

THE WORLD FOUNDRY ORGANIZATION
THE REFERENCE POINT FOR THE GLOBAL METAL CASTING INDUSTRY

CURRENT SITUATION AND COOPERATIVE CHALLENGES IN THE GLOBAL FOUNDRY INDUSTRY

*Australian Foundry Institute
60th Conference Surfers Paradise– Oct 8th – 10th 2026*



WFO Lifetime Legacy Sponsors and Supporting Organizations

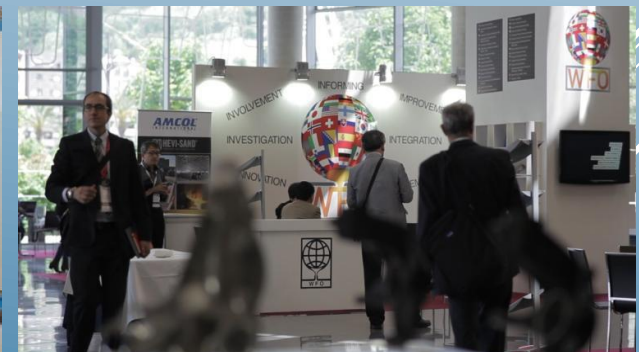




The **World Foundry Organization** is the recognised **centre of strategic foundry knowledge**, designed to develop, enhance and improve the production of metal castings, through the latest technical and sustainable industry practices. Currently, the WFO **represents 90% of global production**, being the **reference point for the global Metal casting industry**.

Through the **involvement of the member associations in 30 countries**, the WFO creates a network of technical knowledge and resources that is a vital tool to every foundry association, foundry and foundry worker throughout the world.

The WFO is a neutral body that represents the collective needs of the members on a global stage.





TECHNOLOGICAL

SCIENTIFIC

**The reference point for
global metalcasting**



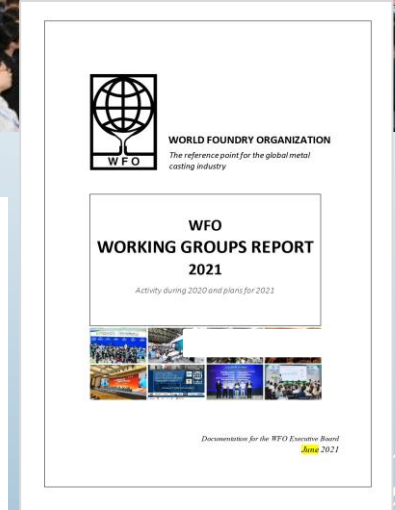
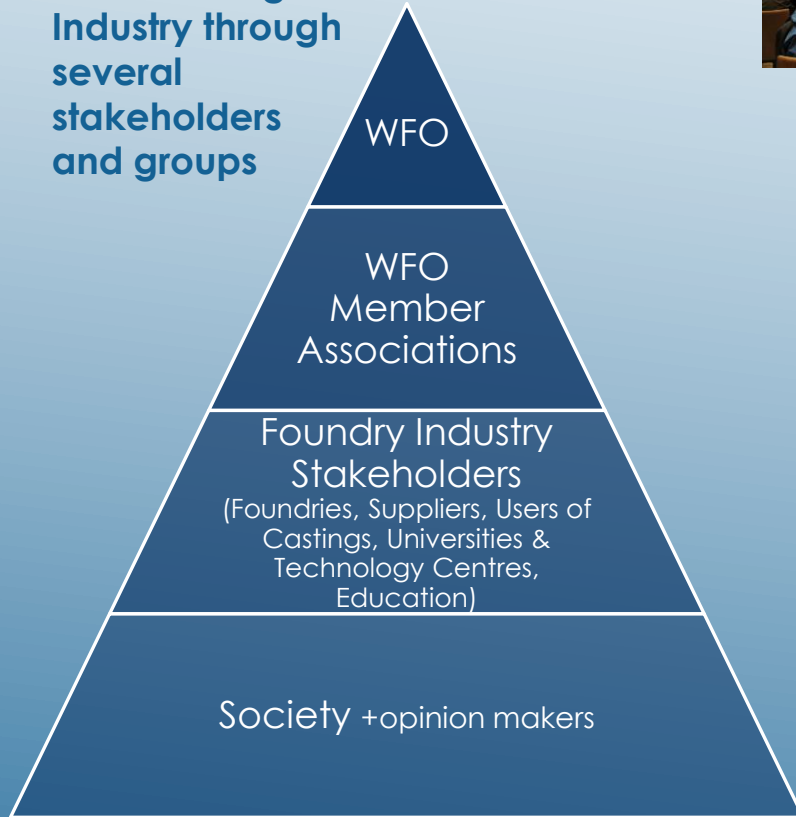
**Strategic Foundry Knowledge
and Networking**

STRATEGIC

INDUSTRIAL



The WFO establishes links with the global Metalcasting Industry through several stakeholders and groups

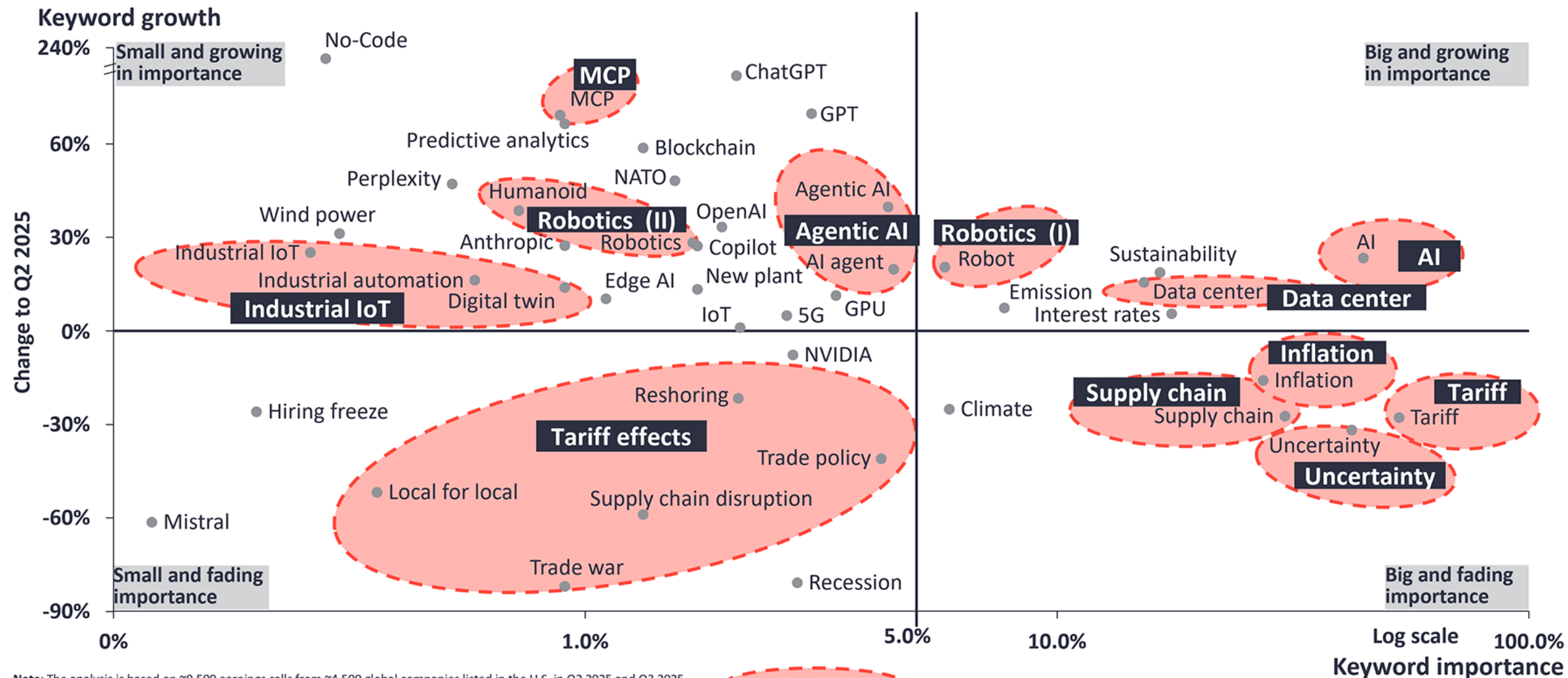


Value for national foundry industries through Member Associations

- Access to the technical knowledge gathered and shared by the WFO network, represented by over 30 countries.
- Possibility of developing or taking part in Technical Working Groups, with renowned worldwide professionals.
- Possibility of holding a high level technical event with the support and collaboration of the WFO: World Foundry Congress or Technical Forum.



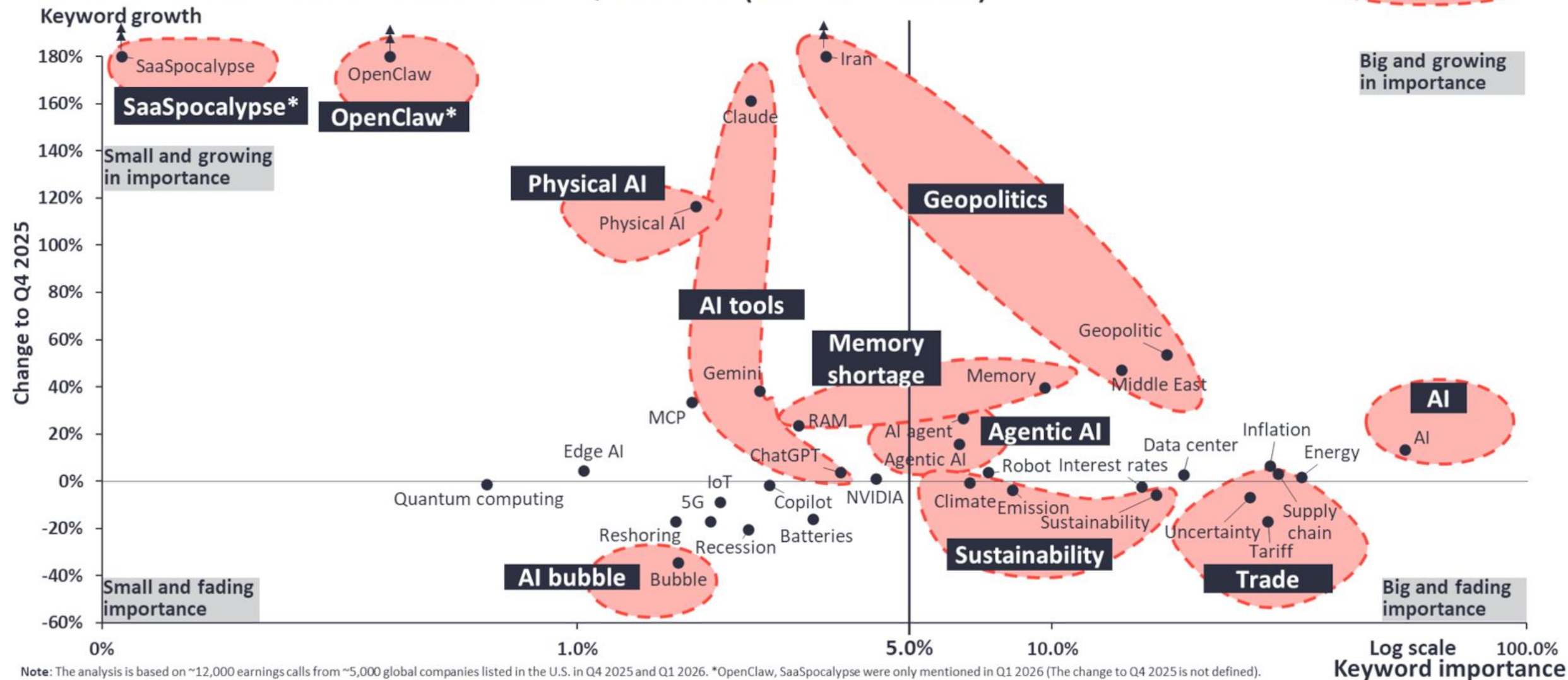
What CEOs talked about in Q3 2025 (vs. Q2 2025)



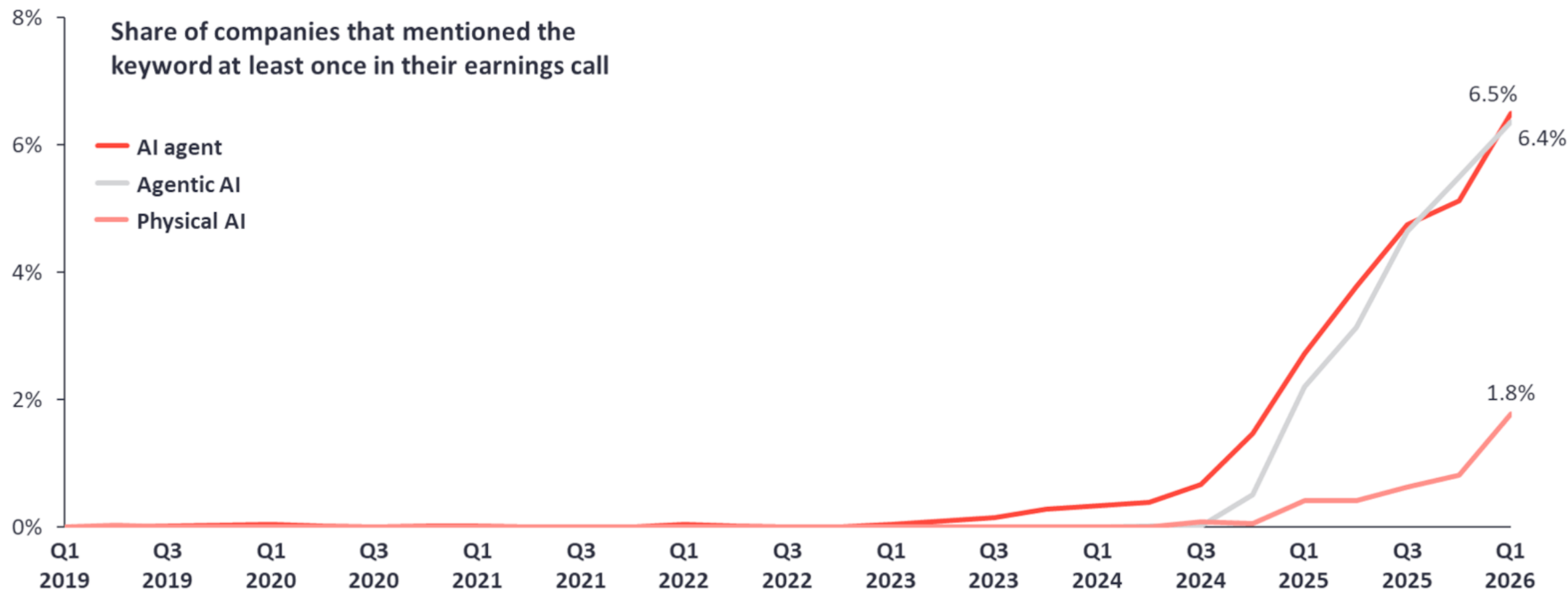
= Topic clusters

(Share of companies that mentioned the keyword in Q3 2025 at least once)

What CEOs talked about in Q1 2026 (vs. Q4 2025)



CEO mentions of “agentic AI,” “AI agents,” and “physical AI” in earnings calls Q1 2019–Q1 2026



Note: The analysis is based on +120,000 earnings calls from ~6,300 global companies listed in the US between Q1 2019 and Q1 2026.

Source: IoT Analytics Research 2026–Quarterly trend report: What CEOs talked about in Q1 2026. We welcome republishing but ask for citation with link to original post and company website.



2025 World at Work Report

BUSINESS CHALLENGES AND PRIORITIES

Top challenges keeping executives up at night:

- Increasingly **competitive marketplace**
- Keeping pace with **tech changes**
- Economic **uncertainty**

- ▶ 64% of executives are concerned their organization is **not built to withstand** today's geopolitical, economic and technological disruptions
- ▶ Despite concerns about the macroeconomic climate, two-thirds (67%) of executives are still **prioritizing growth** over the next year (an increase of 7% from 2024).



OVERVIEW OF GLOBAL FOUNDRY PRODUCTION



WORLD FOUNDRY ORGANIZATION
The reference point for the global metal casting industry

WFO GLOBAL FOUNDRY REPORT
March 2024

2025

ACTUAL SITUATION OF THE WORLDWIDE CASTING INDUSTRY



December 2025
Rev 2 March 2026



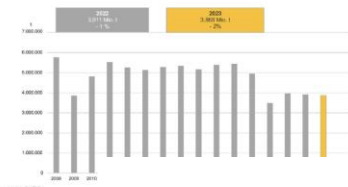
WFO Global Foundry Report 2024
[World Foundry Production | GERMANY]

FOUNDRY PRODUCTION IN GERMANY

National representation in the WFO:
CLAUSTHAL UNIVERSITY OF TECHNOLOGY
VEREIN DER FREUNDE UND FÖRDERER
DER GIEßEREITECHNIK
WWW.TU-CLAUSTHAL.DE

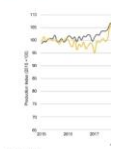


Production development of German foundries (in t)



Figure

Production development
March 2024



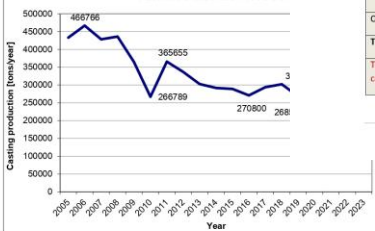
Figure

[10 | WFO Global Foundry]

WFO Global Foundry Re
[World Foundry Production | CZECH]

stagnated. The production composition of castings in Czech foundries pr labour productivity, which is the only way to reduce prices and, as a res The substitution of raw material sources brought about a new pheno chemically diverse and often different inputs, which easily fluctuates production.

