AURUS INSTITUTE FOR RESOURCE DEVELOPMENT

The Two-Speed Iron Ore Market

High-Grade Scarcity, Green Steel and West Africa's Entry into the Seaborne Trade

FLAGSHIP REPORT · EXPLORE

July 2026 · ~50-min read

Aurus Technical Committee

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Evidence before assertion.

MINING · INFRASTRUCTURE · ENGINEERING · ENVIRONMENT

Contents

One commodity is quietly becoming two markets

Iron ore is the largest dry-bulk commodity trade on earth and one of its most concentrated: some 2.6 billion tonnes of usable ore were mined in 2025, priced off a single benchmark that averaged US$100.2 per dry tonne for the year. Beneath that single benchmark, the market is splitting in two. One speed belongs to the 62 per cent Fe mainstream, ample, mature and priced for cost discipline. The other belongs to ores at 65 per cent Fe and above, and above all to the direct-reduction grades near or beyond 67 per cent Fe that low-carbon steelmaking prefers, where the constraint is geology, and geology is scarce.

This paper reads the public record of prices, reserves, steel technology and the new Atlantic supply as one story: the story of a grade divide that is turning ore quality into the industry's principal strategic variable. It is written for the developers now bringing high-grade deposits toward the seaborne trade, for the traders pricing quality between two furnace worlds, and for the lenders deciding which side of the divide a project's revenue line actually sits on.

The mainstream is flat and disciplined. World mine production held at about 2.6 billion tonnes of usable ore in 2025, essentially unchanged from 2024, while global steel demand held near 1,750 million tonnes, flat on the year, with the World Steel Association projecting 1,773 million tonnes for 2026. The price deck agrees: after annual averages of US$109.4 and US$100.2 per dry tonne in 2024 and 2025, the World Bank's April 2026 outlook eases to US$97.0 for 2026 and US$95.0 for 2027. Nothing in the published record invites a producer to plan on price.

The divide is structural, because the furnace mix is changing. Steel accounts for about 7 per cent of energy-sector CO_2 emissions directly, roughly 10 per cent including power, and draws about 75 per cent of its energy from coal. On the IEA's Sustainable Development Scenario, the sector's CO_2 intensity falls about 60 per cent by 2050 and hydrogen-based direct reduction grows to just under 15 per cent of primary steel. Direct-reduction plants prefer feed at or above 67 per cent Fe, and published technical literature identifies the scarcity of such ore as a binding constraint on the gas- and hydrogen-based route. The buyer's decarbonisation pathway, in other words, is a specification the seller's orebody either meets or does not.

The supply answer has a West African address. The Simandou system in Guinea, railed to the coast in November 2025 and shipping since December, carries published reserves of roughly 1.5 billion tonnes at 65.0 to 66.4 per cent Fe, with combined system capacity stated at up to 120 million tonnes a year on a 30-month ramp. Mauritania already ships 15 million tonnes a year from 10 billion tonnes of crude-ore reserves. The Atlantic basin is entering the seaborne trade at exactly the grade point the divide rewards.

Freight is the quiet second divide. Iron ore's seaborne tonnage grew 3.5 per cent in 2024 while its tonne-miles grew 6.4 per cent, because supply shifted toward long-haul Atlantic exporters. Every new Atlantic tonne re-prices the freight differential between basins, and Chapter 6 reads what that means for delivered cost when the benchmark eases.

The scenario set is published, and this paper stays inside it. Chapter 7 assembles the World Bank, IEA, World Steel Association and UNCTAD decks side by side, each with its scenario and vintage label intact, and derives no forecast of its own. Where the public record is silent, above all on the size of the future DR-grade supply gap, the silence is stated, named in the back matter, and left unfilled.

> **Two-speed market** · in this paper, the divergence between the 62 per cent Fe benchmark mainstream and the high-grade segment (65 per cent Fe and above, including direct-reduction grades near or beyond 67 per cent Fe) whose demand is tied to low-carbon steelmaking routes.

What the record supports: five findings

- **Volume is flat; quality is not.** Production and steel demand both held flat in 2025, yet the segment above 65 per cent Fe gained a continental-scale new entrant and a technology-driven buyer class. Averages conceal the divide; specifications reveal it.
- **The price deck rewards cost, the furnace mix rewards grade.** A benchmark easing toward US$95 by 2027 disciplines every producer; a direct-reduction fleet that prefers 67 per cent Fe feed pays for the few who can meet it.
- **Simandou moved the reference class.** First ore railed in November 2025, first shipment in December, published reserve grades of 65.0 to 66.4 per cent Fe: the high-grade segment's supply question now has an operating answer, on a published 30-month ramp.
- **Demand growth has changed its address.** China's steel demand fell 2.0 per cent in 2025 while the developing world excluding China grew 3.4 per cent, with India near 9 per cent a year. The marginal buyer of the next decade is being re-domiciled.
- **The freight map is stretching.** Tonne-miles outgrew tonnes by nearly a factor of two in 2024; as Atlantic supply grows, distance, not just grade, sets the delivered-cost order.

Who should read this paper

Three audiences. **Developers and owners** weighing high-grade projects toward the seaborne trade will find in Chapters 2 through 5 the specification their orebody is being priced against, and in Chapter 8 a grade-aware development discipline. **Traders** will find in Chapters 2 and 6 the mechanics by which grade and freight now interact under one easing benchmark. **Lenders and investors** will find in Chapters 4 and 7 a conservative treatment of the segment's central uncertainty, the future DR-grade balance, with every published number labelled and every missing number named.

The paper's method is deliberately conservative: every market and project figure is transcribed from a cited public source and, but for the two disclosed exceptions set out in the References, archived in the paper's evidence dossier; ranges and scenario labels are preserved as published; and where the record is silent, as it still is on the size of the future direct-reduction supply gap, the silence is stated rather than filled. The back-matter page Method and evidence records the full discipline, so any figure here can be traced and re-verified without access to anything but the cited public record.

