

AUSTRALIAN FOUNDRY INSTITUTE | AFI 2026

40 Years in the Foundry Industry

What lies ahead?

Andy Pickering - Omega Sinto Foundry Machinery

A PERSONAL INTRODUCTION

Andy Pickering

Sales Director | **Omega Sinto Foundry Machinery Ltd**

40 years plus in the foundry industry

Early career, UK

Foundry Technologist at Charlestown Engineering (iron, mining wear parts), Cronite Castings (high nickel and chrome steels) and Cosworth Castings (high-integrity aluminium).

1987 — Hepworth Minerals

Technical service representative across the UK: Consumable supplier - silica sand, organic binder systems, refractory coatings and moulding ancillaries.

1990 — Borden Chemical

23 years in technical service and commercial roles across the UK, Europe, Middle East and India. Alkaline phenolic binder development, mould handling and sand reclamation.

Last 10 + years — Omega Sinto

Commercial activities across the Middle East, the Indian Sub-Continent and South East Asia.

Forty years on the floor

The industry I joined and the industry I see today are barely the same trade – but the fundamentals have not moved.

Then

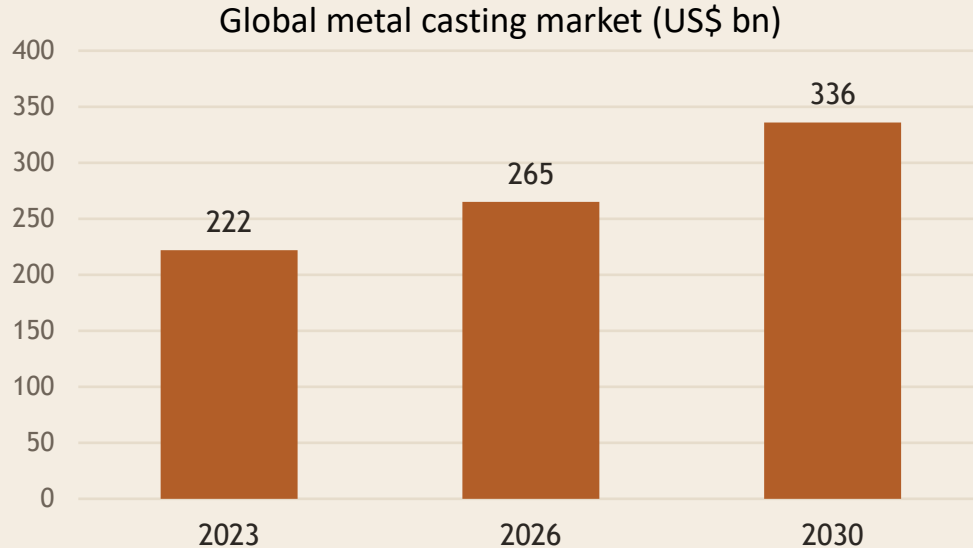
- Cupola melting common place
- Green sand and silicates - predominant molding systems
- Emerging organic binders such as furan and later alkaline phenolic.
- Skills passed hand to hand on the floor
- Domestic customers in UK sourcing overseas

Now

- Electric induction melting, energy-metered
- Organic binders and reclaimed sand common place
- Inorganic binders re-emerging
- An ageing workforce and a thin pipeline
- Global competition, volatile costs

Demand keeps climbing

Global casting output passed 112 million tonnes and the market is on a steady growth path.