FERROUS METALS PRODUCT



Graph 2. Total casting production in the Czech Republic – Fe metals (2005 – 2023)

The production of steel castings (Graph 3) is directed towards alloyed materials. However, the price of alloys for steel is skyrocketing and designers are looking for other solutions. Carbon steel is gradually being replaced by spheroidal graphite cast iron. For the last four years, steel production has been around 40 thousand tons per year. A huge and fundamental impact on the production of steel castings was the termination of the production of the largest giant Viteks Heavy Machinery and Pilsen Steel. Heavy castings were obtained by competitors from England and Germany. It was all the worse for us because the castings from these foundries were linked to direct domestic engineering production. Another effect of the decline is the focus of engineering products on Russia, with which trade has ceased. Steel foundries are heading to Western markets, where it is not easy to succeed in terms of price.

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WFO Global Foundry Report 2024
[World Foundry Production | POLAND]

they had reached very high levels after Russia's invasion of Ukraine. An additional problem was the constantly rising minimum wage, which resulted in an increase in employee salaries. This whole situation has led to the closure of several foundries in Poland.

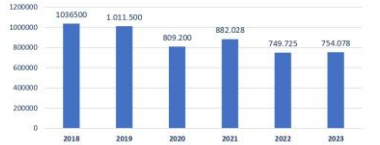


Figure 1. Changes in the production volume of castings in Poland in 2018-2023 (in tons)

In 2023, total casting production accounted for 754 078 tons incl. 492 486 tons of ferrous castings, which is 65,3% of total casting production. Production of nonferrous casting was on a lower level of 261 592 tons which consisted 34,7% of total casting production. The total production of castings in Poland in 2023 was 0,58% higher than the previous year.

Material	Output 2022 /estimated/	Output 2023 /estimated/
Total iron castings	335 540	339 540
Total ductile iron castings	114 886	117 886
Steel castings	37 060	35 060
Total ferrous alloy castings	485 486	492 486
Copper alloy castings	4448	4442
Aluminium alloy castings	252 008	250 000
Zinc alloy castings	5 559	5 050
Other nonferrous alloy castings	2 224	2 100
Total nonferrous alloy castings	264 239	261 592
Total ferrous and nonferrous castings	749 725	754 078

Table 2. Total casting production in Poland

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WFO Global Foundry Report 2024
[World Foundry Production | INDIA]

	2019-20	2020-21	2021-22	2022-23	2023-24
son	761075	965135	961100	1071310	947143
	781065	988028	970902	1069853	965065
	76047	88621	128636	124542	97828

Table 3. Tractor Sector Data (Figures in Units)

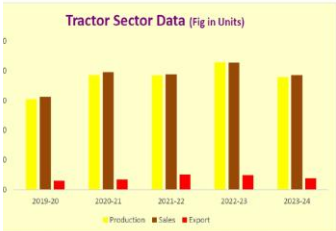


Figure 2. Tractor Sector Data (Fig in Units)

Export of Castings

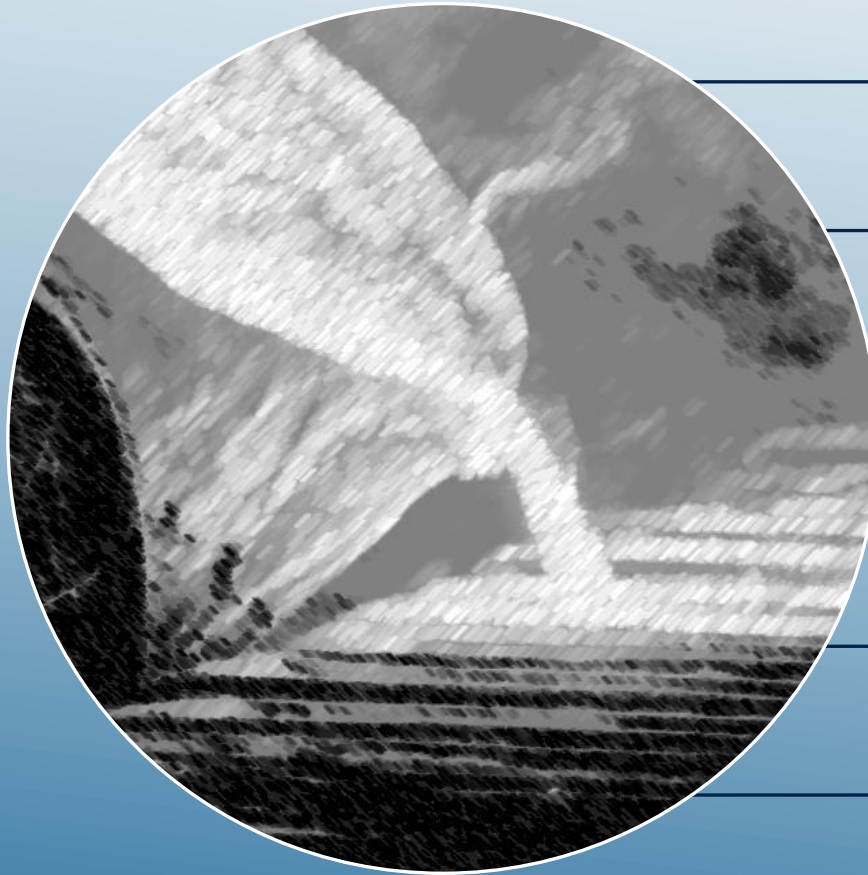
The export of castings from India from the f.y. 2020-21 onward till f.y. 2023-24 has shown significant growth (approx. CAGR 12.84%). India has achieved a momentous growth in casting exports due to a strong domestic manufacturing landscape. India is also experiencing growing demand from new markets, which is leading to considerable export gains. Additionally, India has been proactive in signing Free Trade Agreements (FTAs) with strategically significant countries to boost economic activities.

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Global Foundry production – Top 5 producers

Source: WFO Global Foundry Report 2025



China

50% >51 MT



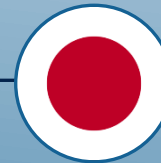
India

11% >15 MT



U.S.

9% >11 MT



Japan

3% >4MT



Germany

3% >3 MT

The Top 5
account for
76% of global
production

FOUNDRY PRODUCTION IN CHINA

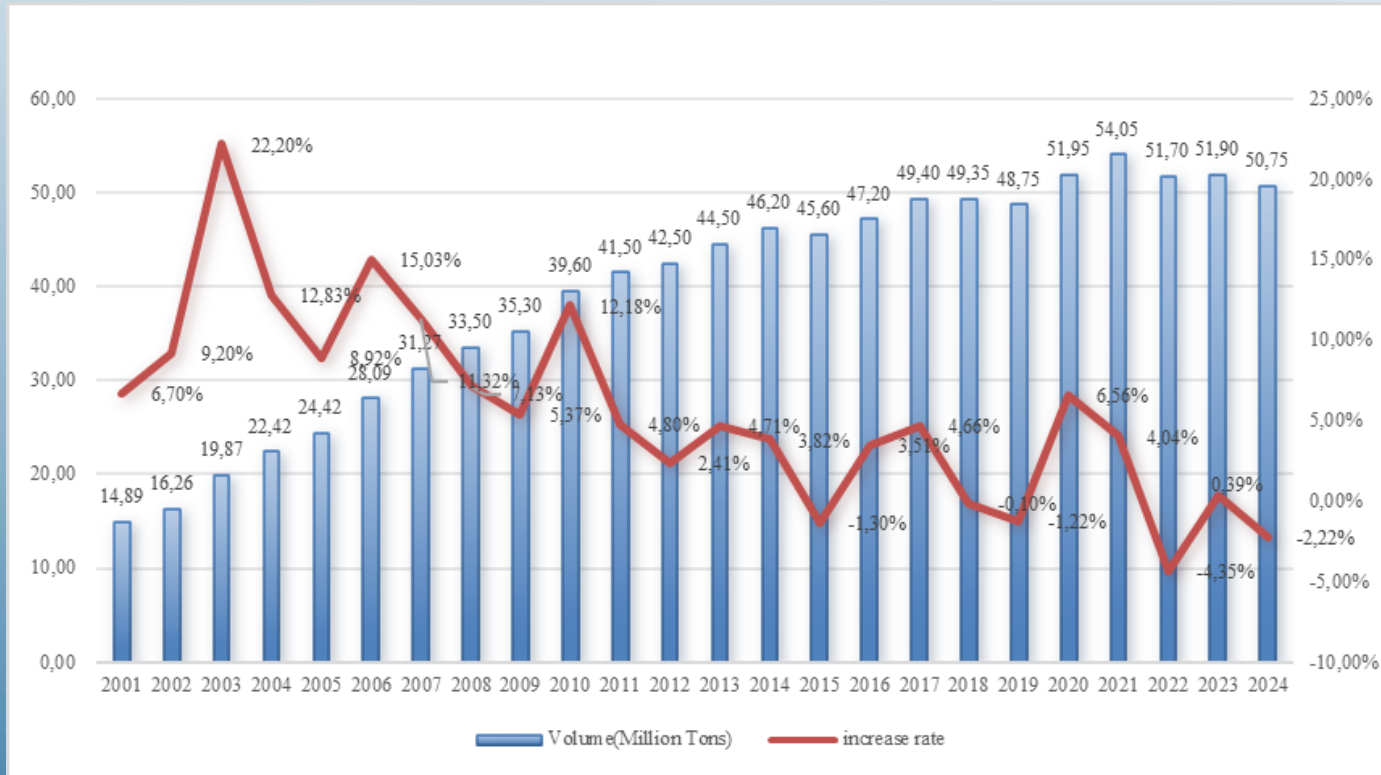


Figure: China's Casting Output, 2001-2024 (Million Metric Tons)

- 2018 to 2019 slightly **decreased**
- 2020 to 2021 recovery of downstream demand, 51.95 million tons and **54.05 million tons**, respectively, with a year-on-year increase of **6.56%** and **4.04%**.
- In 2022, due to the increasing downward pressure on the national economy, the production of castings experienced a certain degree of **decline**.
- In **2024**, China's total casting output reached **50.75 million metric tons**, a **decrease of 2.2 percent** year-on-year



FOUNDRY PRODUCTION IN CHINA

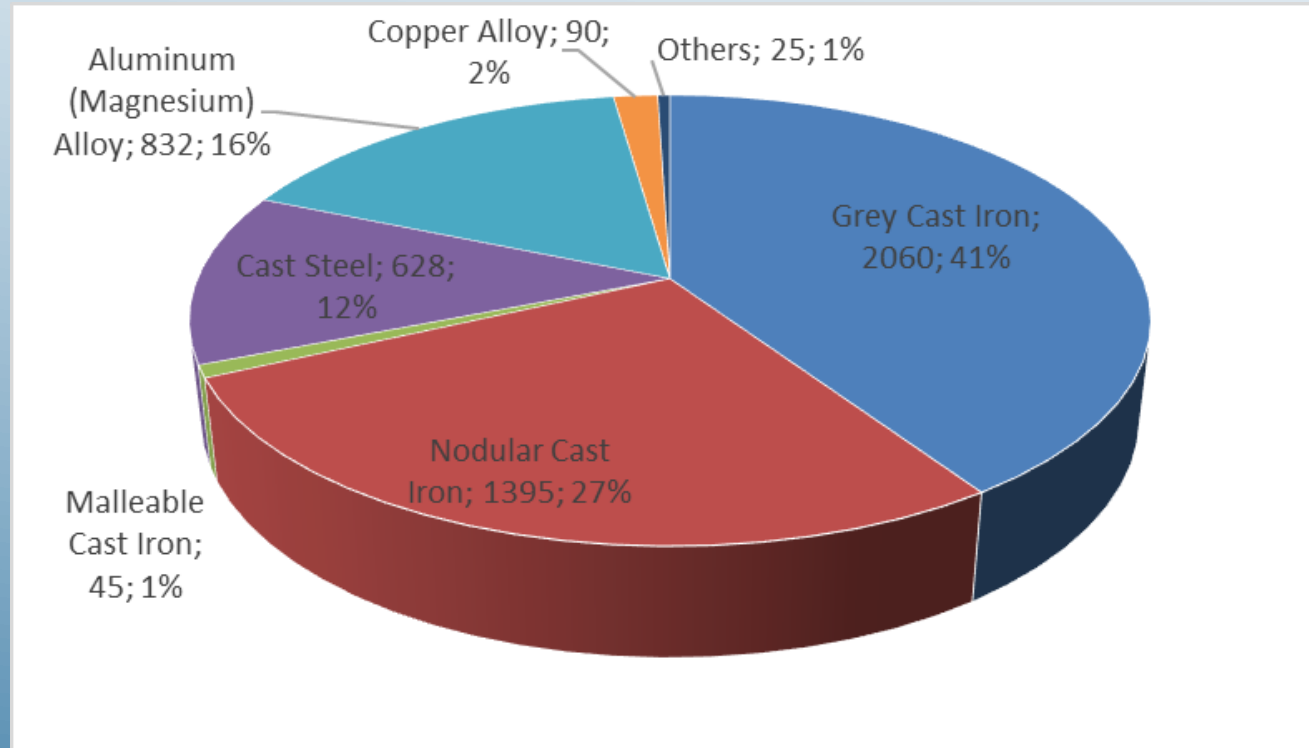


Figure: Share of Castings by Material Type, 2024



- Gray cast iron: 20.6 million tons, accounting for 40.6%;
- Ductile cast iron: 13.95 million tons, accounting for 27.5% (29% in 2023);
- Steel castings: accounting for 12.4%, unchanged from 2023;
- Aluminum (magnesium) alloy castings: the proportion has increased to 16.4%, driven by the EVs and the trend of lightweight;

FOUNDRY PRODUCTION IN CHINA

MARKET ANALYSIS

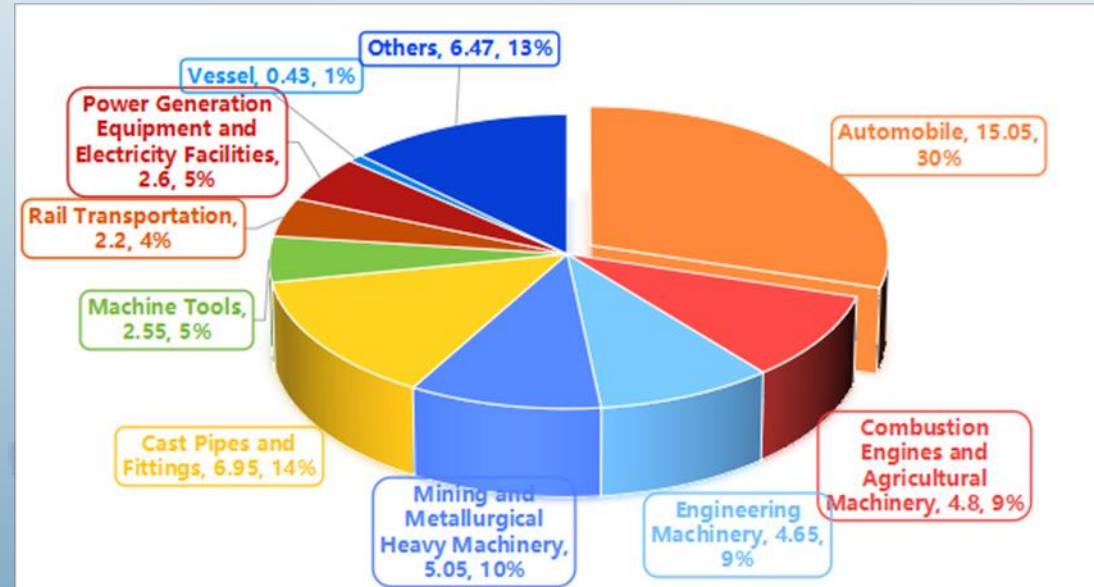


Figure:
Share of
Customer Sector
Demand for
Castings in
China, 2024
(Million Metric
Tons)

Figure:
Changes in Downstream
Demand for Castings in China,
2020-2024 (Million Metric Tons)

Year	Automobile	Combustion Engines and Agricultural Machinery	Engineering Machinery	Mining and Metallurgical Heavy Machinery	Cast Pipes and Fittings	Machine Tools	Rail Transportation	Power Generation Equipment and Electricity Facilities	Vessel	Others	Total
2020	15	5.4	4.9	4.7	8.53	2.27	2.2	2.5	0.35	6.1	51.95
2021	15.4	5.55	5.2	5	8.85	2.6	2.15	2.35	0.35	6.6	54.05
2022	14.75	5.15	4.8	5.2	8.3	2.45	2.1	2.15	0.35	6.45	51.7
2023	15.2	5.05	4.3	5.15	8.1	2.4	2.15	2.5	0.4	6.65	51.9
2024	15.05	4.8	4.65	5.05	6.95	2.55	2.2	2.6	0.43	6.47	50.75
Increase Rate	-1.00%	-5.00%	8.10%	-1.90%	-14.20%	6.30%	2.30%	4.00%	7.50%	-2.70%	-2.70%

FOUNDRY PRODUCTION IN CHINA

MARKET ANALYSIS

Automotive sector

In 2023, the production volume of automobiles in China has reached 30.16 millions(+11.8%). The production and sales in 2024 is estimated to reach 31 millions.