How to use this paper

Read **front to back** for the market story, told from benchmark to furnace to freight. Read **Chapter 8 first** for the instrument: the grade-aware development discipline, then trace each of its questions back into the chapters that evidence it. Or read **by exhibit**: the exhibits and stat tiles, led by the signature two-speed chart in Chapter 2, carry the paper's entire quantitative content, each with its source line burned in, and the exhibit index in the back matter maps every one to its references.

One commodity, two speeds; the rest of this paper is the published evidence that the gap is widening, and the discipline for building on the right side of it.

AT A GLANCE

Five figures that frame the two-speed market

2.6 Bt

WORLD IRON ORE MINED IN 2025 (USABLE ORE), FLAT AGAINST 2024

USGS, Mineral Commodity Summaries, 2026

US$100.2

2025 ANNUAL AVERAGE, 62% FE BENCHMARK, PER DRY TONNE; FORECAST US$97.0 (2026), US$95.0 (2027)

World Bank, Commodity Markets Outlook, April 2026

65.0–66.4% Fe

PUBLISHED SIMANDOU (SIMFER) ORE-RESERVE GRADES, ~1.5 BT

Rio Tinto, Simandou disclosures, 2026

JUST UNDER

15%

SHARE OF PRIMARY STEEL FROM HYDROGEN-BASED DIRECT REDUCTION BY 2050, IEA SUSTAINABLE DEVELOPMENT SCENARIO

IEA, Iron and Steel Technology Roadmap, 2020

+6.4%

IRON ORE TONNE-MILE GROWTH IN 2024, AGAINST +3.5% IN TONNES: THE TRADE IS STRETCHING

UNCTAD, Review of Maritime Transport, 2025

HOW TO READ THIS SPREAD

Each figure is transcribed from the cited institution’s own publication and re-appears, in context, in the chapters that follow. Ranges, qualifiers and scenario labels are preserved as published.

How this paper is organised

CHAPTER	THE QUESTION IT ANSWERS	ANCHOR EVIDENCE
1 · Market state 2026	Where do supply, demand and price actually stand as this paper goes to press?	USGS, 2026; WSA, 2025; World Bank, 2026
2 · The grade divide	What separates 62% Fe from 65% Fe and DR-grade ore, and how is the difference priced?	FRED, 2026; Vale, 2025/2026; Rio Tinto, 2026
3 · Decarbonisation pathways	Which steelmaking routes are growing, and what do they eat?	IEA, 2020
4 · The DR-grade question	How scarce is direct-reduction feed, and what does the record actually publish?	Published DR practice, 2025; IEA, 2020
5 · Supply-side revolution	What did Simandou change, and who else is entering the Atlantic trade?	Rio Tinto, 2025/2026; USGS, 2026
6 · Cost curves and freight	Where does margin live when the benchmark eases and the haul lengthens?	UNCTAD, 2025; Vale, 2025/2026
7 · Scenarios to 2040	What do the published decks agree and disagree on, label by label?	World Bank, 2026; IEA, 2020; WSA, 2025
8 · Implications	What should developers, traders and lenders do differently, and what is the Aurus view?	Chapters 1 through 7, cited record

1

EXPLORE · MARKET STATE 2026

Market state 2026

A 2.6-billion-tonne industry, flat on volume, easing on price, and quietly re-sorting itself by grade.

2.6 Bt
USABLE ORE MINED 2025, FLAT VS 2024 (USGS, 2026)

US$100.2
2025 ANNUAL AVERAGE, 62% FE, PER DRY TONNE (WORLD BANK, APRIL 2026)

~1,750 Mt
GLOBAL STEEL DEMAND 2025, FLAT VS 2024 (WSA SRO, OCTOBER 2025)

Every two-speed story starts with the single speedometer everyone still watches. In 2025 the world mined about 2.6 billion tonnes of usable iron ore carrying 1.6 billion tonnes of iron, flat against 2024; global steel demand held near 1,750 million tonnes, also flat; and the 62 per cent Fe benchmark averaged US$100.2 per dry tonne for the year, down from US$109.4 in 2024. Volume flat, demand flat, price easing: read on the averages, iron ore in 2026 is a mature industry practising cost discipline. This chapter sets that baseline precisely, because everything after it is about what the averages conceal.

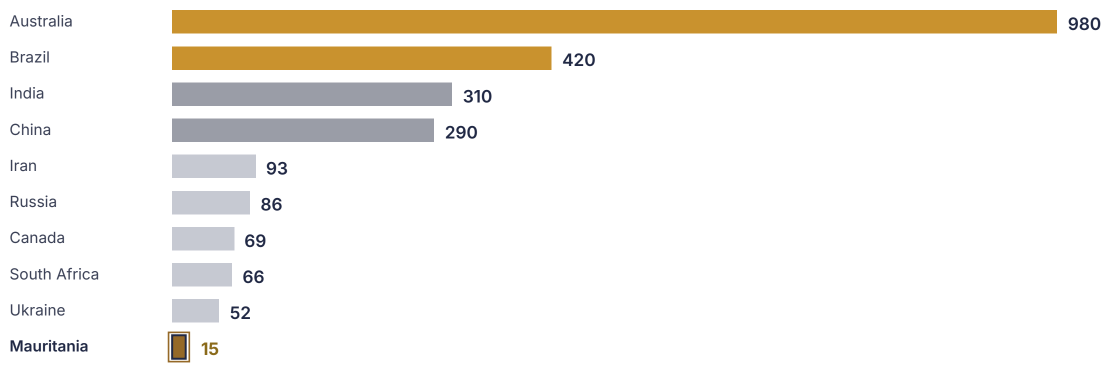
Supply: concentrated at the top, long in the tail

The production table remains one of the most concentrated in the commodity world. Australia mined an estimated 980 million tonnes of usable ore in 2025 and Brazil 420 million; India followed at 310 million and China at 290 million, with a long tail running through Iran, Russia, Canada, South Africa and Ukraine down to Mauritania's 15 million tonnes. Two producers thus account for well over half of the seaborne-relevant total, a structure that has held for two decades and that Chapter 5's new entrants are the first credible challenge to, at the specific grade point where the incumbents are weakest.