6.1%

compound annual growth in
the global casting market to
2030

112 Mt

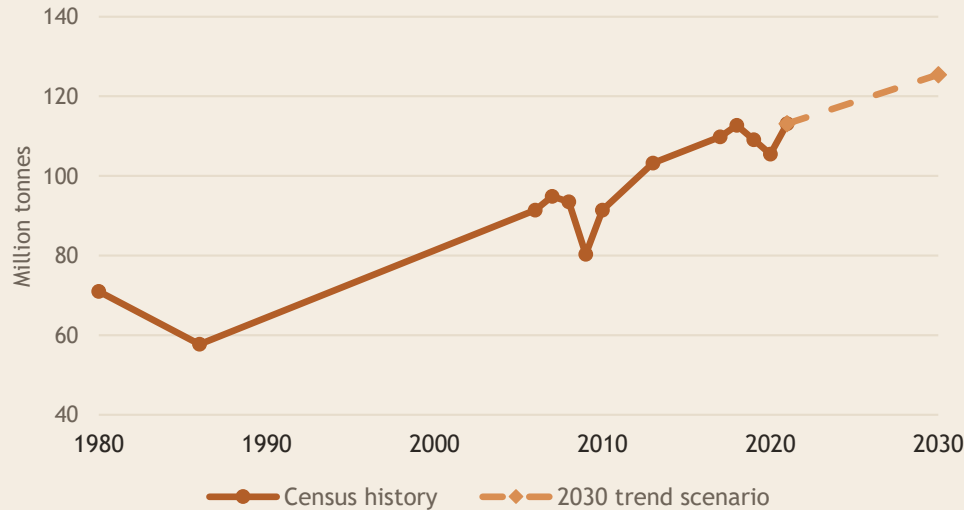
global castings produced a
year — up 2.6% on 2018

~90%

of manufactured goods and
equipment contain cast metal
parts

Global casting volumes: 1980–2030

The long-run tonnage trend is upward despite sharp cyclical shocks – with the outlook separated from census history.



71 Mt* estimated global casting volume in 1980

112 Mt latest comparable census benchmark shown

125 Mt† 2030 trend scenario — not a market-value forecast

Sources: Modern Casting World Census; WFO; IKB 2030 outlook. *1980 interpolated from 1976/1986 benchmarks. †2030 extends the 2013–21 census CAGR.

What is driving the growth

01 Vehicles, still

Automotive takes 53% of Australian foundry equipment demand – and EV structural castings are getting larger, not fewer.

02 Energy and infrastructure

Grid build-out, renewables, mining and defence all need heavy cast components with long lead times.

03 Reshoring and resilience

Geopolitical tension is pushing buyers to shorten supply chains and qualify regional casting capacity.

04 Complexity over volume

Customers want fewer, smarter castings – consolidated assemblies, thinner walls, tighter tolerances.

Capacity, not demand, is the constraint ahead.

People. Power. Process.



People

Our strength

The skills, judgement and pride that make a casting right first time.



Power

Driving efficiency

Energy used deliberately — electric melting, metered and managed.



Process

Reliable results

Binders, sand, simulation and automation that repeat, shift after shift.

People: an acute shortage

Foundries are competing for skilled trades against every other part of manufacturing — and losing.

3.8M

new manufacturing workers
needed globally between 2024
and 2033 (Deloitte /
Manufacturing Institute)

1.9M

of those roles at risk of going
unfilled on current skills trends

930k

people employed in Australian
manufacturing — sixth largest
industry, \$137bn of value added

The metallurgists, pattern makers and melt supervisors retiring this decade took forty years to make. We have not started replacing them.

People: attract, retain, lead

Attract

- Show school and TAFE students a modern, instrumented foundry – not the one in their imagination
- Rebadge roles around technology: process engineer, simulation analyst, robotics technician
- Foundry in a box initiative
- Open the doors – plant tours, work experience, industry scholarships

Retain

- Structured apprenticeships with visible progression, not sink-or-swim
- Invest in conditions: heat, noise, dust and manual handling are solvable problems
- Pay for skill and certification, not just for time served

Lead

- Deliberate succession planning for every critical technical role
- Capture what the veterans know before they leave – document, film, mentor
- Rotate emerging leaders through melt, moulding, quality and customers

Power: the margin squeeze

- Energy and materials account for roughly 55-70% of casting output value – foundries are the largest energy users in the metals sector.
- Most steel foundries draw 500-800 kWh per tonne in melting alone, 35-100% above the theoretical requirement.
- Typical energy utilisation efficiency sits at just 15-25%; yield losses in casting and finishing multiply every wasted kilowatt-hour.
- Industrial electricity rates keep climbing year on year, and foundries run 24/7 – there is nowhere to hide the cost.



Power: what we do about it

Measure before you cut

Meter melting, holding and compressed air separately. You cannot manage a cost you only see once a quarter.

Attack holding time

Holding molten metal is pure loss. Tighter scheduling between melt and pour beats any equipment upgrade.

Re-time production

Shifting melt cycles away from peak tariff windows is a structural change to how we plan the week.