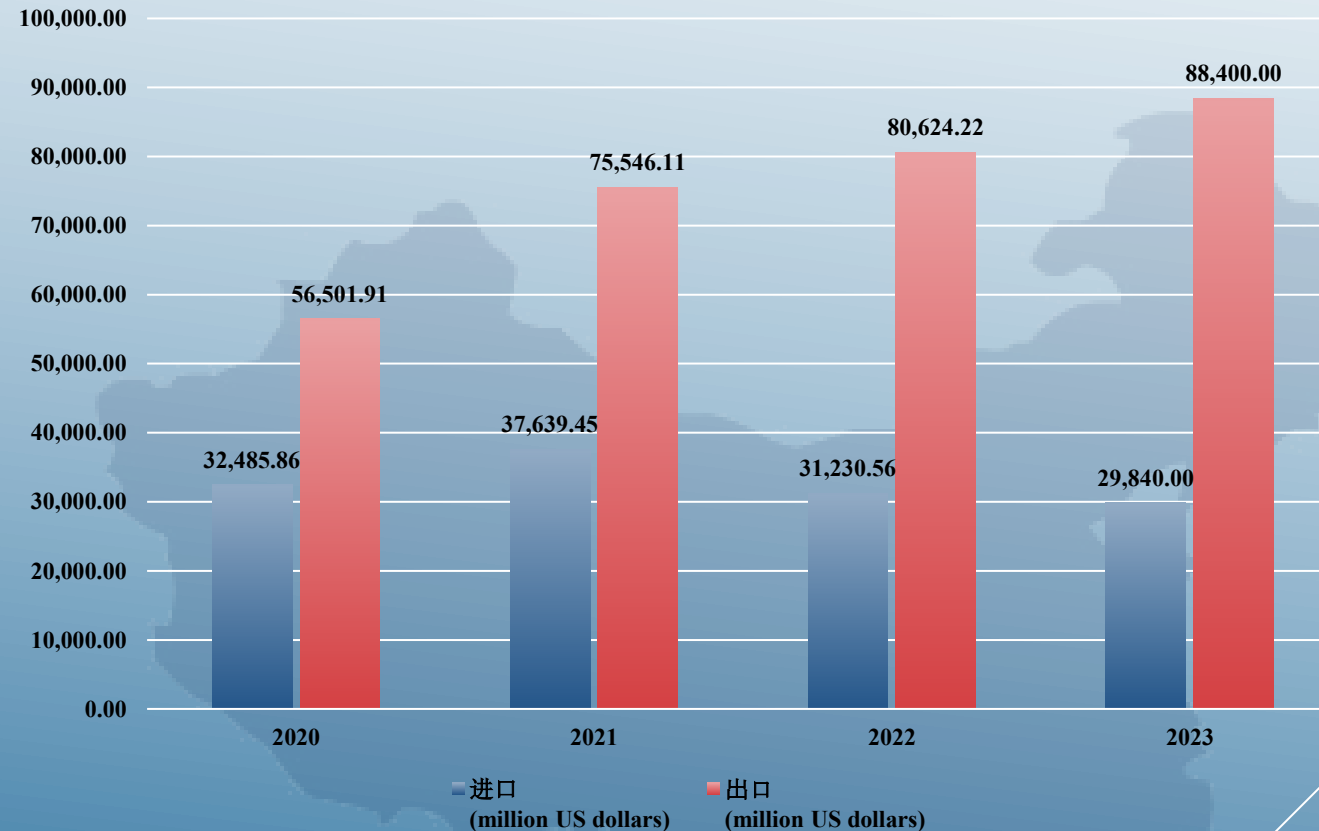


Figure:
The import and export amounts of China's automotive parts from 2020 to 2023

FOUNDRY PRODUCTION IN INDIA

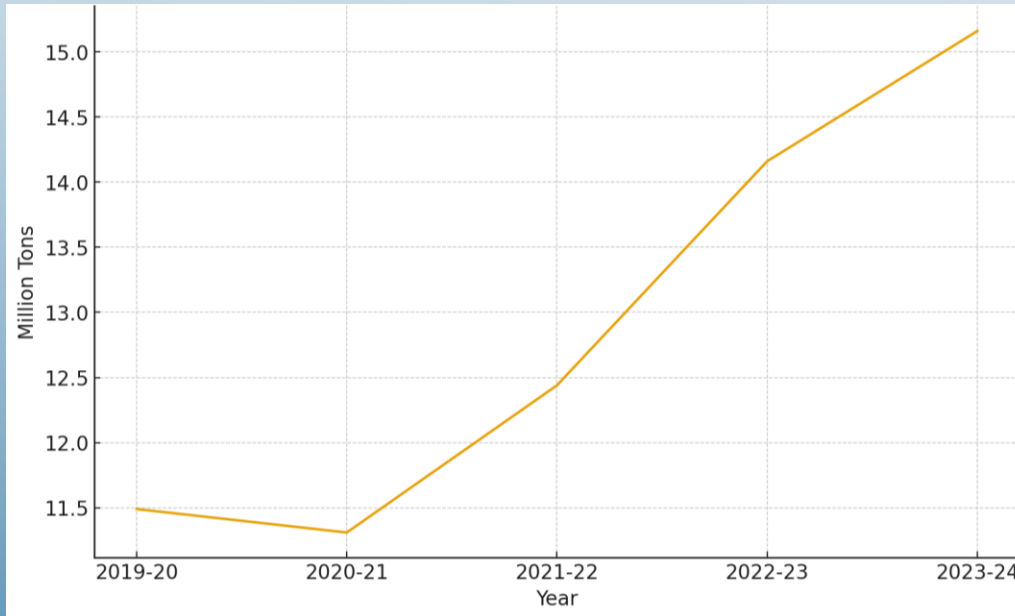
The Indian economy is projected to **expand at a rate of 6.3 per cent to 6.8 per cent** in the financial year 2025-26

Major Factors Propelling Economic Growth in India

- **Domestic Demand & Consumption:** Strong private consumption — both rural (supported by agriculture) and urban — remains the backbone of growth.
- **Investment & Government CapEx:** The expectation is that government capital expenditure (infrastructure, public works, etc.) along with corporate/private investment will support growth for 2025-26.
- **Resilient Services & Manufacturing Sectors:** Mixed but fairly solid performance in services and manufacturing sectors provide a diversified support base, rather than growth being overly reliant on one sector.
- **Favorable Global Conditions:** Lower global commodity prices (particularly energy) help control input costs and inflation; also domestic supply-chain improvements (e.g. agriculture) help stabilize food prices.



FOUNDRY PRODUCTION IN INDIA



Casting Production in India (in Million Tons)
Source: Foundry Informatics Centre, IIF

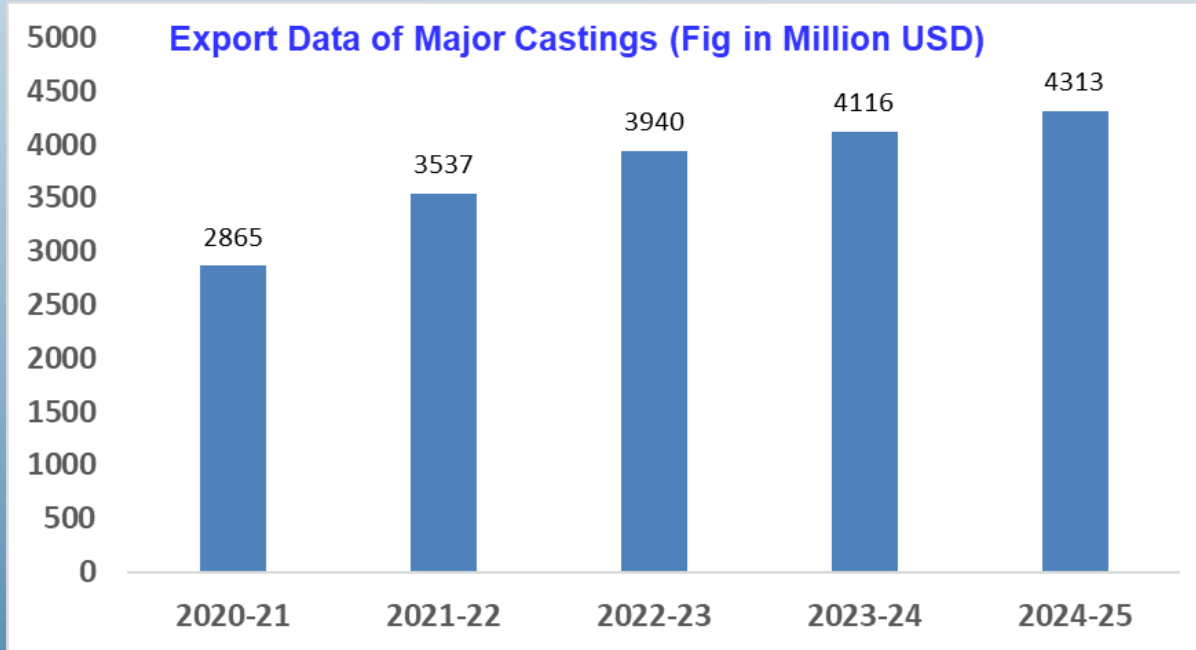


Casting Production in India (in Million Tons)
Source: Foundry Informatics Centre, IIF

- Emerging **Defence** Sector undergoing rapid transformation
- Modernization of **Railways**
- Growing share of **higher-value castings** — especially non-ferrous and precision die-cast parts as demand for lightweight, fuel-efficient automotive parts
- Larger or more capable foundries **investing** in automation, new processes, improved quality control

	2019-20	2020-21	2021-22	2022-23	2023-24
Grey C.I.	7.72	7.91	8.62	9.83	10.42
SG Iron	1.22	1.10	1.26	1.46	1.61
Malleable	0.05	0.05	0.05	0.05	0.05
Steel	1.14	0.91	1.05	1.24	1.36
Non Ferrous	1.36	1.34	1.46	1.58	1.72
TOTAL	11.49	11.31	12.44	14.16	15.16

FOUNDRY PRODUCTION IN INDIA



Export Data of Major Castings
(Fig in Million USD)



Growth in casting exports due to a **strong domestic manufacturing** landscape

Growing **demand from new markets**

India has been proactive in signing **Free Trade Agreements** (FTAs) with strategically significant countries to boost economic activities

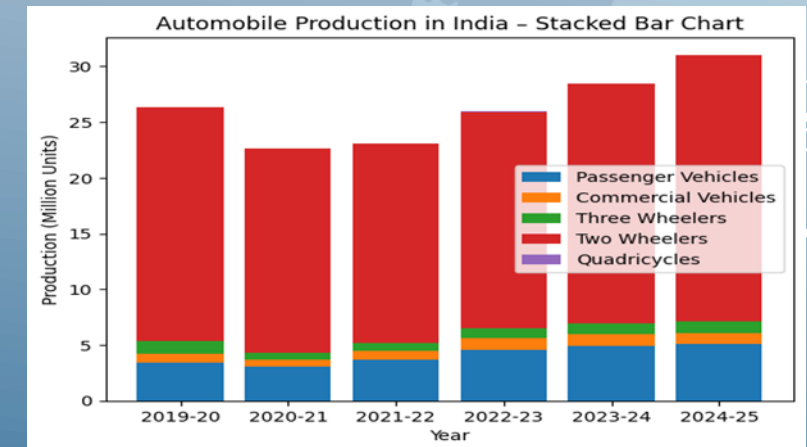
FOUNDRY PRODUCTION IN INDIA

Category	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
Passenger Vehicles	3.425	3.062	3.651	4.587	4.902	5.061
Commercial Vehicles	0.757	0.625	0.806	1.036	1.068	1.033
Three Wheelers	1.133	0.615	0.759	0.856	0.996	1.050
Two Wheelers	21.033	18.350	17.821	19.459	21.469	23.884
Quadricycles	0.006	0.004	0.004	0.003	0.005	0.006
Grand Total	26.353	22.656	23.040	25.940	28.439	31.034

AUTO INDUSTRY PRODUCTION
Source: SIAM (Figures in Million Units)



Automobile production in India



The Indian automobile industry is entering a **strong multi-year expansion cycle** driven by manufacturing revival, export momentum, and rapid technology adoption. The sector is expected to remain one of the fastest-growing across all major segments

FOUNDRY PRODUCTION IN INDIA

Construction equipment industry

‘Developed Nation’ by 2047: India is envisaging a revolution of sorts in infrastructure sector in the next quarter of a century by **building sustainable and modern infrastructure** that can match that of any developed country, particularly through **advanced transportation networks, including roads, railways, ports, and airports**, India intends to accomplish the overall goal of **over 8% growth** in future



Tractor industry

Category	2020-21	2021-22	2022-23	2023-24	2024-25
Production	0.965	0.961	1.071	0.947	1.008
Sales	0.988	0.971	1.070	0.965	1.039
Export	0.089	0.129	0.125	0.098	0.099

Tractor Sector Data Source: TMA (Figures in Million Units)

Ratings agency ICRA has forecasted continued expansion, upgrading outlooks for FY2026. Earlier estimates projected 4–7% growth; recent analysis suggests a **stronger 8–10% expansion** due to monsoon support, GST cuts, and pent-up demand.



Source: WFO Global Foundry Report 2025

FOUNDRY PRODUCTION IN THE USA



American foundries have a current capacity of 19 million tons. Plant Utilization in 2024 saw a steady **decline from 68.8% early in the year to 49.8% by years end.**

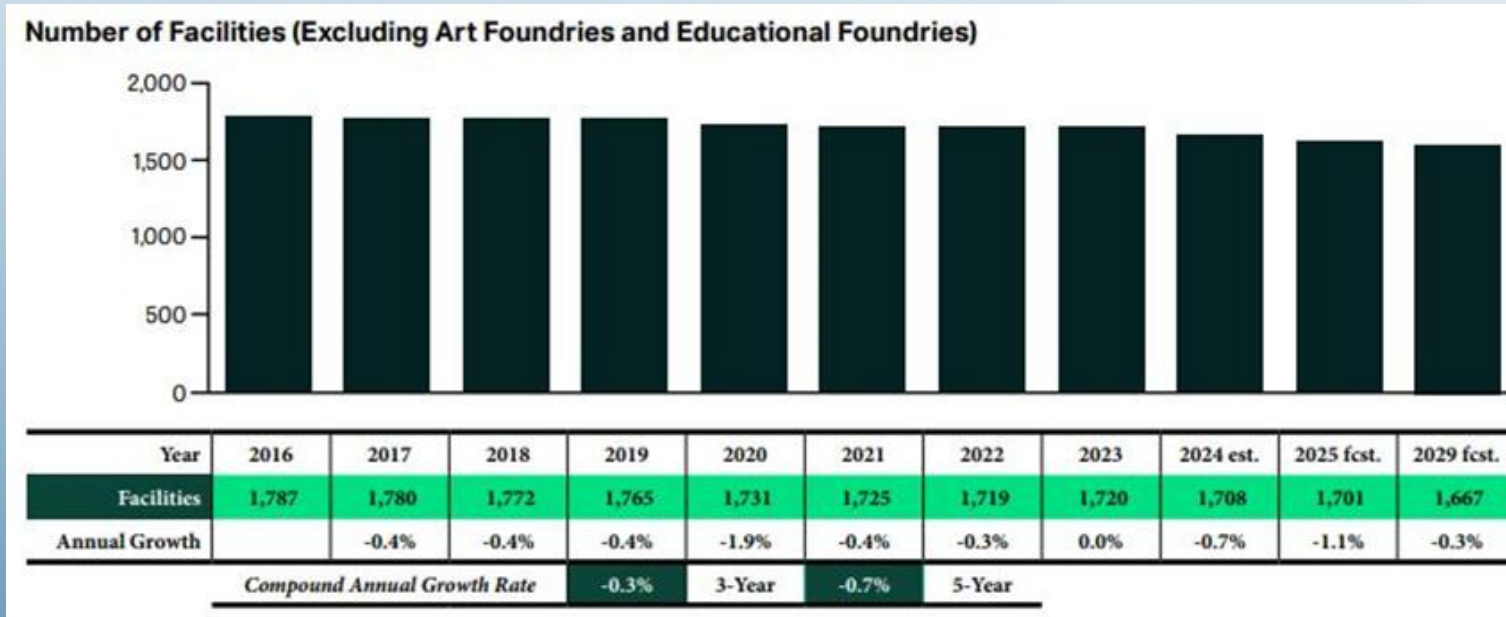


Foundry casting production in 2024 totaled **11.3 million metric tons** across all alloys, with gray iron leading the way at 4.3 million metric tons.