EXHIBIT 1

Two producers still set the rhythm of the seaborne trade

Mine production 2025 estimates, usable ore, million tonnes, selected producers



Gold: the two seaborne incumbents. Ochre: the Atlantic's established West African exporter, Chapter 5's reference point. Grey: other producers, context.

Source: USGS, Mineral Commodity Summaries, 2026 (2025 estimates, usable ore). Producers below 50 Mt omitted for legibility except Mauritania; the full published table also lists the United States (38), Kazakhstan (35), Sweden (26), Peru (21), Chile (19), Turkey (18) and Mexico (8).

Demand: flat in total, moving in composition

The demand side tells the same headline and a different story underneath. The World Steel Association's October 2025 Short Range Outlook holds global steel demand at about 1,750 million tonnes for 2025, flat on 2024, and projects 1,773 million tonnes for 2026, a 1.3 per cent rise. Within the total, China declined 2.0 per cent in 2025 with a further 1.0 per cent slip expected in 2026 as housing bottoms out, while the developing world excluding China grew 3.4 per cent and is projected at 4.7 per cent for 2026. India is compounding at about 9 per cent a year across 2025 and 2026, with 2026 demand some 75 million tonnes higher than 2020. Africa's steel demand, at about 41 million tonnes in 2025, has averaged 5.5 per cent growth over three years; the developed world is nearly flat, with the EU and UK recovering from a low base. USGS's own reading of the same year is blunter: China's decline was offset by growth in Egypt, India, Saudi Arabia and Viet Nam. The marginal tonne of steel demand is migrating away from the buyer around which the entire seaborne iron-ore system was built.

EXHIBIT 2

The total is flat; the composition is not

Steel demand by region, World Steel Association Short Range Outlook, October 2025

REGION	2025 GROWTH	2026 FORECAST	AS PUBLISHED
World	~0%	+1.3%	~1,750 Mt in 2025; 1,773 Mt forecast 2026
China	−2.0%	−1.0%	Housing downturn bottoming
Developing world excl. China	+3.4%	+4.7%	The growth engine of the outlook
India	~+9%/yr	~+9%/yr	2026 demand ~75 Mt above 2020
Africa	·	·	~41 Mt in 2025; ~5.5%/yr average over the past 3 years
Developed world	−0.5%	+1.5%	EU+UK +1.3% / +3.2%; US +1.8% / +1.8%
Central & South America	+5.5%	·	~50 Mt; Brazil +5.0% in 2025

Source: World Steel Association, Short Range Outlook, October 2025 (via SAISI republication, archived). Growth rates and levels as published; dots mark values the source does not state at this altitude. Every cell verifies against the archived capture, the United States 2026 figure included. Cross-check: USGS, MCS, 2026 reads 2025 world demand as flat, China's decline offset by Egypt, India, Saudi Arabia and Viet Nam.

A vignette from the mature end: the United States in 2025

One national market compresses the paper's whole argument into a single year. US usable-ore production fell 16 per cent in 2025, to 38 million tonnes from 45.1, and the value of that output fell 25 per cent to US$3.38 billion: the mainstream's easing price arithmetic, applied. Its import mix leans on high-grade Atlantic suppliers, Brazil at 58 per cent, Canada at 21, Sweden at 10 and Chile at 4 over 2021 to 2024. And its most strategic iron units are no longer ore at all: an iron-metallics segment of 5.2 million tonnes was valued at US$874 million, and the country's November 2025 decision to add metallurgical coal to its Final Critical Minerals List for its steelmaking role shows input security reaching policy grade. A mature market, in other words, already behaves two-speed: volume shrinks with price, while quality and strategic inputs earn designation and premium value.

EXHIBIT 3

A mature market already behaves two-speed: the US year in four figures

United States, 2025 estimates and 2021–2024 import shares, as published

−16%
Usable-ore production, 2025
38 Mt, from 45.1 Mt

−25%
Value of production, 2025
US$3.38 bn

US$874 m
Iron-metallics value, 5.2 Mt
DRI and HBI, four plants

58%
Of ore imports from Brazil
Canada 21%, Sweden 10%, Chile 4%

Policy marker, November 2025: metallurgical coal added to the US Final 2025 Critical Minerals List (90 FR 50494) for its role in BF-BOF steelmaking: steel-input security has reached designation grade in the mature markets.

Source: USGS, Mineral Commodity Summaries, 2026 (production, value, import shares 2021–2024, metallics, critical-minerals listing). Percentages and shares as published.

Price: a deck that pays for discipline

Price completes the baseline. The spot 62 per cent Fe CIF benchmark averaged US$99.07 per tonne over January to September 2025, against US$112.07 for the same period of 2024; the full-year averages were US$109.4 and US$100.2 per dry tonne for 2024 and 2025. Forward, the World Bank's April 2026 Commodity Markets Outlook writes US$97.0 for 2026 and US$95.0 for 2027, declines of 3.2 and 2.1 per cent. The monthly series behind those annual points, drawn in full in Chapter 2's signature exhibit, spans a decade from US$56.1 average in 2015 through the US$158.2 average of the 2021 spike to US$103.7 in 2025, with the first five months of 2026 averaging US$107.4. The two annual figures for 2025, US$100.2 and US$103.7, are not a discrepancy but two distinct public benchmarks this paper runs in parallel by design: the World Bank Commodity Markets Outlook index anchors the forward deck, while the FRED monthly series supplies the chart spine, and the paper quotes each in its own series rather than blending the two. The same two-feed gap recurs in 2024, where the World Bank annual average of US$109.4 sits beside the FRED series mean of US$111.1, and it is read the same way: not a discrepancy, but two independent public indices reported side by side. A market that has round-tripped a boom and settled near US$100 is a market in which the low-cost producer wins the mainstream, and everyone else must find a segment. That segment is the subject of the rest of this paper.