Yield is energy

Every kilogram of returns is re-melted energy. Better gating and simulation cut power without touching the furnace.

Recover the heat

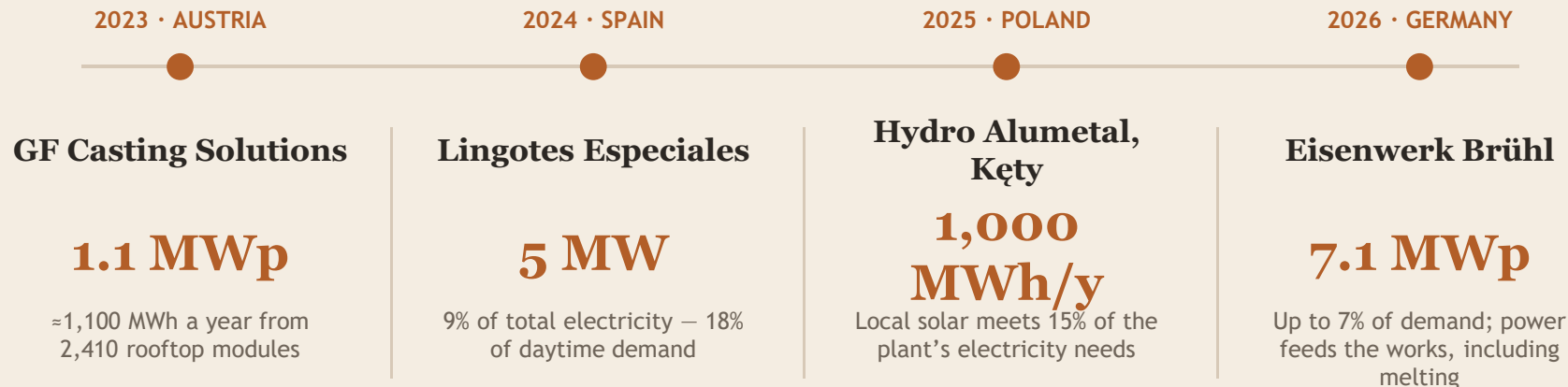
Waste-heat recovery, furnace lining discipline and lid management return real money on existing plant.

Generate and contract

On-site solar, storage and smarter energy contracts turn a volatile cost into a managed one.

European foundries are turning roofs and land into power assets

Selected projects across Europe show the same strategy: generate behind the meter and use the power where the load sits.

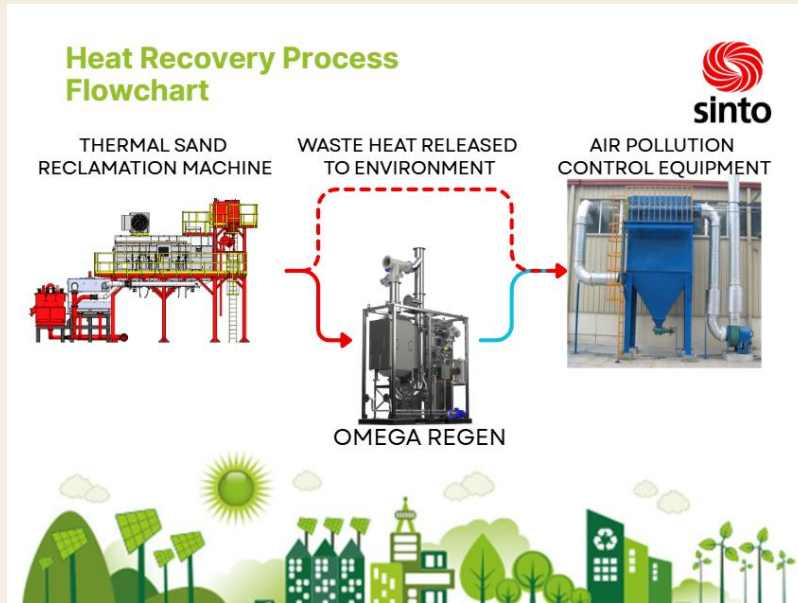


Solar will not run a foundry alone — but it can shave peaks, stabilise part of the power cost and cut scope 2 emissions.

Selected examples, not a census: GF Casting Solutions/Kleine Zeitung (2023); EiDF/Lingotes (2024); Hydro Alumetal (2024-25); Eisenwerk Brühl/Home of Foundry (2026).