Historical Tonnage Data											
Year	Gray Iron	Ductile Iron	Malleable Iron	Steel	Copper-Base	Aluminum	Magnesium	Zinc	Other Nonferrous	Total Tonnage	Excluded
2024	4,324,273	3,131,372	32,688	1,184,386	334,022	1,647,926	141,945	404,281	53,327	11,254,219	7,000,000



FOUNDRY PRODUCTION IN THE USA

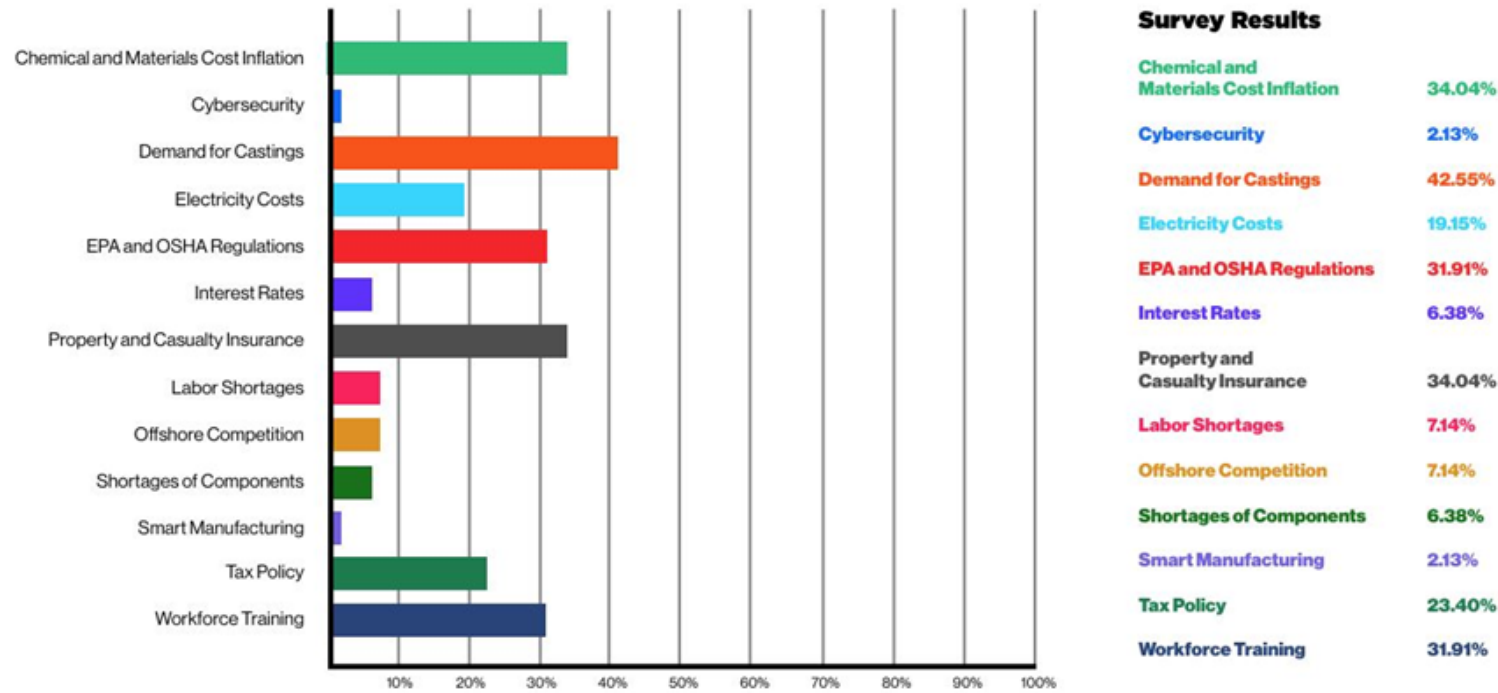


Over the past 10 years, the **number of foundries has declined by an average of about 12 per year**, reflecting the long-term trend where some small, family-owned foundries are closed or sold to larger companies when the current owners are ready to retire.



FOUNDRY PRODUCTION IN THE USA

Which of these issues are the top 3 concerns or priorities for your company at this time?



Inflation is now a top concern for 34% of foundries.

Only 7% of respondents noted their top concern for the future was **labor shortages**, down from 64% a year ago.

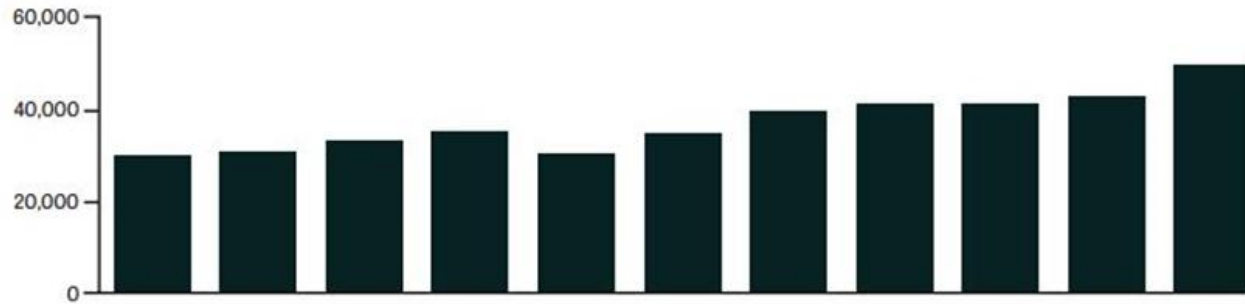
Insurance rates and federal regulations were also leading concerns in 2024.



Electricity costs are a rising concern, as data centers continue to be built throughout the country, driving up the costs of energy and testing electrical grid infrastructure.

FOUNDRY PRODUCTION IN THE USA

Industry Operating Expenses



Year	2016	2017	2018	2019	2020	2021	2022	2023	2024 est.	2025 fcst.	2029 fcst.
(\$ Millions)	29,504	30,768	33,134	35,043	29,887	34,219	39,400	41,221	41,441	42,692	48,138
Annual Growth		4.3%	7.7%	5.8%	-14.7%	14.5%	15.1%	4.6%	0.5%	3.0%	3.0%
Compound Annual Growth Rate				6.6%	3-Year	3.4%	5-Year				

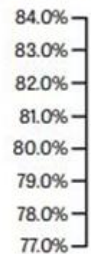
Operating expenses continue to increase along with revenues, with many foundries reporting the **rising cost of raw materials** as the primary expense driver.

Employee expense was the second largest cost, at an average operating cost of 32.8%.

Total operating expenses dropped significantly 0.5%.



Operating Expense as a Percent of Revenues



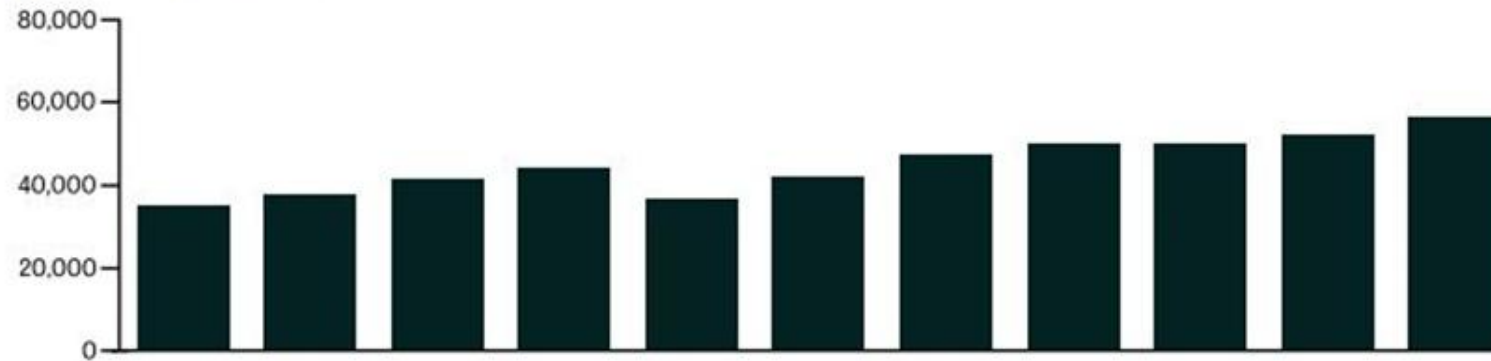
Year	2016	2017	2018	2019	2020	2021	2022	2023	2024 es.t	2025 fcst.	2029 fcst.
OPEX / Rev.	82.8%	81.3%	80.1%	79.1%	81.4%	80.9%	82.8%	82.3%	81.8%	82.7%	80.3%

FOUNDRY PRODUCTION IN THE USA

Total casting sales were estimated to have grown for a fourth consecutive year reaching an estimated \$51 billion in 2024, **a 1.1% increase from a strong 2023, which saw 5.3% growth.**



Industry Revenue (\$ Millions)



Year	2016	2017	2018	2019	2020	2021	2022	2023	2024 est.	2025 fcst.	2029 fcst.
(\$ Millions)	35,640	37,835	41,354	44,290	36,716	42,297	47,584	50,086	50,662	51,626	59,932
Annual Growth		6.2%	9.3%	7.1%	-17.1%	15.2%	12.5%	5.3%	1.1%	1.9%	3.8%
Compound Annual Growth Rate				6.2%	3-Year	2.7%	5-Year				

The three-year growth rate of the foundry industry places it in **the top 40% of all U.S. manufacturing industries.**

FOUNDRY PRODUCTION IN JAPAN

Year	Gray Cast iron	Spheroidal Graphite Cast iron	Cast Iron pipe	Malleable Cast iron	Steel castings	Copper alloy castings	Aluminum Alloy castings	Die castings	Precision castings	Total
2015	2,022.9	1,305.1	398.7	43.1	157.0	78.0	418.5	975.7	5.9	5,404.9
2016	1,933.7	1,301.3	290.3	41.0	150.1	77.4	423.7	980.4	5.4	5,203.3
2017	2,032.1	1,403.6	248.9	42.0	161.9	75.4	441.8	1,042.4	5.5	5,453.6
2018	2,064.3	1,440.8	249.0	39.9	167.7	74.6	454.1	1,075.3	5.1	5,570.8
2019	1,953.0	1,362.6	230.8	37.9	153.0	70.9	437.5	1,025.8	4.2	5,275.7
2020	1,596.1	1,168.1	233.3	29.4	121.7	58.3	343.7	840.7	4.4	4,395.7
2021	1,833.1	1,338.2	223.6	29.8	132.1	59.1	374.5	924.3	4.7	4,919.4
2022	1,800.3	1,316.3	205.0	29.4	136.6	58.9	364.6	894.3	4.3	4,809.7
2023	1,783.6	1,296.7	192.7	28.9	130.6	57.4	390.9	961.9	4.2	4,846.9
2024	1,647.5	1,218.6	171.1	27.1	115.1	57.5	363.8	906.8	4.1	4,511.4
Ratio In2024	36.5%	27.0%	3.8%	0.6%	2.6%	1.3%	8.1%	20.1%	0.1%	100%

Total casting production in 2024 was approximately 4.5 million tons, 7% decrease compared to 2023.

Gray cast iron decreased by 8%, spheroidal graphite cast iron by 6%, cast iron pipes by 11%, malleable cast iron by 6%, steel castings by 12%, copper alloy castings remained unchanged, aluminum alloy castings decreased by 7%, and die castings decreased by 6%. Although production has recovered from the impact of the COVID-19 pandemic, **production levels over the past decade have been gradually declining.**



FOUNDRY PRODUCTION IN JAPAN

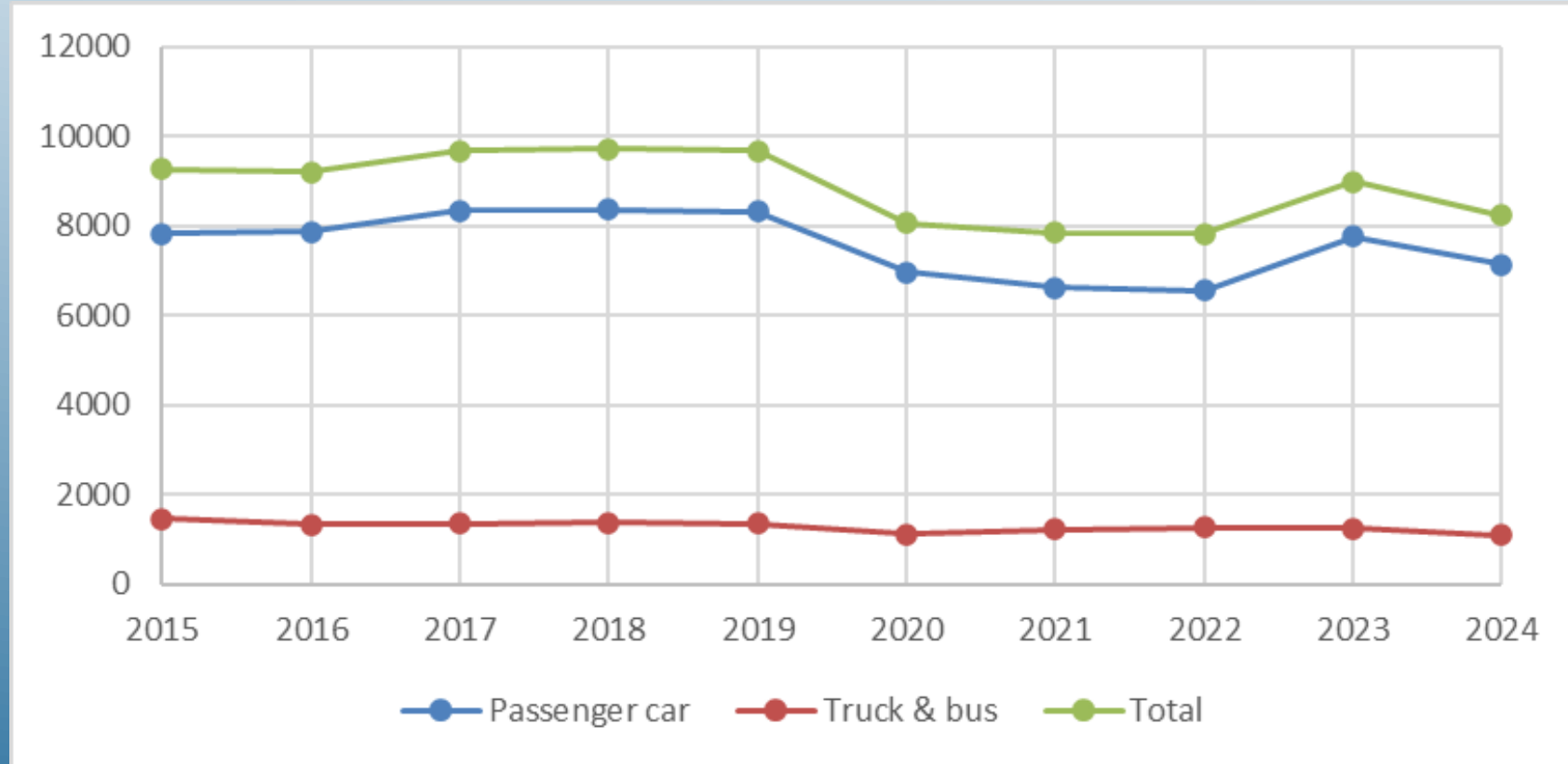


Figure: Production trends for passenger cars, trucks and buses over 10 years (x1,000 cars/year)

FOUNDRY PRODUCTION IN JAPAN

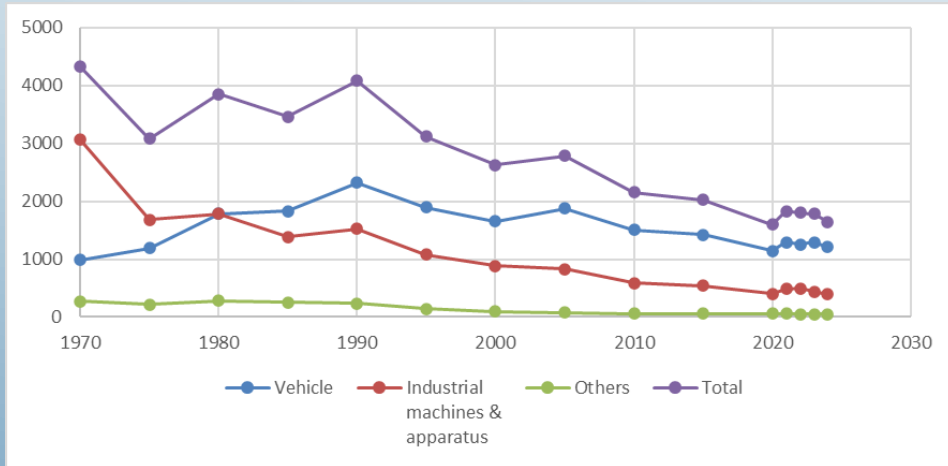


Figure: Production trends by application for cast iron since 1970 (x10³ton)