> BENCHMARK (62% FE CIF) · the reference price for iron ore fines assaying 62 per cent iron, quoted cost, insurance and freight into China (the USGS basis); the "first speed" of this paper's title, against which higher- and lower-grade ores trade at differentials.

Volume flat, demand flat, price easing: the averages describe a mature industry. The specifications underneath describe a market splitting in two.

CHAPTER 1 · MARKET STATE 2026

Why the baseline misleads on its own

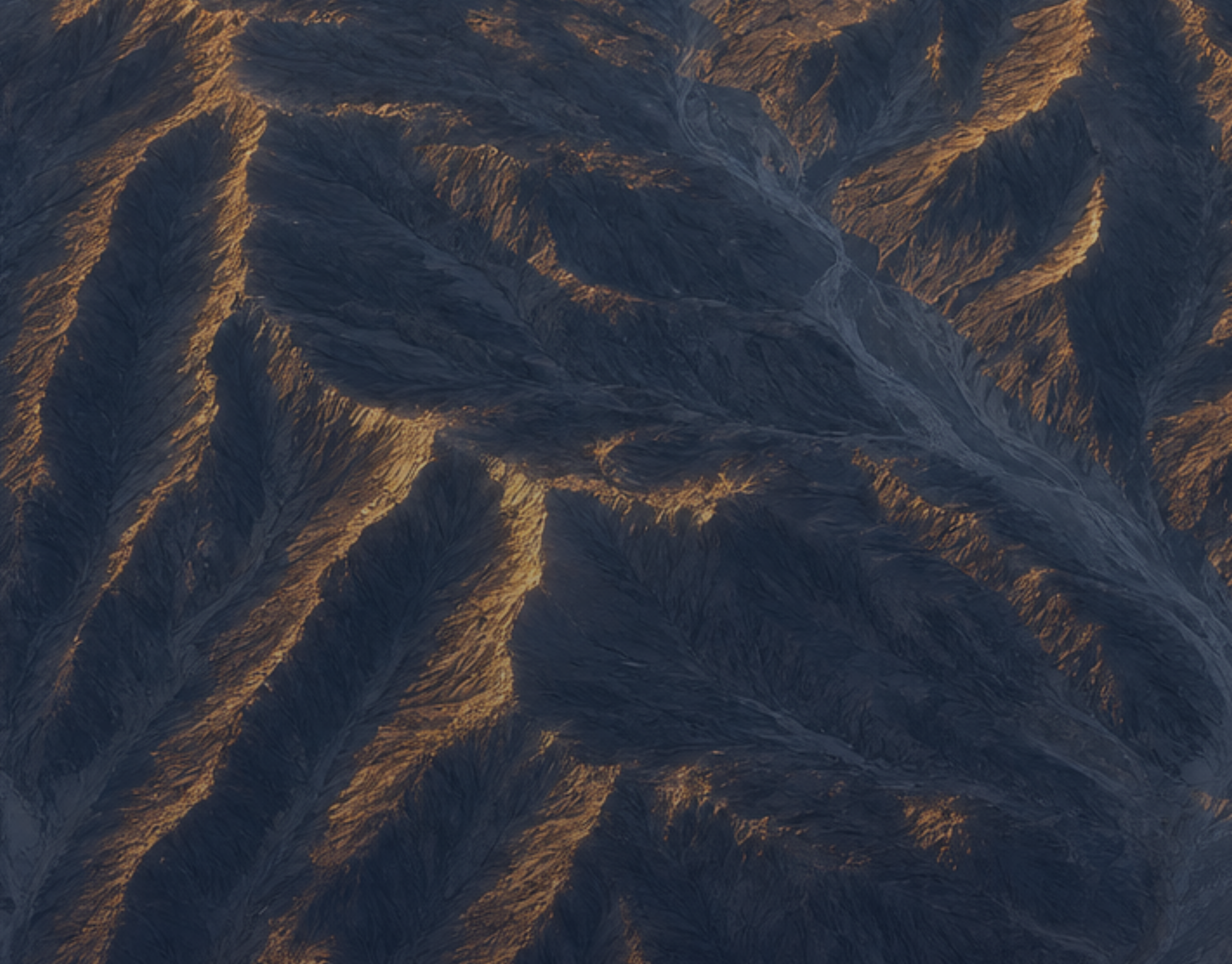
Each figure above is true, published and, taken alone, incomplete. Flat world production hides that the new capacity entering the trade in 2025 arrived at 65 per cent Fe and above, not at the mainstream grade. Flat world steel demand hides that the technology composition of that demand is under a decarbonisation mandate whose preferred furnace routes eat a feed the mainstream cannot supply. And an easing benchmark hides that realized prices differ producer by producer: Vale's average realized fines price rose from US$85.1 (derived) to a disclosed US$95.4 per tonne across the quarters of 2025, tracking quality and freight as much as the index. The next chapter takes these three concealments and gives them a single name: the grade divide.

> DMT (DRY METRIC TONNE) · a tonne of ore net of moisture; the basis on which the benchmark averages and forecasts in this paper are quoted. Wet-basis and dry-basis figures are never mixed in this series.

What to watch, quarter by quarter

The baseline of this chapter is rebuilt from four publications on fixed calendars, and a reader can maintain it without any subscription: the USGS Mineral Commodity Summaries each January for production, reserves and the year's supply story; the World Steel Association's Short Range Outlook each April and October for demand and its composition; the World Bank's Commodity Markets Outlook each April and October for the forward deck; and the monthly benchmark series, freely retrievable, for the price record itself. Every edition of this paper re-runs exactly that circuit before it prints. The chapters that follow add two further recurring feeds, producer disclosures and the annual maritime-transport review: those six public documents are the two-speed argument's recurring spine, with the IEA roadmap and the feed-grade reference standing outside the cadence.