New Technology – higher efficiency

Omega Sinto Regen system for thermal reclamation- converts lost heat into kWh



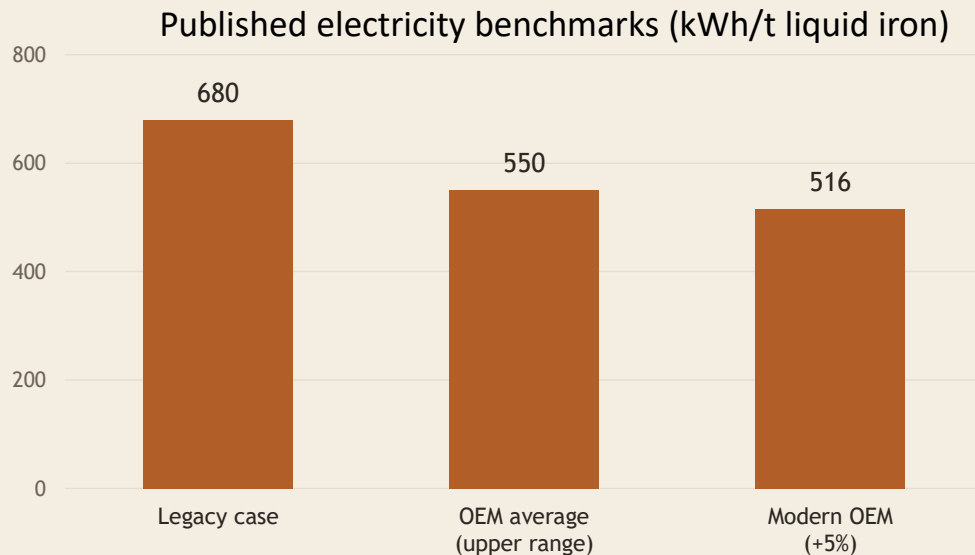
Designed to recover and convert otherwise lost thermal energy into usable power, this system improves overall energy efficiency while reducing operating costs and carbon emissions.

An efficient performance booster for thermal sand reclamation, helping maximise productivity through energy recovery and reuse.

Capable of providing more electrical kWh than the reclamation system consumes, while at same time reducing the size and running cost of related dust extraction.

Induction melting power has moved toward 500 kWh/t

Published benchmarks show a clear efficiency direction – but they are not a controlled time series.



~24%

lower: 680 kWh/t legacy case to 516 kWh/t modern OEM high-side benchmark

385

kWh/t thermochemical heat content for cast iron at 1,480°C – not practical input

**+150–
230**

kWh/t can still be added by holding, handling and pouring after melting

Benchmarks: NIT Calicut foundry case; Otto Junker (510-550 kWh/t at 1,450°C); Inductotherm (491 kWh/t +5% at 1,480°C). Different plants and boundaries.

Process: better binders

Binder chemistry is where cost, emissions and casting quality meet.

Improved organics

- Lower-emission resin systems with reduced free formaldehyde and solvent load
- Familiar handling, existing equipment, faster route to a measurable gain
- Still a thermal-decomposition problem at pour

Shift to inorganics

- Sodium-silicate systems cut hazardous air pollutants dramatically at pour
- Cleaner working environment, less odour, easier plant approvals
- Demands humidity control, core storage discipline and reclamation rethink

The direction of travel is one way: less organic chemistry in the mould, lower cost and better environmental performance.

Process: binders in detail

Where the chemistry is heading – and what each route asks of the plant.

What inorganics deliver

- Near-zero VOC and hazardous air pollutant emissions at pour and shakeout
- No smoke and no odour – a step change in the working environment
- Sand is not carbon-contaminated, so reclaimed sand behaves predictably