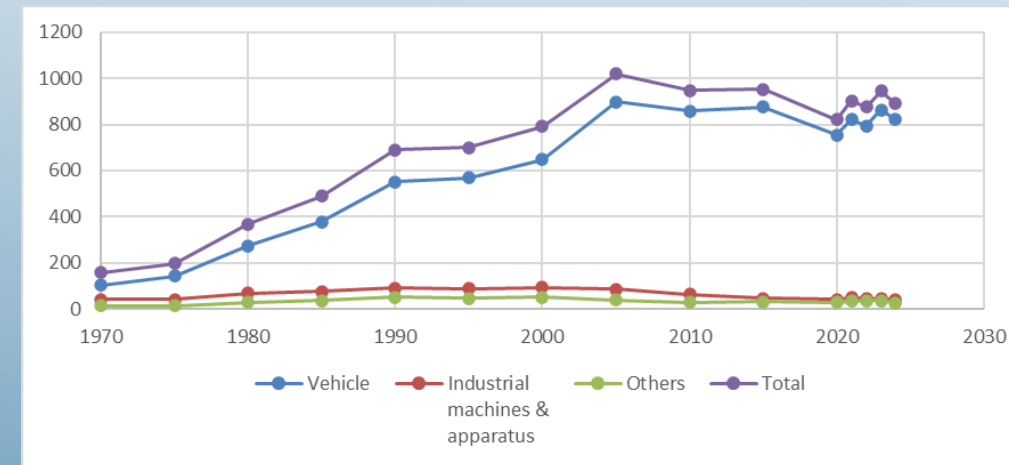


Figure: Production trends by application for aluminum alloy die castings since 1970 (x10³ton)

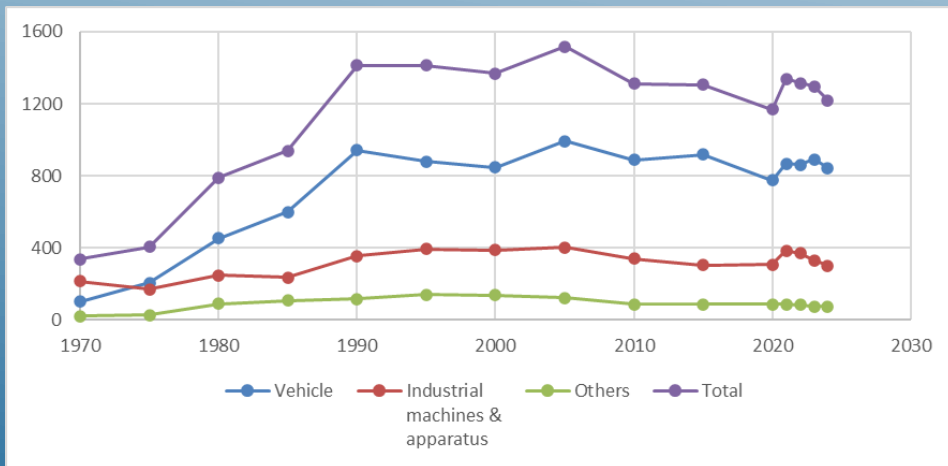
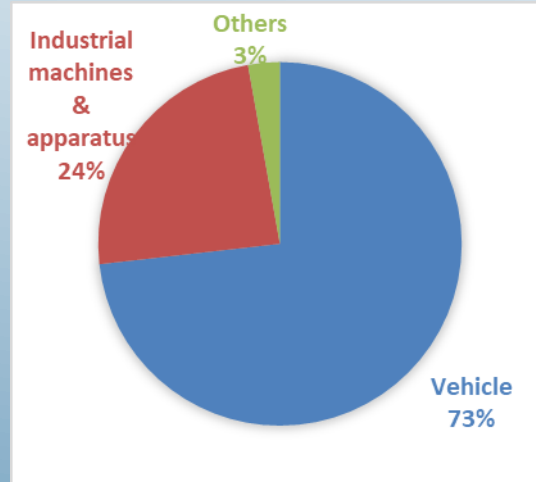


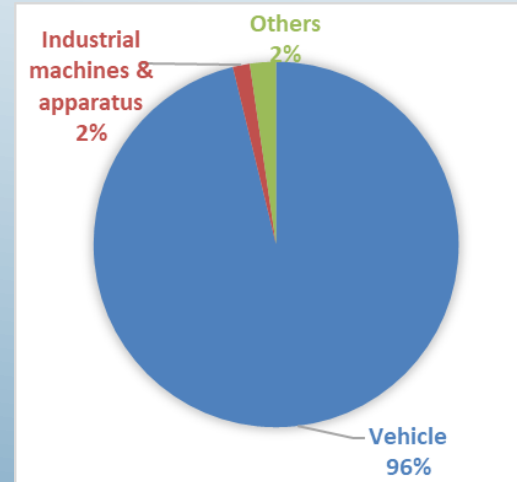
Figure: Production trends by application for spheroidal graphite cast iron since 1970 (x10³ton)



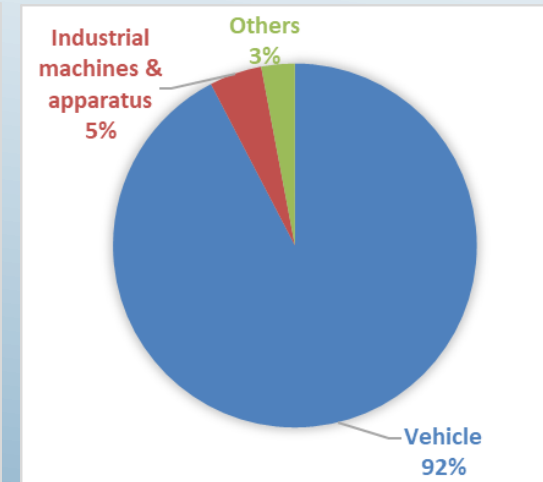
FOUNDRY PRODUCTION IN JAPAN



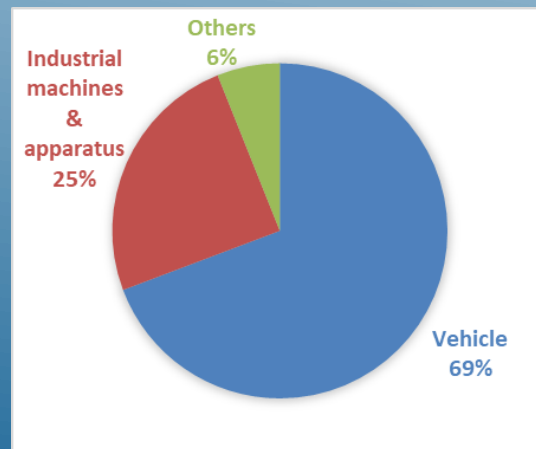
Consumption ratio of gray cast iron in 2024



Consumption ratio of aluminum alloy castings in 2024



Consumption ratio of aluminum alloy die castings in 2024



Consumption ratio of spheroidal graphite cast iron in 2024

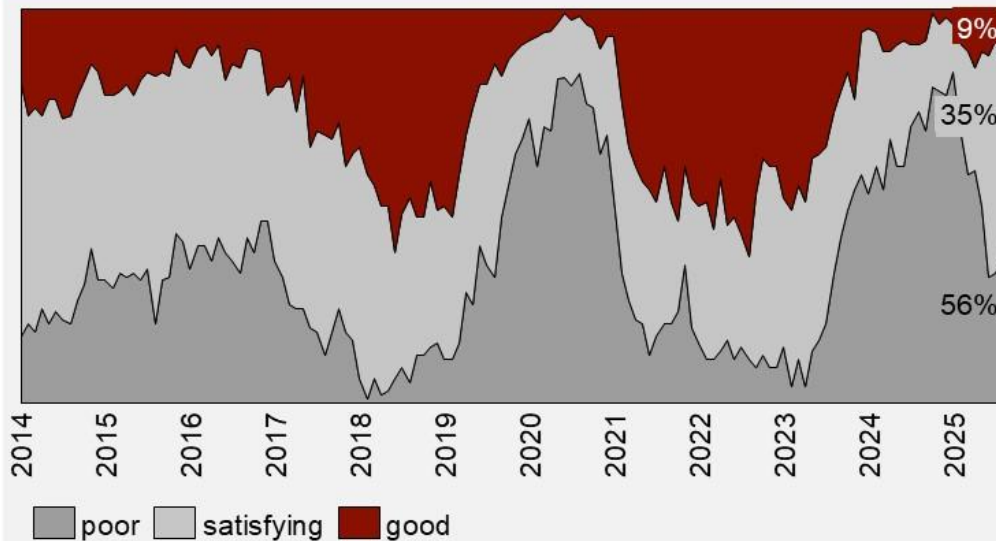


FOUNDRY PRODUCTION IN GERMANY

FOUNDRY MARKET – BUSINESS CLIMATE FOUNDRY INDUSTRY GERMANY (09/2025)

BUSINESS CLIMATE FOUNDRY DETERIORATED FOR THE THIRD CONSECUTIVE MONTH

BUSINESS SITUATION FOUNDRY INDUSTRY GERMANY (09/25)



MANAGEMENT SUMMARY

- Business climate in the German foundry industry declined for the third consecutive month in September 2025, reaching its lowest level since February 2025
- Only 9% of foundries rated their situation as good, 35% as satisfactory, and 56% as poor
- Both the current situation and expectations were assessed as worse than in the previous month

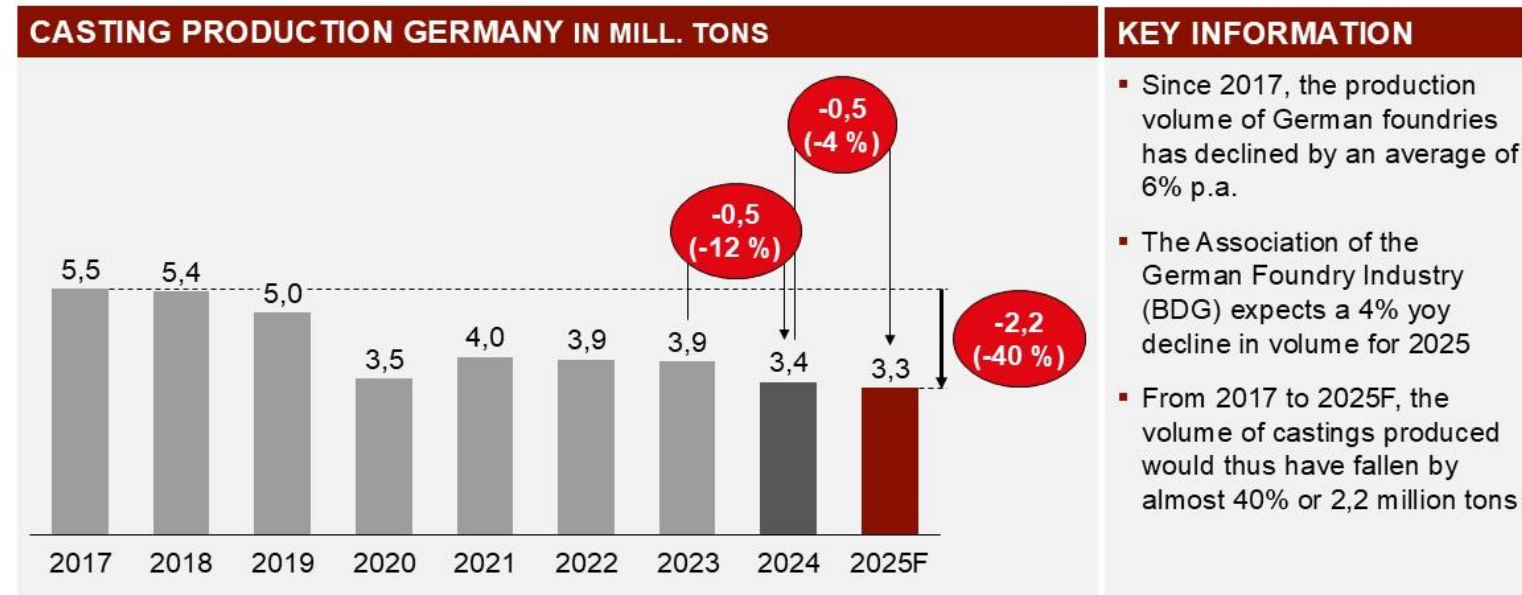
Sources: Ifo Institut Munich, bdg September 30th 2025, HA Strategy Analysis



FOUNDRY PRODUCTION IN GERMANY

FOUNDRY MARKET – CASTING PRODUCTION 2017-2025F (GERMANY)

GERMAN CASTING PRODUCTION CONTINUES TO FALL: -12% IN 2024, -4% EXPECTED IN 2025

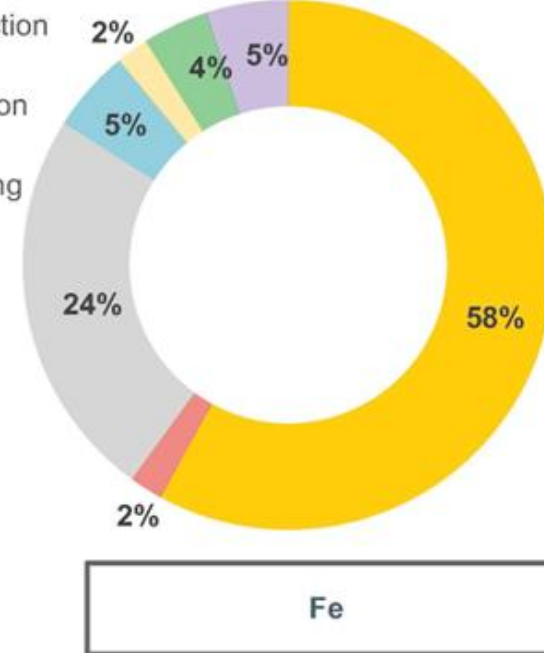
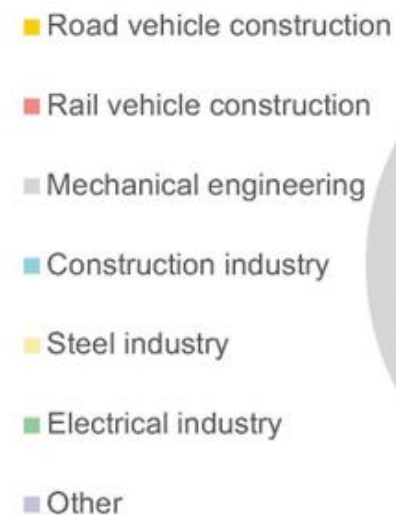
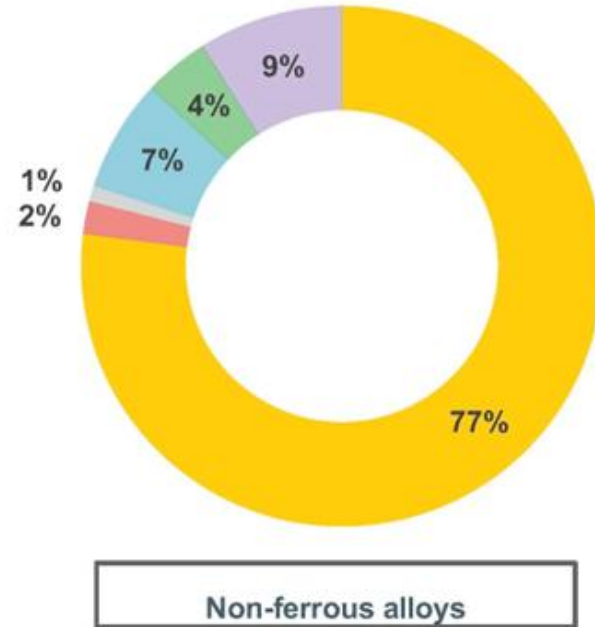


Sources: Bundesverband der deutschen Gießerei-Industrie e.V. 09/2025, HA Strategy Analysis



FOUNDRY PRODUCTION IN GERMANY

Customer structure (share in %)



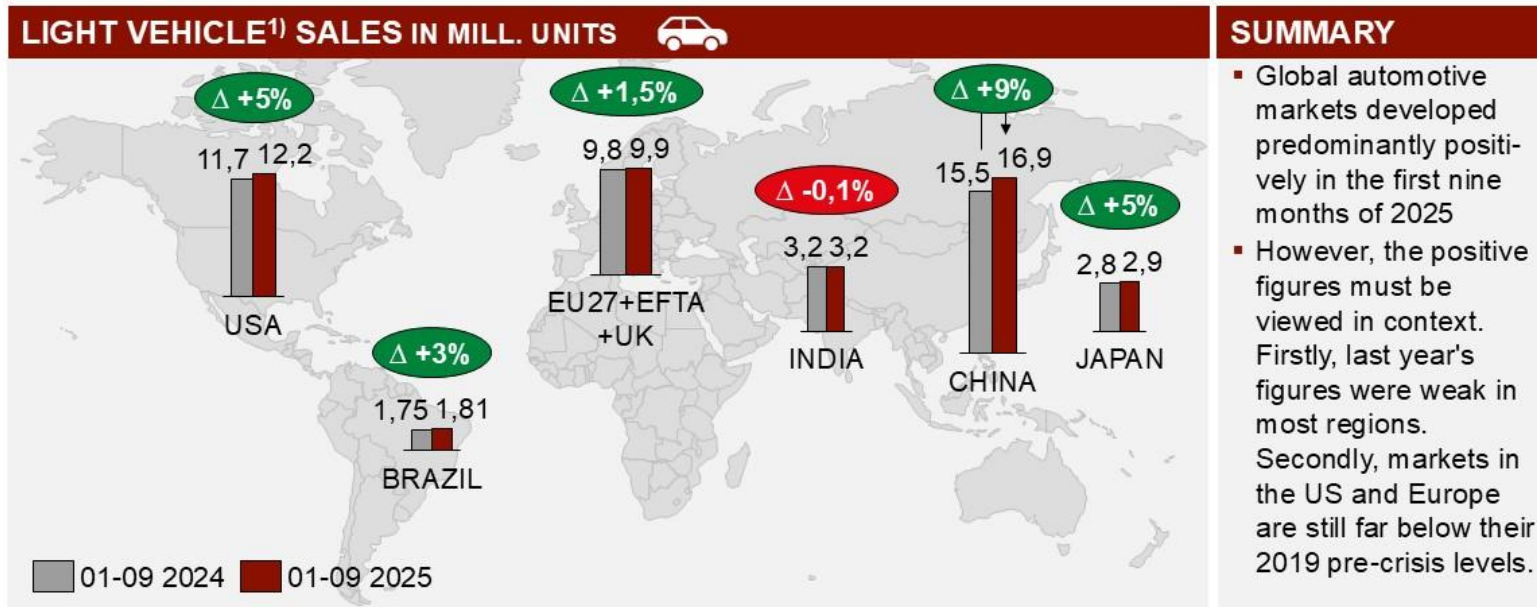
Quelle: BDG, 2023, teils Schätzungen, Difference to 100% due to rounding with decimal places



FOUNDRY PRODUCTION IN GERMANY

AUTOMOTIVE – GLOBAL LIGHT VEHICLE¹⁾ SALES 01-09/2025 YOY

GLOBAL SALES INCREASED FOR THE MOST PART, INDIAN MARKET SLIGHTLY WEAKER



SUMMARY

- Global automotive markets developed predominantly positively in the first nine months of 2025
- However, the positive figures must be viewed in context. Firstly, last year's figures were weak in most regions. Secondly, markets in the US and Europe are still far below their 2019 pre-crisis levels.