> A year that read as flat on every headline was, underneath, the year the mainstream and the premium began to keep separate time.



2

EXPLORE · THE GRADE DIVIDE

The grade divide

Three thresholds, 62, 65 and 67 per cent iron, now sort one commodity into two markets. This chapter draws the divide and prices it.

62% Fe
BENCHMARK MAINSTREAM: US$100.2/DMT AVERAGE 2025 (WORLD BANK, APRIL 2026)

65.0–66.4%
PUBLISHED SIMANDOU RESERVE GRADES (RIO TINTO, 2026)

≥67% Fe
PREFERRED DIRECT-REDUCTION PLANT FEED (PUBLISHED DR TECHNICAL PRACTICE, 2025)

Grade is the percentage of a cargo that is actually iron, and it has always been priced. What has changed is what the price is for. In the blast-furnace world, higher grade bought productivity: less slag, less coke, more metal per charge. In the emerging direct-reduction world, grade buys admission: below the specification, the cargo is penalised or excluded outright. A differential has become a divide, and this chapter draws it at the three thresholds the public record prices: the 62 per cent benchmark, the 65 per cent-plus high-grade segment, and the direct-reduction grades at or beyond 67 per cent.

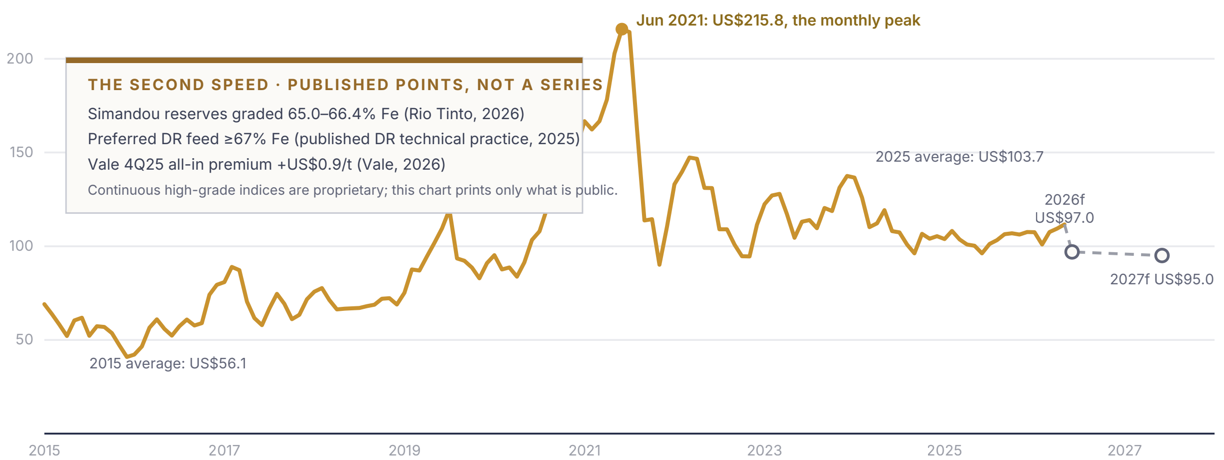
Reading the signature exhibit

Exhibit 4 is this paper's centrepiece, and it is built almost entirely from one archived series: the monthly global iron-ore benchmark price from January 2015 through May 2026, 137 observations drawn from FRED. The line tells the mainstream's decade in one stroke: the US$56.1 annual average of 2015, the long climb, the June 2021 monthly peak at US$215.8, and the settling into a US$95–112 band from 2024 onward, with the World Bank's forward deck easing below it. Above the line sit the second speed's markers, each an attributed point rather than a continuous series: Simandou's published reserve grades of 65.0 to 66.4 per cent Fe, the direct-reduction feed threshold at or beyond 67 per cent, and Vale's disclosed 4Q25 all-in premium of US$0.9 per tonne. The asymmetry is deliberate and honest: the mainstream has a public price history; the high-grade segment, priced largely through proprietary indices, appears here only through what companies and institutions have published about it. The divide is visible precisely in what each side of the chart is able to show.

EXHIBIT 4 · SIGNATURE EXHIBIT

One public price for the mainstream; published points for the premium: the two-speed divide in one chart

Global iron ore benchmark price, monthly, US$ per dry metric tonne, January 2015 to May 2026, with the World Bank forecast and the published high-grade markers



Source: FRED (Federal Reserve Bank of St. Louis), Global price of Iron Ore (PIORECRUSDM), monthly, retrieved July 2026 (archived series; annual means derived from the archived observations); World Bank, Commodity Markets Outlook, April 2026 (2026–2027 annual forecasts, drawn dashed at year centres); Rio Tinto, 2026; Vale, 2026; published direct-reduction technical practice, 2025. The gold line is the 62% Fe mainstream; the boxed panel lists the premium segment's published points.

Reading the two-speed chart

Four observations discipline any use of Exhibit 4. **First, the two speeds are two kinds of evidence.** The mainstream is a 137-month public series; the premium segment is a handful of published points. Any strategy document that draws the second speed as a smooth line is quoting a source this paper could not archive. **Second, the deck slopes down while the divide widens.** The forecast points ease toward US$95 even as the technology chapters tighten the specification; a falling benchmark and a rising quality premium are not in tension, they are the two speeds. **Third, the peak is a warning, not a base case.** June 2021's US$215.8 monthly average shows what supply disruption does to a concentrated trade, and no published deck extrapolates it. **Fourth, the box will fill in public.** Simandou's ramp disclosures, Vale's quarterly premium lines and any whitelisted institution publishing a continuous high-grade series will all land in the boxed panel's successors, and the next edition re-draws the chart from the same archived pipeline.

> PREMIUM / DIFFERENTIAL · the amount by which a cargo trades above or below the 62 per cent benchmark on account of its iron content and impurities. Continuous premium indices for 65 per cent and DR-grade ore are proprietary; this paper therefore cites only published point-in-time premia, and says so.