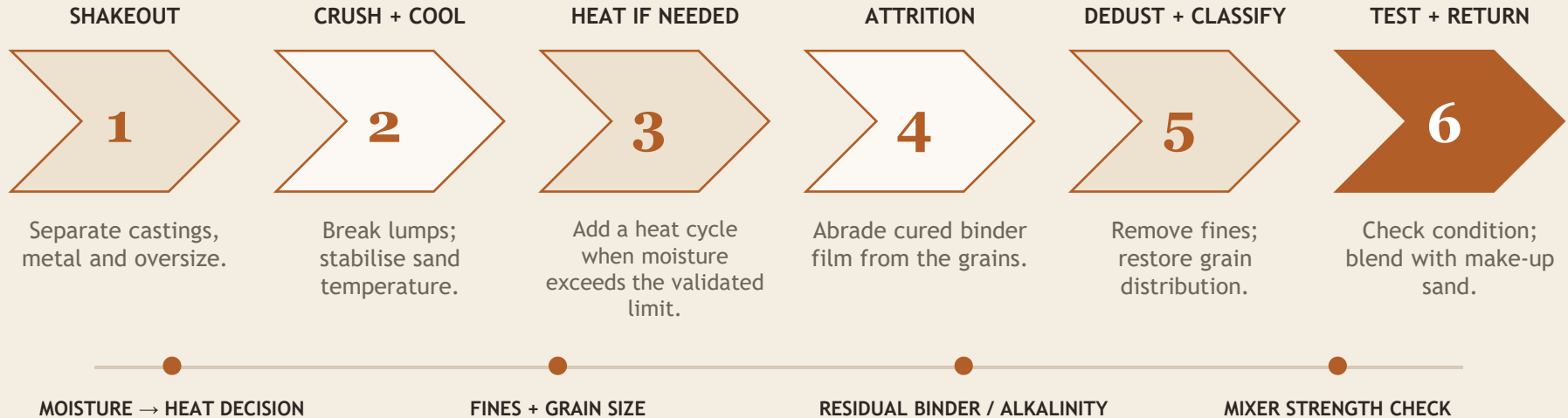
What they ask in return

- Tight humidity and temperature control in core storage – moisture is the enemy
- Heated tooling and revised core box design, with real capital attached
- Coating and gating practice re-qualified, casting family by casting family

Inorganic is not a drop-in substitution. It is a process change – and the foundries that plan it deliberately are the ones that make it pay.

Inorganic reclamation closes the sand loop

Six controlled steps turn knockout sand into a measured feedstock for the mixer.



Reclaimed sand becomes a raw material only after measurement — not merely after attrition.

Simplified process schematic. Confirm equipment, limits and blend ratio with GEOPOL supplier guidance and site trials.

Organic binders still earn their place

The best binder is the lowest-impact system that reliably makes the casting.

Where organics still win

- Proven performance across demanding casting and core applications
- Existing plant, tooling and operator knowledge can be used immediately
- A practical choice for high-mix work where wholesale conversion is difficult

How to use them better

- Select lower-emission grades and use only the binder the process needs
- Control sand, addition and cure tightly to protect quality and reduce waste
- Pair good extraction with reclamation and a planned path to cleaner chemistry

The future is not organic or inorganic. It is choosing the right chemistry – deliberately, casting by casting.

Alkaline phenolic has evolved into a controlled process system

The advance is no longer resin alone — it is chemistry, dosing, reclaimed sand and process data working together.

01 Resin + ester chemistry

Resin reactivity and ester choice tune bench life, strip time and early strength at controlled additions.

02 Metered cure control

Temperature-aware dosing and calibrated mixers stabilise working and stripping times.

03 Reclaimed-sand circuit

Fines removal and residual-alkali monitoring make reclaimed-sand cure more predictable.

04 Cleaner performance

Cleaner formulations retain low-N, low-S performance with less free phenol/formaldehyde and better breakdown.

The breakthrough is integration: chemistry + dosing + sand condition + data.

Technical direction: Foseco Foundryman's Handbook; ASM Handbook Vol. 15; established Alphaset-type process practice. Results remain plant-specific.

Phenolic furan is advancing through cleaner chemistry and tighter control

Modern performance comes from cleaner resins, efficient bonding, tailored acid catalysts and tighter sand-loop control.

01 Cleaner resin chemistry

Cleaner formulations reduce free formaldehyde and furfuryl alcohol while controlling nitrogen and sulphur.

02 Strength at lower addition

Efficient bonding supports mould strength at lower addition when sand quality and compaction are controlled.

03 Tailored acid catalysts

Tailored acids tune bench life and strip time for sand temperature, alloy and production rhythm.

04 Closed-loop sand control

Reclamation and fines/LOI data guide automatic dosing as reclaimed-sand content rises.