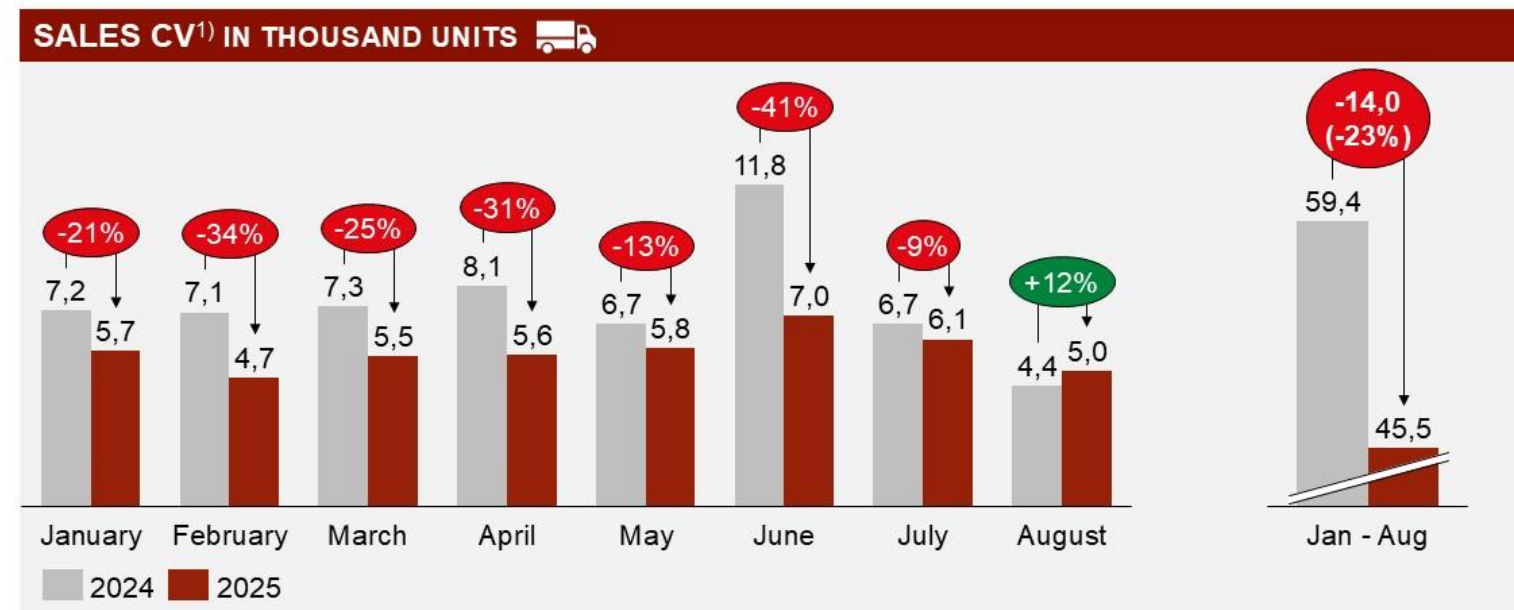
¹⁾VDA figures vary depending on country/region: light vehicles (= passenger cars and light commercial vehicles <3.5 t) or passenger cars only.
Sources: VDA October 28th 2025, HA Strategy Analysis



FOUNDRY PRODUCTION IN GERMANY

COMMERCIAL VEHICLES – SALES GERMANY JANUARY–AUGUST 2025 YOY

GERMAN CV SALES DECREASE THROUGHOUT 2025, TEMPORARY REBOUND IN AUGUST



¹⁾ CV = Commercial Vehicles, CV >6t – 16t, CV >16t

Sources: VDA/KBA Monthly Report, January-August, 2024/2025, HA Strategy Analysis





COOPERATION AND CHALLENGES FOR FOUNDRY

RELEVANT ISSUES AFFECTING THE SECTOR



- ▶ Failing logistics or unavailability of some materials for manufacturing components
- ▶ Lack of components in the client industries (like microchips in Automotive)
- ▶ Alarming increase in the prices for raw materials, **energy** and transportation
- ▶ New reality of global trade

The actual supply chain for our sector is unreliable and much more expensive

2021-2022

Production stops

- Shutdowns in the production of several plants around the world

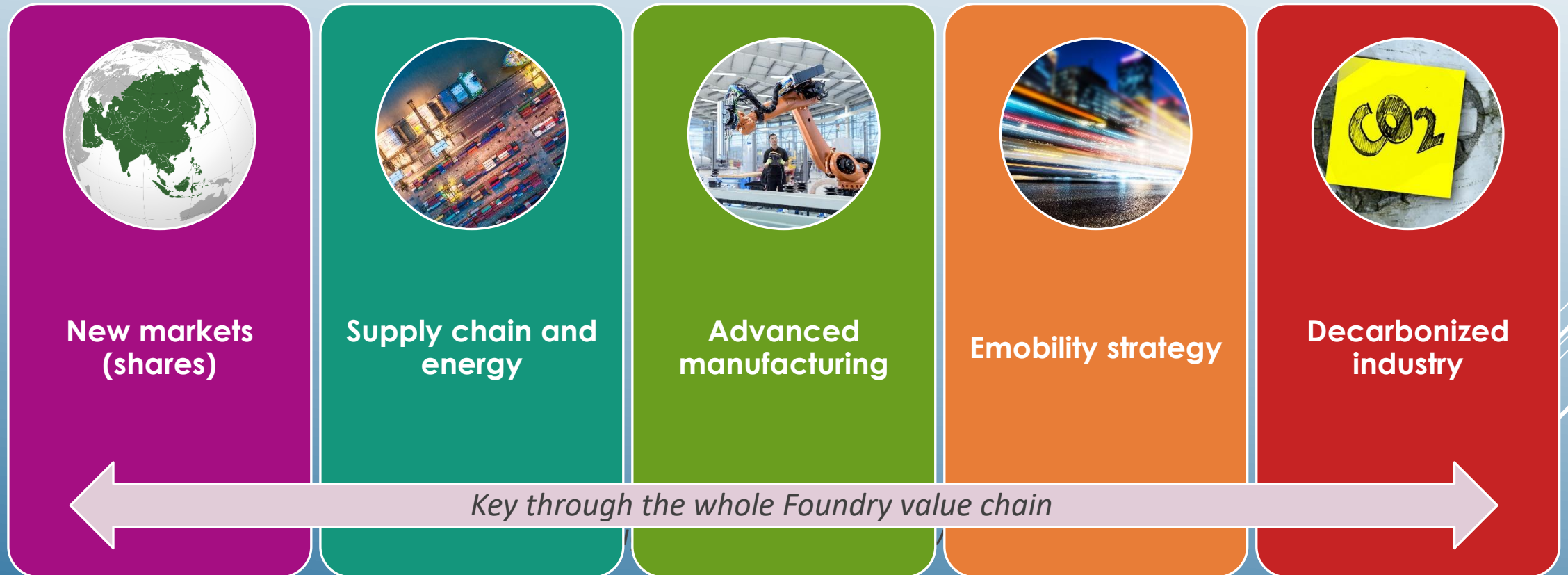
Less profitability

- Very reduced profitability in some businesses

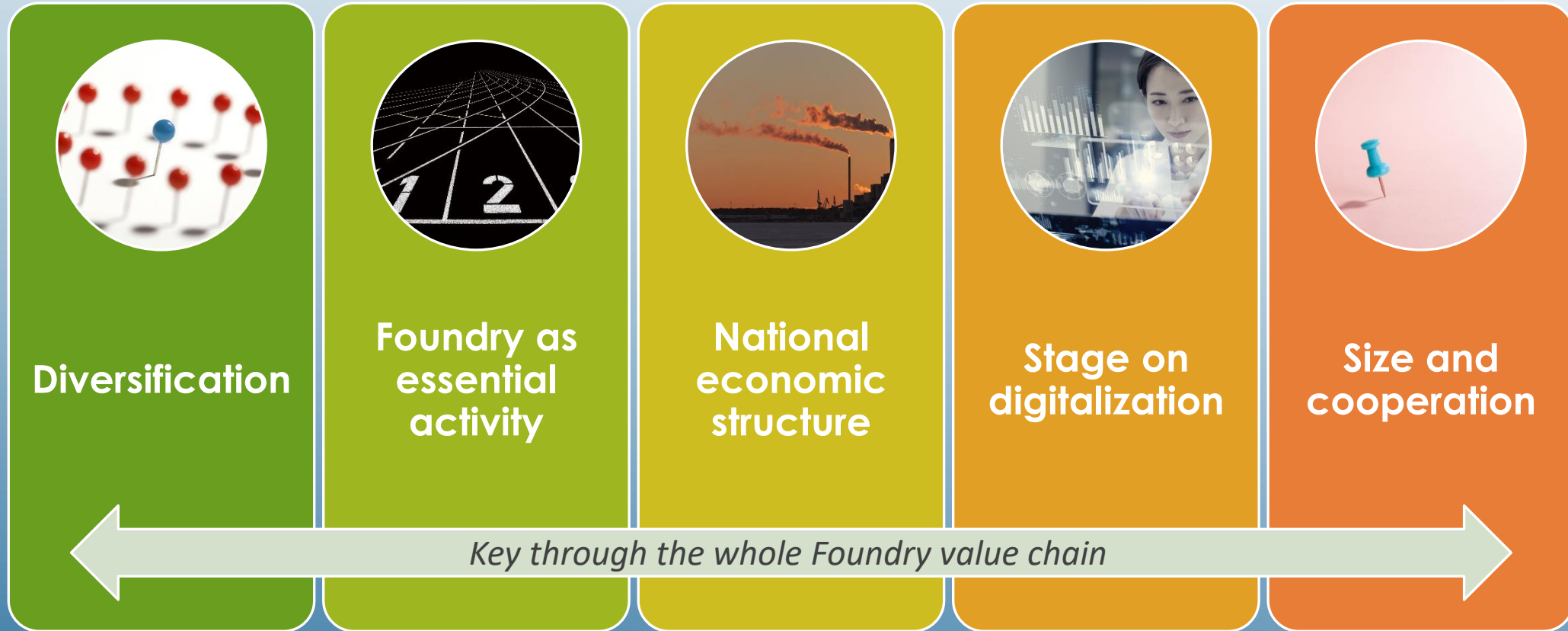
2023-2025

- Slowing down the recovery path and putting into risk especially the foundry SMEs
- Profitability
- Redistribution of the market
- Problem with the access to qualified workforce

Challenges **actively** faced by foundries



Some strengths that show the way



AN ENERGY SECTOR ROADMAP TO CARBON NEUTRALITY IN CHINA

Source: IEA – International Energy Agency ,2021

- ▶ China can build on its current clean energy momentum
- ▶ Reaching a peak in China's CO₂ emissions before 2030 relies on progress in three key areas: **energy efficiency, renewables and reducing coal use**
- ▶ **Electrification** is the key to decarbonising transport and buildings

The next cycle of heavy industry investment in China could result in a huge amount of additional emissions if cleaner alternatives are not ready in time. 40% of the Chinese energy sector's CO₂ emissions reductions in 2060 come from **technologies that are still at the prototype or demonstration stage today.**

- ▶ Reaching carbon neutrality by 2060 hinges on a major acceleration in **clean energy innovation**

How does China's expected emissions peak compare with other countries?

If China's emissions were to peak before 2030, it would likely mean that the country had achieved this feat at **lower levels of economic development and per capita emissions than most other countries that have already passed peak emissions.** Most other economies achieved that peak when GDP per capita was between USD 20 000 (about CNY 140 000) and USD 50 000 (about CNY 340 000) at PPP and 2019 prices (see Chapter 1). In the APS, China's emissions peak before 2030 at just above USD 20 000 (about CNY 140 000) per capita.

Similarly, China's peak per capita emissions are around 7 t CO₂ to 8 t CO₂, compared with the 7 t CO₂ to 15 t CO₂ range in most other countries.



Source: *A Feasibility Study to Minimize the Carbon Footprint of Cast Iron Production While Maintaining the Technical Requirements*
Ali Abdelshafy, Daniel Franzen, Amelie Mohaupt, Johannes Schüssler, Andreas Buhrig-Polaczek, Grit Walther (2022)

Correlation between aspects of the cast iron production

Technical

The environmental analyses show that the addition of steel scrap up to a content of 60 wt% results in significant CO₂ savings compared to an alloy with 15 wt% pig iron and no steel scrap.

Economic

Therefore, using steel scrap is superior from an environmental perspective. However, exceeding a certain threshold (i.e. 25 wt%) can lead to a relapse due to the ferrosilicon and carbon that have to be added (to yield comparable composition and technical performance), which have high embedded carbon emissions.

Environmental

Public/Private alliances to work all the aspects

Focus for CO₂ emission reduction

Promoting energy efficiency or energy conservation

- Apart from the input materials, energy consumption is generally responsible for the largest proportion of the carbon footprint. Minimizing the energy requirements and recovering the waste heat can lead to lower GHG emissions. Existing practices in foundries should be further investigated and available efficiency measures have to be adopted

Energy substitution

- Shifting the electricity mix towards more renewable energies should result in a carbon-neutral melting process

Process substitution

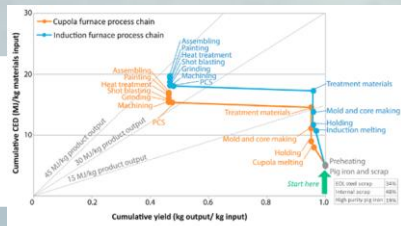
- Eliminating the fossil-based technologies and increasing the share of electricity-based ones such as also crucial. Adopting more climate-neutral production processes for the other material inputs can reduce the embedded emissions such as employing iron reduced via hydrogen or using biogenic carbon and carbon capture and storage (CCS) while producing the other inputs

The energy structure, which highly influences CO₂ emission reduction, should be fully considered when a decarbonization strategy is being developed. Thus, the relationship between energy structure and CO₂ emissions in the iron and steel industry needs to be studied systematically.

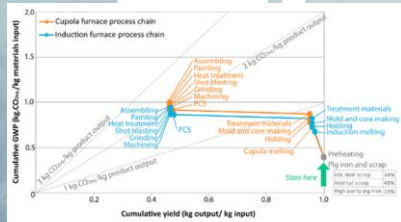
Source: Decarbonization options of the iron and steelmaking industry based on a three-dimensional analysis
Xin Lu, Weijian Tian, Hui Li, Xinjian Li, Kui Quan, and Hao Bai (2022)
org/10.1007/s12613-022-2475-7

The total CO₂ reduction strongly depends on the carbon intensity of the supplied electricity. This means that **one of the premises for greening the iron and steel industry is the decarbonization of the electricity sector.**

Source: Green Hydrogen as Decarbonization Element for the Steel Industry
A. Sasiain, K. Rechberger, A. Spanlang, I. Kofler, H. Wolfmeir, C. Harris, and T. Bürgler (2020)



(a) Normalized CED (MJ/kg material input) vs. cumulative yield. PCS: pouring, cooling and shakeout. GS: greensand molding.



(b) Normalized GWP (kg CO₂/kg material input) vs. cumulative yield. PCS: pouring, cooling and shakeout.

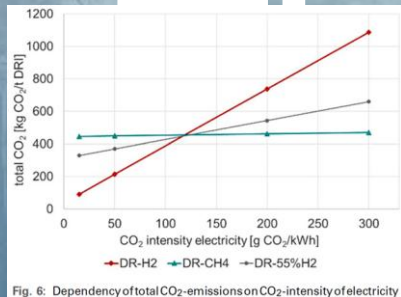
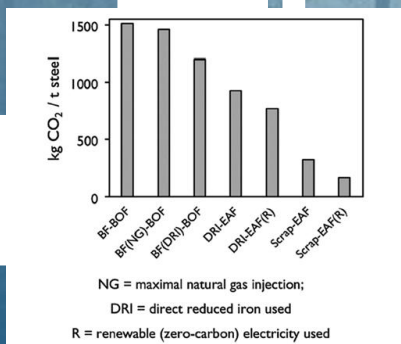


Fig. 6: Dependency of total CO₂-emissions on CO₂-intensity of electricity





***De-globalization or
Re-globalization?***

IS INDUSTRIAL INTERNATIONAL COOPERATION AT RISK?