The three thresholds, and what each buys

The 62 per cent threshold is a convention: the assay around which the liquid seaborne mainstream settles, where Australia's and Brazil's large systems compete on cost and logistics. The 65 per cent threshold is a quality claim: at and above it, a producer sells blast-furnace productivity and a lower-emissions burden per tonne of metal, the segment where Brazilian premium fines and now Simandou's 65.0 to 66.4 per cent reserves sit. The 67 per cent threshold is a specification: published direct-reduction practice prefers feed at or above that iron content, treats blast-furnace-grade pellets at 65 per cent or below as workable but penalised, and identifies the scarcity of ore above 67 per cent as a binding constraint on the growth of the gas-based route. Exhibit 5 stacks the three thresholds as a ladder, with the published evidence attached to each rung.

EXHIBIT 5

Three thresholds sort one commodity into two markets

The grade ladder, with the published evidence at each rung

≥67% Fe · direct-reduction grade — SPEED TWO · SCARCE
The specification the low-carbon routes prefer; BF-grade pellets ≤65% workable but penalised; scarcity above 67% identified as a binding constraint on gas-based DR-EAF growth.
Evidence: published direct-reduction and hydrogen-metallurgy technical practice, 2025.

65% Fe and above · the high-grade segment — SPEED TWO
Blast-furnace productivity and lower emissions per tonne of metal; premia disclosed point-in-time, not as a public series.
Evidence: Simandou reserves 65.0–66.4% Fe (Rio Tinto, 2026); Vale 4Q25 all-in premium US$0.9/t (Vale, 2026).

62% Fe · the benchmark mainstream — SPEED ONE
Liquid, publicly priced (US$100.2/dmt average 2025), cost- and logistics-competitive; the first speed.
Evidence: World Bank CMO, April 2026; FRED monthly series, 2015–2026.

Source: World Bank, Commodity Markets Outlook, April 2026; FRED, 2026; Rio Tinto, Simandou disclosures, 2026; Vale, quarterly disclosures, 2026; published direct-reduction technical practice, 2025. Band heights are schematic, not tonnage-proportional.

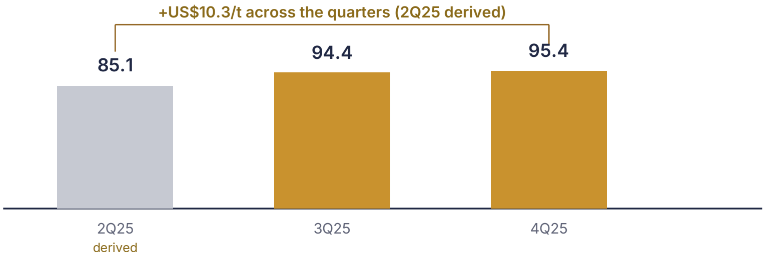
How the divide is priced today

Because the high-grade indices are proprietary, the honest way to price the divide from the public record is through producer disclosures, and Exhibit 6 draws the fullest of them. Vale, the largest seaborne supplier, discloses an average realized iron-ore fines price by quarter across a medium-grade and blended portfolio. The archived 4Q25 filing reports US$95.4 per tonne, US$1.0 higher quarter on quarter, and US$94.4 in the third quarter, itself US$9.3 higher quarter on quarter; the second-quarter figure of US$85.1 follows by arithmetic from that disclosed step and is marked derived where it appears. The same filing discloses an all-in premium for 4Q25 of US$0.9 per tonne, down US$1.2 per tonne quarter on quarter. Read together, the premium sits not in that below-benchmark blended price but in the separately disclosed all-in term. What no public series shows is how that premium behaves when direct-reduction demand scales, and Chapter 4 treats that question with the caution it deserves.

EXHIBIT 6

A major supplier's realized price and disclosed premium, 2025 quarters

Vale average realized iron-ore fines price, US$ per tonne, 2025 quarters as disclosed and derived, with the disclosed 4Q25 all-in premium



Disclosed 4Q25 premium

+US$0.9/t

All-in premium as disclosed by Vale for 4Q25 (Vale, 2026).

Bar heights drawn from zero.

Source: Vale, quarterly production and sales, and financial, disclosures, 2025–2026 (public filings; 4Q25 capture archived on disk, reporting the 3Q25 and 4Q25 realized prices and their quarter-on-quarter steps verbatim). The 2Q25 figure is derived from the disclosed 3Q25 quarter-on-quarter change and is marked derived. Realized prices net of the company's own pricing adjustments, as disclosed; not the benchmark index.

THEMATIC ASIDE

Grade is made at the mine plan, long before it is priced at the port

A cargo's assay is a decision chain: the deposit's in-situ grade, the cut-off the mine plan applies, the degree of beneficiation the concentrator attempts, and the blending strategy at the port. High-grade direct-shipping deposits carry a structural advantage along that whole chain, because their quality is delivered by geology rather than bought with processing capital and operating cost. That is why the divide, though priced in the freight market, is ultimately an exploration and resource-definition story, and why this paper sits on the Explore shelf of its series.

DSO (DIRECT-SHIPPING ORE) · ore of sufficient in-situ quality to be crushed, screened and shipped without beneficiation; the deposit class whose grade is delivered by geology rather than by processing plant.

The divide in contract form

Markets that split by specification eventually split by contract, and the early signs are already in the disclosures this chapter cites. A mainstream cargo prices off the public benchmark, with the index itself doing the work of quality adjustment around 62 per cent. A premium cargo prices off the benchmark plus a negotiated quality term, which is why Vale discloses an "all-in premium", its basis not stated in the filing, and why direct-reduction feed, whose value to the buyer turns on a threshold rather than a gradient, tends toward term structures and dedicated supply rather than spot liquidity. For a developer, the contract consequence matters as much as the price consequence: the second speed's revenue line is negotiated, bilateral and specification-tested, and a marketing strategy for a high-grade project is therefore a technical document before it is a commercial one.