The direction of travel: cleaner resin + less over-addition + repeatable cure + controlled reclaimed sand.

Technical direction: Foseco Foundryman's Handbook; ASM Handbook Vol. 15; ECHA substance information. Results remain plant-specific.

Process: rethinking sand

Casting one tonne of iron in chemically bonded sand takes roughly 3 to 4 tonne of sand.

Artificial sand

Engineered spherical grains give lower thermal expansion, better surface finish and less binder demand than natural silica.

Reclamation

Thermal reclamation at +600°C removes over 95% of binder residues and can save 90% of new sand cost. Secondary mechanical reclamation can reduce LOI by 50% - offering alternative to thermal.

Beyond landfill

Reclaimed and beneficially reused sand cuts waste levies, raw material draw and the silica exposure risk.



Process: sand supply and reclamation

Sand is our largest raw material by weight and our largest waste stream. Both ends are now under pressure.

Why artificial sand

Spherical, uniform grains cut binder demand, resist thermal expansion defects such as veining and scabbing, and survive repeated reclamation cycles without degrading.

What reclamation returns

Mechanical attrition strips 80-90% of binder and cuts new sand purchase by 10-20%. Thermal treatment clears over 95% and restores near-virgin performance.

The economics

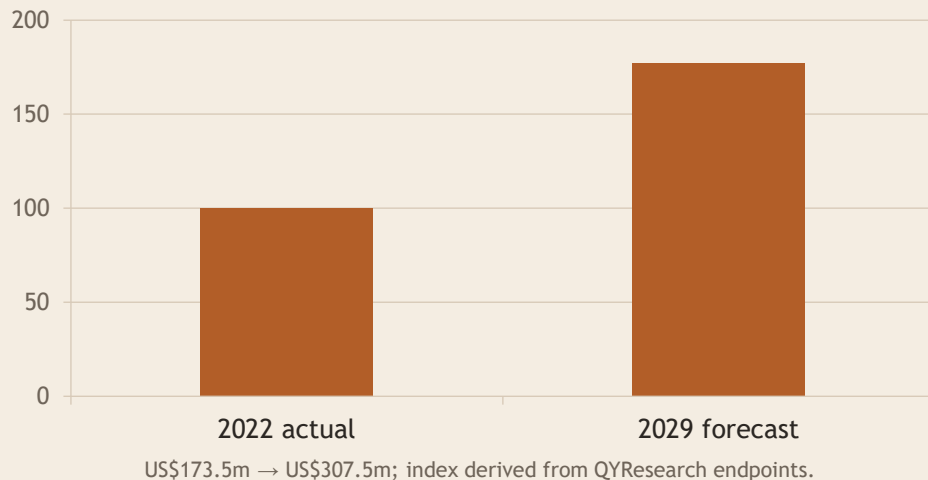
Reclamation can save 80-90% of new sand cost while removing landfill levies, truck movements and the compliance risk that comes with spent sand disposal.



Ceramic foundry sand is moving from niche to industrial scale

Public data does not provide a reliable global tonnage census — but commercial forecasts and producer scale both signal expansion.

Published market-value proxy • 2022 = 100



SUPPLY CAPABILITY

200,000+ t/y

Combined disclosed capacity/output from Qiangxin and Kailin alone — not global consumption.

83%

of the market is attributed to the top five suppliers.

Adoption is broadening into 3D-printed moulds — with ceramic-sand regeneration now demonstrated.

Direction: rising demand and industrial-scale supply. Limitation: physical global consumption remains unverified.

Sources: QYResearch (2023/2024); Qiangxin; Kailin/Foundry.cn; Foundry-Planet (Resand-voxeljet-ITOCHU, 2023).

Process: automation and AI



Machinery and machine intelligence are moving from the finishing line into the whole process.

Quality

Computer vision inspection is reaching ~99% accuracy on surface anomalies — every casting checked, not a sample.

Efficiency

Over \$2.3bn went into industrial AI in 2025, much of it retrofitted onto legacy plant for immediate gains.

Safety

Robots take the hot, heavy and repetitive work — pouring, shakeout, grinding — where our injuries come from.

Process: printing, milling and connected plant



Three technologies already earning their place on foundry floors – none of them experimental any longer.