- Tariffs, countermeasures and **volatile new trade agreements**
- **Multilateral frameworks** threatened and disrupted
- Reduced confidence in global collaborative manufacturing actions and cooperation -> **prioritize bilateral or regional agreements**
- Deglobalization and its **focus on self-sufficiency or regional alliances** can limit the flow of raw materials, technology and expertise

GROWTH OPPORTUNITIES

- Substantial growth in the coming years, fueled by **changing global trends**, cutting-edge technology and transforming consumer expectations
- **Investments in regional manufacturing hubs**, supported by automation to offset labor costs
- **Global military expenditure** reached a record in 2024
- Need for suitable castings to meet the necessary new green industrial developments

Metalcasters that cooperate and are able to integrate digital solutions, sustainability, and supply chain adaptability, while aligning with regional incentives, will gain a competitive edge



Technical
knowlege

- Access global high-level technical knowledge to take the best decisions

Drivers supported
on the ability to
connect with the
global foundry
network

Strategic
knowledge



- Survey the global strategies in our industry to support you decisions according to the reality of your business

INTERNATIONAL WORKING GROUPS

Chair: Prof. Natalia Sobczak POLAND

- Plans for 2026 pending to be received

Cast Metal
Matrix
Composites



Chair: Mr. Liming Peng CHINA

- Hosted the 20th China Die Casting Congress, on March 26-28, 2025, in Nanjing, China
- Host the 21st China Die Casting Congress on March 25-27, 2026, in Wuhan, China

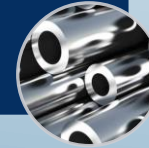
Die Casting



Chair: Dr. Li Yanxiang CHINA

- Oct. 26-28, 2025, the "The 2025 International Forum on Ferrous Materials and Casting Technologies" took place successfully in Xian.
- Organizing the 2027 WFO International Forum on Ferrous Materials and Casting Technologies.

Ferrous
Materials



Chair: Mr. GAO Wei

- Signing of the agreement at the Asian Foundry Congress.
- Launch the activities of the Working Group.

Foundry Clusters



Chair: Vladimír Krutiš CZECH REP.

- A revised version of the template for the best practice guideline was prepared.
- Send a reminder to all members and, if necessary, include relevant members from other organizations. Consolidate the data received. Finalize the graphical layout of the document and share it

Management
of Foundry
Associations



Chair: Lee Jenkins UK

- Preparation of Industry Workshop on the Re-use of Waste Foundry Sand in Concrete Production. This event will bring together industry leaders, policy makers, and researchers.
- To support and communicate the existing findings.

Minimising the
Impact of Spent
Foundry Sand



Chair: Mr. Lou Yanchun CHINA

- Molding Materials Forum
- Revision of the Investigation Report on Application Status and Development Trend of Casting Molding Materials
- Complete Committee. (Conduct Industry Research and Complete the Revision of the Research Report and Special Reports

Moulding
Materials



Chair: Prof. Yanqing Su CHINA

- July 16-18, 2025, "8th International Forum on Non-Ferrous Alloys and Special Casting Technologies" Shanghai
- Next forum scheduled for 2027. In 2026, the committee's primary focus will be on organizing this event, including finalizing the venue and theme, and inviting speakers

Non-Ferrous
Alloys



Chair: To be identified

- New chairing is needed for this Working Group, this is the main objective for 2026

Training and
Professional
Development



Common
challenges
for the
global
casting
industry

WFO WORLD FOUNDRY CONGRESS

ISTANBUL, TURKEY 2026

Global
access to
technical
information



WFC 2026
76th Centenary World Foundry Congress

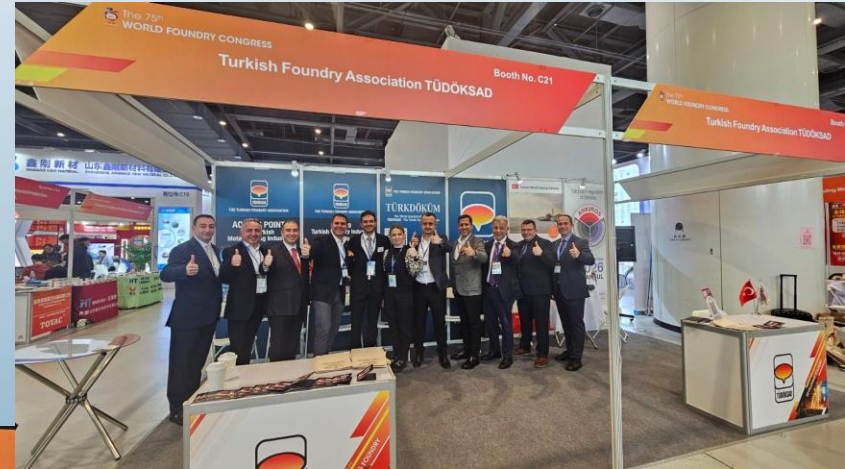
 Turkish Foundry Association

 World Foundry Organization

76th Centenary World Foundry Congress | A Bright New Century: Shaping the New Ecosystem

Hilton Istanbul Bomonti Hotel & Conference Center, Türkiye
18-24 October 2026

TUDOKSAD
www.tudoksad.org.tr



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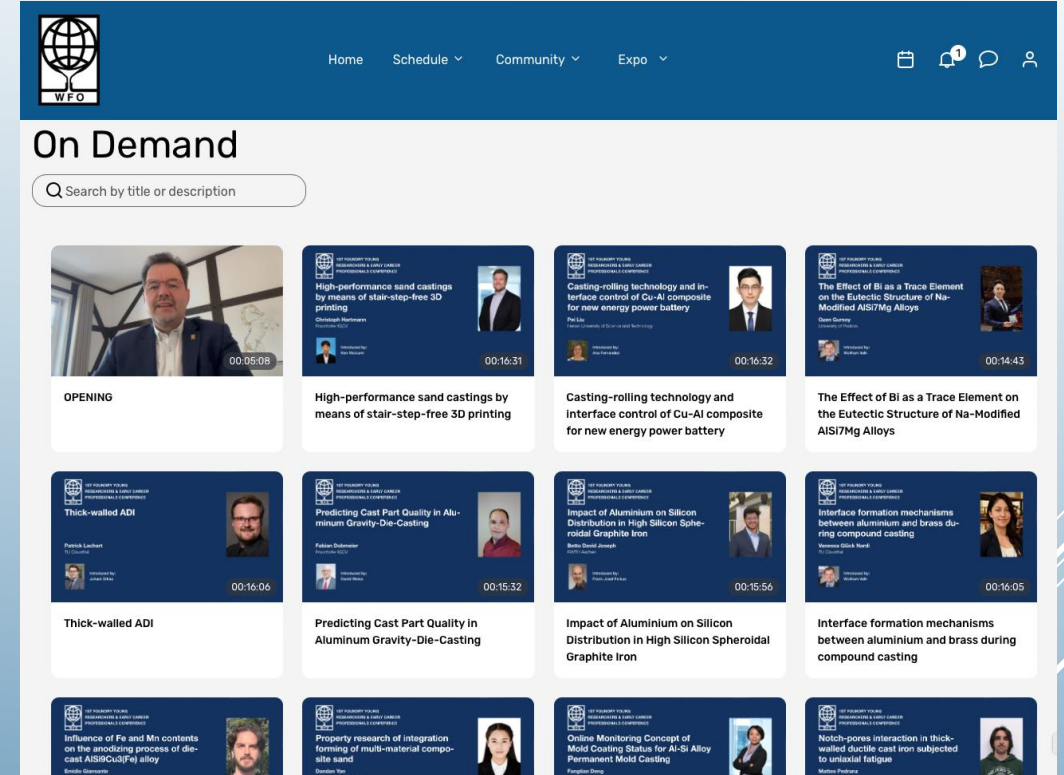
 SUMMARY AGENDA ORGANIZERS SCIENTIFIC BOARD SPEAKERS CONTACT US **REGISTER**
[Already Registered?](#)

1ST FOUNDRY YOUNG RESEARCHERS & EARLY CAREER PROFESSIONALS CONFERENCE

18th of April - 30th of June

On-Demand - Recorded Videos
Americas, EMEA (Europe, Middle East and Africa), Asia-Pacific

WFO YOUNG RESEARCHES CONFERENCE



 Home Schedule Community Expo

On Demand

Search by title or description

 00:05:08 OPENING	 00:16:31 High-performance sand castings by means of stair-step-free 3D printing	 00:16:32 Casting-rolling technology and interface control of Cu-Al composite for new energy power battery	 00:14:43 The Effect of Bi as a Trace Element on the Eutectic Structure of Na-Modified AlSi7Mg Alloys
 00:16:06 Thick-walled ADI	 00:15:32 Predicting Cast Part Quality in Aluminum Gravity-Die-Casting	 00:15:56 Impact of Aluminium on Silicon Distribution in High Silicon Spheroidal Graphite Iron	 00:16:05 Interface formation mechanisms between aluminium and brass during compound casting
 00:16:06 Influence of Fe and Mn contents on the smelting process of die-cast AlSi9Cu3[Fe] alloy	 00:16:06 Property research of integration forming of multi-material composite sand	 00:16:06 Online Monitoring Concept of Mold Coating Status for Al-Si Alloy Permanent Mold Casting	 00:16:06 Notch-pores interaction in thick-walled ductile cast iron subjected to uniaxial fatigue



Graduate Students who are enrolled on Masters courses directly related to the metal casting and metal-mechanical industry at the time of the abstract submission deadline.



Early Career Professionals and Researchers who work at companies, universities, research centers or knowledge centers.



PhD students who are enrolled on their first PhD course at the time of the abstract submission deadline.



<35

All candidates must be **<35** years old.

WFO YOUNG RESEARCHERS CONFERENCE



Current situation and cooperative challenges





Asia-Pacific Metal Forming Tech Congress is **hosted by the World Foundry Organization (WFO)** and organized by the Chinese Mechanical Engineering Society, as a major international gathering in the fields of metallurgy and foundry technology



SMART FORMING CREATING TOMORROW

Asia-Pacific Metal Forming Tech Congress is organized by the World Foundry Organization (WFO) and the Chinese Mechanical Engineering Society. As a major international gathering in the fields of metallurgy and foundry technology, it represents another prestigious event to be held in China following the 79th World Foundry Congress (2024, Deyang) and the 17th Asian Foundry Congress (2025, Kunming).

Held alongside the Congress, 2026 China Foundry will support SMEs in the foundry industry by integrating global resources, offering insights on policy, technology, market trends, and practical solutions through interactive formats to future sustainable growth.

About China Foundry Congress

The First China Foundry Congress was held in 2000. More than 20 years later, it has developed into a comprehensive service platform and yearly festival for Chinese foundry industry integrating academic discussion, technical exchange, corporate management practice, science and technology achievement presentation, recognition and awards, domestic and international exchange as well as economic and trade cooperation. Each year the congress gathers industry experts, including academicians and professors from various universities and research institutions, corporate technicians and managers, as well as and exchange their research results and progress.

Expected Scale

 Penary Attendees 4-6	 Technical Tonches 200+	 Posters 90+
 Papers 100+	 Attendees 3000+	 Exhibitors 60+

Program at a Glance

Day 1	All Day
Tu. 29	» On-site Registration » Tech Innovation Competition
Sat. 30	» Exhibition » Photography Exhibition » Technical Session
Day 2	» Opening Ceremony » Plenary Session
Sun. 31	» Technical Session » Poster Session » Exhibition » Photography Exhibition
	» Gala Dinner
	Night
Day 3	» Technical Session » Poster Session » Exhibition » Photography Exhibition
Mon. 01	» Work & University Visit
	PM

* The above is the preliminary agenda of the conference. Please refer to the final agenda.

Call for Papers

Language: English or English
Deadline: June 30, 2020

Topics

The 2020 Asia-Pacific Metal Forming Tech in Cast, Foundry and Composites calls for papers on topics related to Foundry, including but not limited to:

- Advanced casting technologies, cast steel, cast iron, magnesium alloys, aluminum alloys, titanium alloys, superalloys, high-entropy alloys, wear-resistant materials, rare earth materials, laser-based technologies, and ancient art casting, etc.

- Manufacturing and Innovative Casting Technologies, additive manufacturing, functional and composite materials, smart equipment and digital tech technology, surface treatment and machining, welding, heat treatment, etc.

- Application Areas: aerospace, marine & shipbuilding applications, lithotripsy and jet engine, machine tool, electronics, low-velocity environment, humanoid robotics, etc.

❖ Others other topics related to foundry.

Submission Requirements

- Papers can be written in either Chinese or English, and a template can be downloaded from the official congress website.
- The content of the paper must not have been previously published in domestic or international journal or collections. The manuscript should not exceed 6000 Chinese characters.
- Submissions must be in Word & PDF format. Tables in the document should follow the Chinese table format, and figures must be high resolution, with a minimum of 300 dpi.
- The paper content should be complete including the following items: abstracts, keywords, main body, conclusion, and references. Author information should include a brief biography of the first author as well as detailed contact information, including address, phone number, and email.
- The organizing committee will evaluate submissions based on originality, scientific quality, and their contribution to the significance of the research. Acceptance rates will be sent out on a regular basis.
- Excellent papers will be recommended for publication in journals such as *Foundry Magazine* (Chinese) and *CAST FOUNDRY* (English).

Please visit the official website to submit your paper.
metals.en.foundrynations.com

Advanced Casting Technology Forum

01 Cast Steel
Xi-Sheng, Professor, Tsinghua University
Shu-Ping, General Manager of the Cast Steel Division, Wuxi Iron Works Co., Ltd.
Wang Jing, Deputy Director of Cast Steel Department, Shenyang Iron Works Institute, Shenyang Iron Works Co., Ltd.

02 Iron and Steel
Chen Jiang, Professor, Tsinghua University
Yin Changjun, General Manager, Fushan Lianhe Steel Casting Co., Ltd.
Yao Yujun, Professor, Huazhong University of Science and Technology

03 Magnesium
Zeng Xiangyu, Vice President of Shenyang Iron Works Institute
Zhang Xing, Director of Technology
Zhang Wenming, Deputy Managing Director of Shenyang Iron Works Institute
Wang Cheng, Deputy Director of Shenyang Iron Works Institute
Zhang Long, General Manager, Shenyang Shuangyuan Casting Co., Ltd.
Liu Wei, Director, Shenyang Iron Works Institute
Shen Jie, General Manager, Shenyang Iron Works Institute

04 Aluminum
Jiaohuifeng, Professor, Director of School of Materials Science and Engineering, Tsinghua University
Wang Zhen, Deputy General Manager, Shenyang Shuangyuan Casting Co., Ltd.
Liu Shuhui, Director, Shenyang University of Science and Technology

05 Titanium
Xue Hongping, Professor, Northeast University
Chen Jialun, Professor, Tsinghua University
Liu Shicheng, Director of Industry, Shenyang Shuangyuan Casting Co., Ltd.

06 Superalloy
Liu Jie, Professor, School of Materials Science and Engineering, Tsinghua University
Liu Shicheng, Director of Industry, Shenyang Shuangyuan Casting Co., Ltd.

07 High-Entropy Alloy
Liu Jie, Professor, School of Materials Science and Engineering, Tsinghua University
Wang Zhen, Deputy General Manager, Shenyang Shuangyuan Casting Co., Ltd.
Liu Shuhui, Director, Shenyang University of Science and Technology
Chen Jialun, Professor, Tsinghua University
Jiaohuifeng, Professor, Director of School of Materials Science and Engineering, Tsinghua University

08 Rare Earth
Feng Wenjun, Professor, State Key Laboratory of Rare Earth Materials, Chinese Academy of Sciences
Liu Shicheng, Director of Industry, Shenyang Shuangyuan Casting Co., Ltd.

09 Low-Carbon
Liu Shicheng, Director of Industry, Shenyang Shuangyuan Casting Co., Ltd.
Liu Shuhui, Director, Shenyang University of Science and Technology
Liu Shicheng, Director of Industry, Shenyang Shuangyuan Casting Co., Ltd.

10 Advanced Steel
Secretary Wang Sheng, Liaochuan Wuxi Iron Works Co., Ltd.

11 Secondary Air Casting
Wang Xingjun, Deputy Director, Shenyang Iron Works Institute
Zhang Xing, Deputy Director, Shenyang Iron Works Institute
Zhang Xing, Deputy Director, Shenyang Iron Works Institute

AUSTRALIAN
FOUNDRY
INSTITUTE
60TH ANNAL

QUEENSLAND
BEAUTIFUL ONE



CLOSING THOUGHTS



- ▶ The global recovery for foundry business and its clients expected for 2025 after the pandemic years has slowed down its predictions.
- ▶ The evolution of the geopolitical situation around the world will be important for 2025 business development. The **new global trade** being built will also affect the global manufacturing and the foundry business.
- ▶ Foundry business is highly affected by decisions around the world, **Foundry CEOs need to be connected to the global changes.**
- ▶ **Profitability, automation and access to workforce** are global problems for our companies, let's learn from the best practices around the world.
- ▶ We should be **proud** that our industry is still expected to grow to US\$ 250 Billion by 2026.
- ▶ Foundries are **critical to global decarbonization**. Our castings are key components in the infrastructure of a net-zero economy.
- ▶ The planned increase in renewable energy sources in many regions means **more castings** needed.
- ▶ **Public-Private alliances** are needed. Foundries should collaborate and support policy-makers in setting achievable targets and aligning energy, industrial and trade policies.
- ▶ **We are a strategic industry for a manufacturing world!**



A high-angle photograph of a river with several rapids. The water is turbulent and white with foam. Several kayakers in colorful kayaks (green, blue, red, yellow) are positioned at different points along the river, navigating the rapids. The river is flanked by dense, lush green trees and foliage. The scene is bright and sunny.

