industrial complexes in the region could follow a similar path of transformation — such initiatives could attract even more eager visitors than they already do today."*

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