3D printed sand

Binder-jet printed moulds and cores take tooling off the critical path – prototypes and low-volume castings in days, and geometries no pattern could ever draw.

CNC milled tooling

Direct milling of patterns, core boxes and moulds compresses lead time, holds tighter tolerance and makes design iteration cheap enough to actually do.

IoT and live process control

Sensors across melt, sand plant and moulding, as well pattern recognition technology and autofilling turn shift-by-shift guesswork into real-time control – and give every casting a traceable process record.

Where Australia sits

A small industry by tonnage, but one with a genuine window as buyers look for regional capacity.

\$12.8bn

Australian foundry and casting market in 2025, forecast to reach \$22.4bn by 2034

Commercial market estimate including activity beyond domestic foundry production

6.2%

forecast annual growth to 2034
— ahead of the global casting market

42%

of global casting output sits in China; Europe follows at around 18%

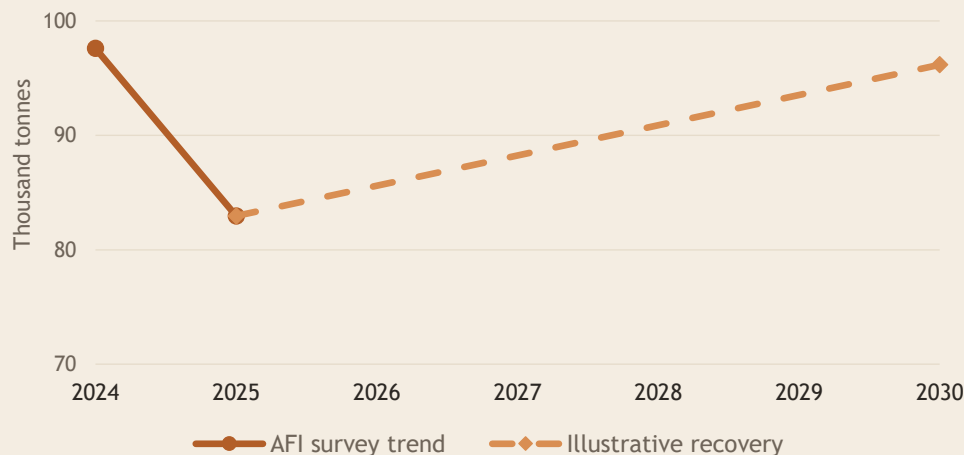
- Green sand still accounts for around 48% of Australian casting work — the upgrade path runs through existing plant, not new plant.
- Automotive-linked demand at 53% makes diversification into mining, defence, rail and energy a strategic necessity.
- Our advantage is not price — it is lead time, engineering support and traceability.

* IMARC Group, *Australia Foundry and Casting Market Size, Share, Trends and Forecast 2026–2034*.

Australian casting output can recover toward 2024 levels

AFI reports a 15% fall in 2025; a 3% annual recovery would nearly restore the implied 2024 volume by 2030.

AFI survey output and recovery scenario (kt)



83.0 kt

2025 AFI survey output: 78.0 kt ferrous plus 4.9 kt non-ferrous

-15%

reported decline versus 2024 — the latest trend is contraction, not growth

96.2 kt†

2030 illustrative recovery scenario at 3% a year — not a published forecast

Source: AFI Industry Report 2025. *2024 implied from the reported 15% fall and rounded. †2030 assumes 3% annual recovery; no national tonnage forecast was found.

Four challenges define Australia's foundry capacity

01 Skills and succession

Experienced specialists are retiring faster than apprentices, technicians and future leaders are being developed.

02 Energy cost and reliability

Power-intensive melting faces volatile tariffs; every delay, low-yield casting and hour of holding compounds the cost.