The challenges are
really globalized

CEOs identifying
common goals, sharing
knowledge and
developing common
strategies



THE WORLD FOUNDRY ORGANIZATION
THE REFERENCE POINT FOR THE GLOBAL METAL CASTING INDUSTRY

CURRENT SITUATION AND COOPERATIVE CHALLENGES IN THE GLOBAL FOUNDRY INDUSTRY

Thank you!



Contact details:

General Secretary: José Javier González

Offices UK: Winton House, Lyonshall, Kington HR5 3JP UK

Email: jjgonzalez@thewfo.com

www.thewfo.com

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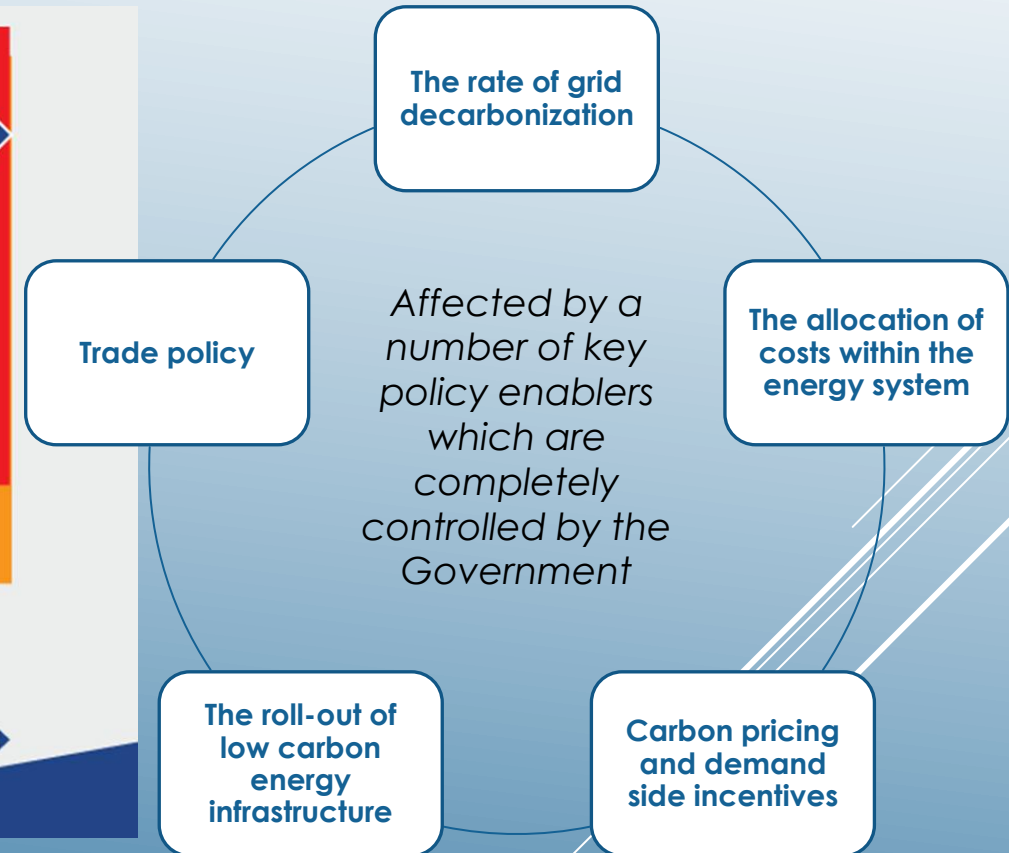
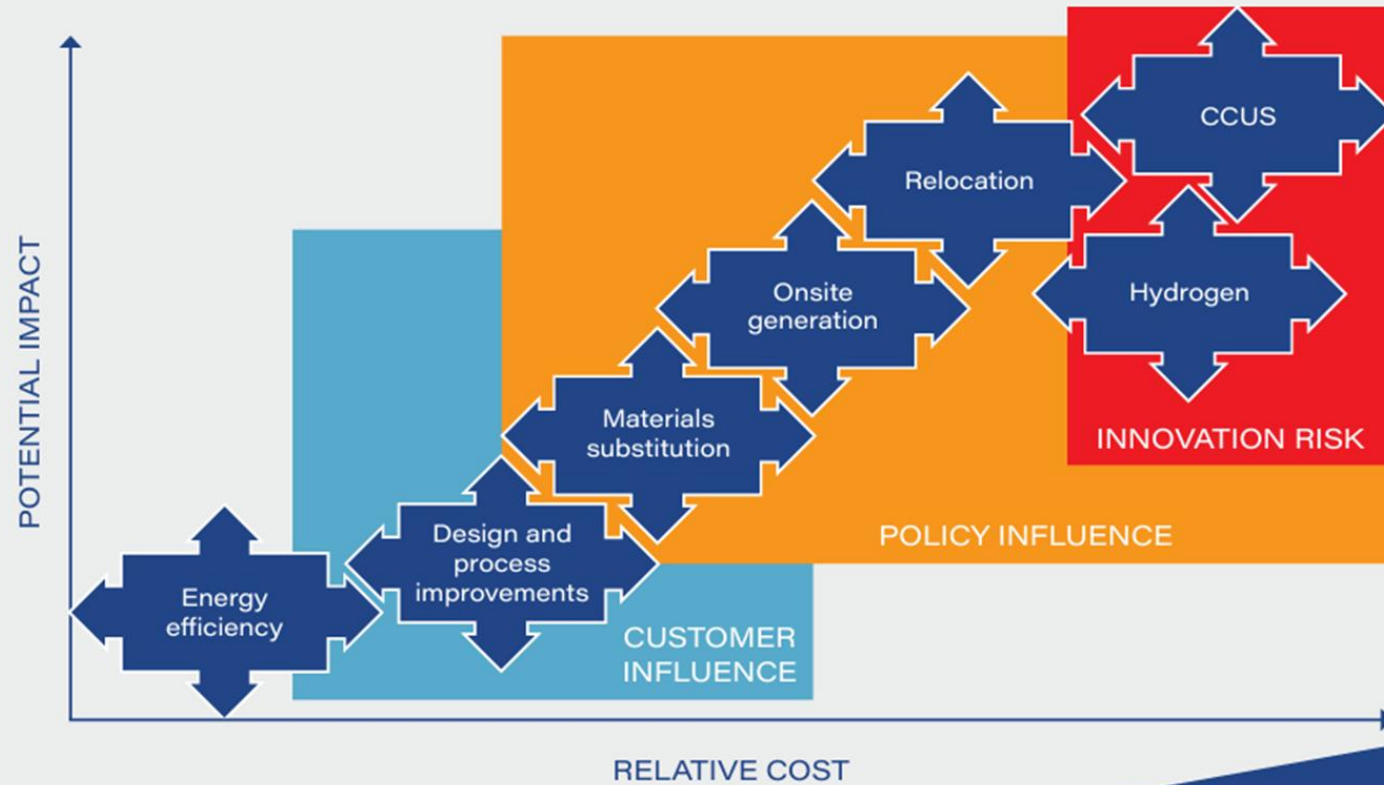
ABP
INDUCTION



ROADMAP TO A GLOBALLY COMPETITIVE NET-ZERO UK FOUNDRY SECTOR

Source: Cast Metals Federation

FIGURE: SCHEMATIC OF LEVERS TO REDUCE CARBON EMISSIONS IN THE FOUNDRY SECTOR



ROADMAP TO A GLOBALLY COMPETITIVE NET-ZERO UK FOUNDRY SECTOR

Source: Cast Metals Federation



- 1 Reform energy markets**
- 2 Provide incentives for capital investment**
- 3 Incentivise customer demand for low carbon components**
- 4 Ensure trade policies support global markets for low carbon UK products**
- 5 Encourage and enable release of land for modern, zero carbon foundries**

INDIA

- **Electric cars in India are too expensive** for people so the market is more focused on electric buses.
- Russia is looking for suppliers, also Iran.

TURKEY

- There is **not subsidized energy** in Turkey after the crisis .
- **Labour cost** has moved from 10% to 25% now.
- Automotive not going well
- Not recovering production until end of 25.
- Great inflation, bad for investments.
- Russian market not accessible.

ITALY

- Italy is **losing 25% of production** because of Automotive declining.
- They don't expect to recover until 3rd Q of 2025.

CZECH REPUBLIC

- Not new projects or investments in new facilities in EU. The industry is on same level, nothing new.
- Germany is a reason for production obstruction. Since 2023 lack of orders, now like 2020.
- **Heavy industry is moving** from EU to India and others.

UK

- **Training, Carbon Zero and Raw Materials** are now highly relevant in UK. A need to discuss the real narrative and practical actions for foundries with the reduction of CO2.

CHINA

- China has been affected seriously by the decreasing demand of last years. The **energy price has been stable** in last 3 years. There is an active new policy and new factories are being built, **a high demand for casting industry is expected**. Supply chain remains as a problem.

GERMANY

- Germany has still a high dependency on Russian gasoline. They are developing some new gas transport facilities in record time, but they also need more windmills. There is a **risk of production lost** from Germany to outside.
- Problems with the infrastructure needed for the change to Hydrogen for Carbon Zero. The cost of the infrastructure needed for new induction furnaces cost to the foundry in many cases more than the furnace itself, which means a really high cost for the transition.

UNIVERSITIES

- It's hard to get money from applied research if it's not linked with Hydrogen in this moment. They are now more focused on fundamental research as it is easier to find funds here. The universities are **working on how to save emissions and recycling processes**.

FRANCE

- France lost some foundries and many are to restart activity now in a better situation. There is a **huge energy cost** increase because of the war. The country wants to restart the 50% non-active reactors, but this means a high maintenance cost.

POLAND

- The problem is energy as it has a bad mix of energy with 55-60% coal and a consumption of 500 MT of coal last year. Renewed investments are in place but still not useful for industry because of the peak of energy. Two big nuclear plants to be built but 15 years-time to have them operative. The country is going green but not very fast. **Defense business is growing** and steel and iron companies are working on NATO certification.

SCENARIOS AND ROADMAPS FOR DECARBONIZATION

Source: Energy efficiency potentials in the EU industry: impacts of deep decarbonization technologies
Katerina Kermeli, Wina Crijns-Graus, Rasmus Magni Johannsen, Brian Vad Mathiesen (2022) <http://creativecommons.org/licenses/by/4.0/>.

Scenarios:	Iron & steel	Non-metallic minerals	Non-ferrous metals	Chemicals	Pulp & paper
No significant transformation	Frozen efficiency Reference No uptake of energy efficiency. Energy efficiency remains at the 2015 level. PRIMES assumptions: - Wide adoption of energy efficiency measures (BATs); - Incremental material efficiency.				
Mitigation scenarios	Energy Efficiency Wide adoption of energy efficiency measures (BATs); No material efficiency.				
	Energy Efficiency+high recycling Wide adoption of energy efficiency measures (BATs); Material efficiency: Share of EAF steel increase from 39% ^a to 67% ^b Clinker to cement ratio decreases from 76% ^c to 60% Share of secondary aluminium increases from 60% ^d to 70% Share of paper from recovered fibres increases slightly				
	Electrification Wide adoption of energy efficiency measures (BATs); Material efficiency same as in the “Energy Efficiency+high recycling” scenario; Wide adoption of innovative measures; Electrification measures: DR electrolysis (Ulcowin, Siderwin, Ulcolysis), electric furnaces Thermal plasma torches (cement); electric melters (glass) Induction furnaces (aluminium) Hydrogen used as feedstock (ammonia, ethylene, methanol); Heat pumps and electric boilers for steam generation Heat pumps and electric boilers for steam generation				
	Hydrogen Wide adoption of BATs; Material efficiency same as in the “Energy Efficiency+high recycling” scenario; Wide adoption of innovative measures; Hydrogen measures: Hydrogen based direct reduction (H-DR) Hydrogen used as feedstock (ammonia, ethylene, methanol); Hydrogen boilers for steam generation Hydrogen boilers for steam generation				

The EU Reference scenario 2016 (Capros et al., 2016) from the PRIMES long-term energy model makes final energy demand projections per industrial sector and EU country.

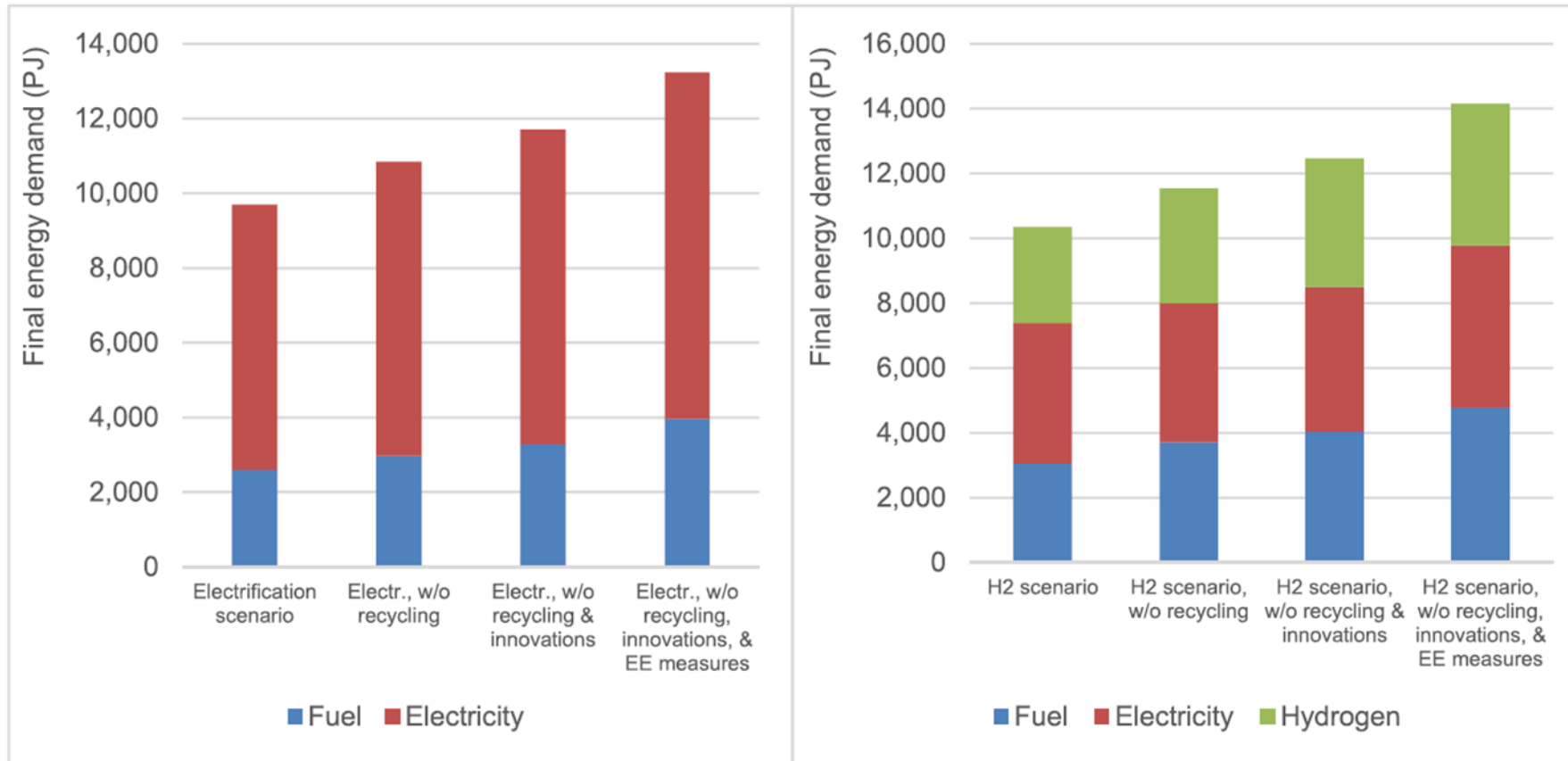
The **industrial GHG emission** intensity slightly decreases (by 2%) in 2020 (compared to 2010) and **decreases more drastically in 2030 (27%) and 2050 (51%).**

Table: Scenario assumptions for the different industrial sub-sectors for each scenario for 2050

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Without the wide adoption of **energy efficiency, material efficiency and innovative energy efficiency measures**, the 2050 industrial energy demand is estimated to be 37% and 27% higher, in an Electrification and a Hydrogen scenario, respectively, compared to when these measures are adopted. Energy efficiency has thereby an important role to play when considering the system integration and optimization for the industrial energy transition

Figure: Final energy demand in the Electrification scenario (left) and the H2 scenario (right) without the inclusion of measures/technologies that decrease the energy demand

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ADDITIONAL ANEXES

Credits