What would falsify the two-speed reading

A two-speed thesis should state its own tests. Three published developments would collapse the divide back into a differential: a sustained fall in the disclosed premia toward zero while direct-reduction capacity still grows; a technology shift that lets direct-reduction plants routinely accept 62 per cent feed without penalty, which the current technical literature does not describe; or a supply response at 67 per cent-plus so large that scarcity never binds, of which the only continental-scale candidate now operating is the one Chapter 5 examines. Each test is observable in sources this paper already cites; the back matter commits future editions to re-running them.

A thesis that names its own falsifiers is the only kind a lender should be asked to underwrite.

The benchmark prices the tonne. The specification decides whether the tonne is admitted at all.

CHAPTER 2 · THE GRADE DIVIDE

3

EXPLORE · STEEL DECARBONISATION PATHWAYS

Steel decarbonisation pathways

The buyer's furnace decides the seller's geology. This chapter reads the published technology roadmap as an ore-demand document.

7%	~75%	−60%
OF ENERGY-SECTOR CO2 EMISSIONS FROM STEEL, DIRECT (IEA, 2020)	OF STEEL'S ENERGY DEMAND MET BY COAL (IEA, 2020)	CO2-INTENSITY FALL TO 2050, IEA SUSTAINABLE DEVELOPMENT SCENARIO (IEA, 2020)

Steel is where the energy transition and the iron-ore market are permanently introduced to each other. The sector emits about 2.6 gigatonnes of CO_2 directly each year, some 7 per cent of energy-sector emissions and about 10 per cent once indirect emissions are included; it is the largest industrial coal user, drawing roughly 75 per cent of its energy from coal, and it accounts for about 8 per cent of global final energy demand. Any serious climate pathway therefore runs through the steel mill, and every route through the steel mill runs through an ore specification. This chapter reads the IEA's Iron and Steel Technology Roadmap, the sector's reference document, as what it also is: a forward demand curve for particular kinds of iron ore.

The three routes and what they eat

Primary steelmaking today is dominated by the blast-furnace, basic-oxygen route, fed by sinter fines and pellets across the grade spectrum and by metallurgical coal, whose strategic weight the United States registered in November 2025 by adding it to its Final 2025 Critical Minerals List for its steelmaking role. The scrap-based electric-arc route bypasses ore entirely, but its ceiling is set by scrap availability: scrap supplies about 30 per cent of steelmaking's metallic input, against roughly 70 per cent from ore, and end-of-life recycling rates of 80 to 90 per cent mean the scrap pool grows only as fast as old steel retires. The third route, direct reduction feeding electric-arc furnaces, is where decarbonisation ambition concentrates, first on natural gas and progressively on hydrogen, and it is the route with the sharpest appetite: preferred feed at or above 67 per cent Fe.

EXHIBIT 7

Steel's emissions problem is an input problem

The sector's published footprint and metallic-input mix

2.6 Gt

Direct CO2 emissions per year (7% of energy-sector total)

~75%

Of the sector's energy demand met by coal

Including indirect emissions: ~10% of the energy-sector total (~3.7 Gt, derived); ~8% of global final energy demand.

Metallic inputs to steelmaking, share as published

Scrap's ceiling is structural: end-of-life recycling already runs at 80–90%, so the pool grows only as old steel retires. Ore remains the marginal metallic for decades on every published pathway.

Source: IEA, Iron and Steel Technology Roadmap, 2020. Shares and direct totals as published; the indirect-emissions tonnage is derived from the published ~10% share; the metallics split is the roadmap's sector-level figure, not a route-level one.

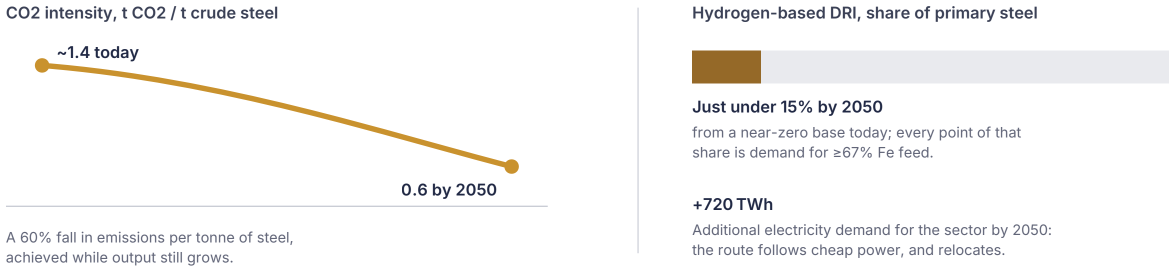
The Sustainable Development Scenario, read as an ore document

On the IEA's Sustainable Development Scenario, steel's CO_2 intensity falls from the IEA's stated 1.4 tonnes of CO_2 per tonne of crude steel today to 0.6 by 2050, a 60 per cent decline as the roadmap reports it; hydrogen-based direct reduction grows to just under 15 per cent of primary steel by 2050; and the sector's electricity demand rises by 720 terawatt-hours. Every clause carries an ore consequence. A falling intensity number penalises the highest-slag, lowest-grade burdens first. A rising direct-reduction share is, tonne for tonne, a rising order book for feed at or above 67 per cent Fe. And an electrified sector relocates: direct-reduction plants follow cheap gas, cheap renewables and, increasingly, hydrogen strategies rather than coking-coal logistics, so the route's geography differs from the blast furnace's. The specification travels with the technology, and the technology is moving.

EXHIBIT 8

The published pathway bends intensity down and direct reduction up

IEA Sustainable Development Scenario, selected 2050 markers (scenario label as published)



Source: IEA, Iron and Steel Technology Roadmap, 2020, Sustainable Development Scenario. Endpoints as published (1.4 today, 0.6 by 2050, in t CO_2 per tonne crude steel; the roadmap's stated 60 per cent fall); curve schematic between them. DR-feed threshold: published direct-reduction technical practice, 2025.