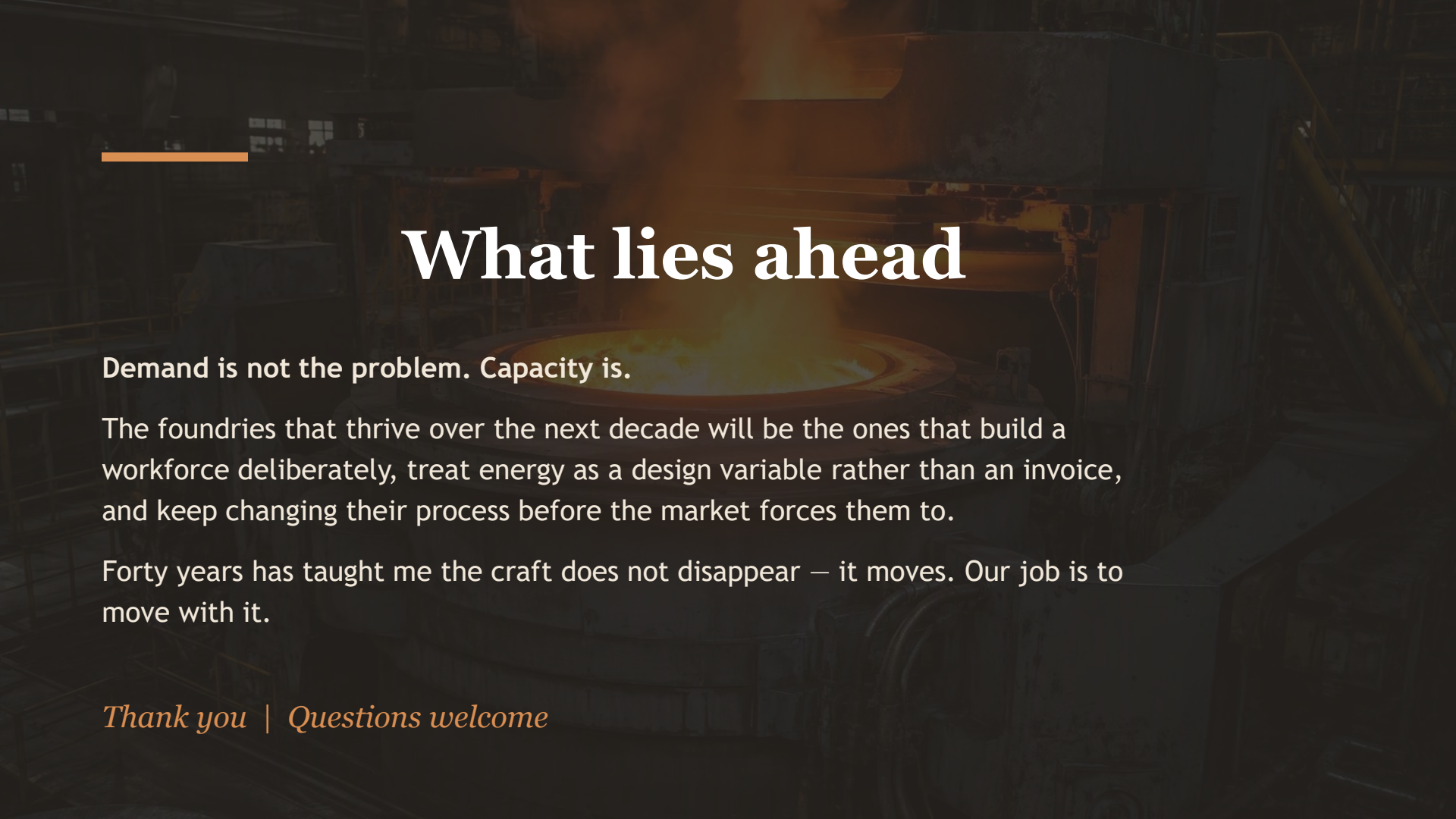
03 Scale, imports and demand mix

A small local tonnage base must compete with imports while reducing dependence on cyclical automotive and mining work.

04 Capital and compliance

Margins must fund cleaner chemistry, reclamation, automation, safety and traceability—often across ageing plant.

The common risk: productive capacity erodes before regional demand is converted into orders.

The background of the slide is a dark, industrial scene featuring a large, glowing orange-yellow molten metal surface, likely in a foundry or casting facility. The scene is dimly lit, with the primary light source being the heat of the metal. A horizontal orange line is positioned in the upper left corner of the slide.

What lies ahead

Demand is not the problem. Capacity is.

The foundries that thrive over the next decade will be the ones that build a workforce deliberately, treat energy as a design variable rather than an invoice, and keep changing their process before the market forces them to.

Forty years has taught me the craft does not disappear — it moves. Our job is to move with it.

Thank you | Questions welcome