> BF-BOF / DRI-EAF · the two principal primary-steel routes: blast furnace with basic-oxygen converter, fed by sinter and pellets plus coke; and direct reduction (gas or hydrogen) feeding an electric-arc furnace, which prefers high-iron, low-impurity feed.

THEMATIC ASIDE

When an input becomes policy: metallurgical coal's designation

In November 2025 the United States added metallurgical coal to its Final 2025 Critical Minerals List, citing its role in blast-furnace steelmaking. The designation is a signal worth reading twice from the ore side. Read once, it says the incumbent route's inputs are now treated as strategic in the mature economies, which lengthens the blast furnace's policy life and, with it, mainstream ore demand. Read again, it says input criticality has become a live policy category for steelmaking generally, and the direct-reduction route's critical input is not coal but qualifying ore. A future in which DR-grade feed attracts the same designation logic is no longer a stretch; the ore that meets the specification would then be strategic twice over, commercially and politically.

The honest caveats

Three cautions keep this chapter conservative. First, the roadmap's figures are scenario outputs, published in 2020 under the Sustainable Development Scenario label, and they are cited here with that label rather than as forecasts. Second, the pace of route-switching is policy-dependent, and the published record since 2020 shows both accelerations and deferrals project by project; this paper deliberately cites no individual plant announcements, which age badly. Third, the blast furnace does not disappear on any published pathway; the mainstream's tonnage remains the market's bulk for decades, which is exactly why the divide is two speeds rather than a replacement. What the record supports is direction, not date: the specification is tightening, and the tightening favours the grades the next two chapters examine.

> **Every clause of the steel roadmap carries an ore consequence: a rising direct-reduction share is a rising order book for ore the mainstream cannot supply.**
>
> CHAPTER 3 · DECARBONISATION PATHWAYS

The furnace mix is a slow variable with a long memory. It is also the only variable that rewrites what an orebody is worth.

CHAPTER 3 · DECARBONISATION PATHWAYS

4

EXPLORE · THE DR-GRADE QUESTION

The DR-grade question

How scarce is direct-reduction feed? This chapter states what the public record publishes, and names, rather than fills, what it does not.

≥67% Fe
PREFERRED DR-PLANT FEED THRESHOLD (PUBLISHED DR TECHNICAL PRACTICE, 2025)

≤65% Fe
BF-GRADE PELLETS: WORKABLE IN DR BUT PENALISED (PUBLISHED DR TECHNICAL PRACTICE, 2025)

4
US IRON-METALLICS PLANTS: ONE DRI, THREE HBI (USGS, 2026)

The most consequential number in the iron-ore market of the 2030s is one this paper refuses to print, because the public record has not printed it: the size of the future gap between direct-reduction-grade ore demand and supply. Widely circulated deficit forecasts for DR-grade ore exist, but they sit behind commercial research paywalls, and this series does not cite what it cannot archive. What the public record does publish is strong enough on its own: a threshold, a penalty, a scarcity statement and a fleet. This chapter builds the DR-grade question from those four published elements, and closes with the register of what remains open.

The threshold and the penalty

Published direct-reduction practice is specific. Preferred plant feed carries an iron content at or above 67 per cent; pellets at blast-furnace grade, 65 per cent or below, can be processed but at a penalty, in productivity and in the burden passed downstream to the electric-arc furnace; and published hydrogen-metallurgy technical practice identifies the scarcity of ore above 67 per cent as a binding constraint on the growth of the gas-based, and by extension hydrogen-based, DR-EAF route. That is a complete economic mechanism in three published clauses: a specification, a cost of missing it, and a statement that the qualifying resource is scarce. Nothing about the mechanism requires a proprietary forecast to be understood.

EXHIBIT 9

A specification, a penalty and a scarcity: the DR-grade mechanism in three published clauses

What the archived record states about direct-reduction feed

THE SPECIFICATION

Preferred DR-plant feed:
≥67% Fe

Low impurities; pellet or high-grade lump feed.

THE PENALTY

BF-grade pellets (≤65% Fe):
workable, penalised

Productivity loss in the shaft; extra burden on the EAF.

THE SCARCITY

Ore above 67% Fe:
a binding constraint

on gas-based DR-EAF growth, per published DR practice.

The mechanism is complete without any proprietary deficit forecast: specification + penalty + scarcity is already an economics.

Source: published direct-reduction and hydrogen-metallurgy technical practice, 2025. The feed-grade threshold is an established, uncontroversial specification treated here qualitatively, not a transcribed market statistic; see the Method note on Reference 6.

The demand skeleton the record does publish

Where the deficit number is proprietary, the demand skeleton is public. The IEA's Sustainable Development Scenario carries hydrogen-based direct reduction alone to just under 15 per cent of primary steel by 2050, on top of the gas-based fleet that exists today. The United States, a small producer but a revealing one, already runs one DRI plant in Louisiana and three hot-briquetted-iron plants in Indiana, Ohio and Texas, and its iron-metallics output of 5.2 million tonnes was valued at US$874 million in 2025, an implied unit value materially above the ore benchmark, which is what a specification premium looks like once it is embodied in product. And the scrap ceiling of Chapter 3 guarantees that ore, at some grade, remains the marginal metallic. Direction, again, without a proprietary number: the qualifying feed's buyer class is growing on every published pathway.

EXHIBIT 10

Embodied grade already earns metallics prices, not ore prices

The US iron-metallics segment, 2025, as published

The fleet

1 DRI plant	3 HBI plants
Louisiana	Indiana · Ohio · Texas

The year

5.2 Mt **US$874 m**

output and value as published; the implied unit value sits far above any ore benchmark (derived, qualitative).

Why it belongs in this chapter

Metallics are the DR specification embodied in product: every tonne began as feed that met the threshold. Their value line is the clearest public print of what qualifying iron units earn once they leave the ore market.

Source: USGS, Mineral Commodity Summaries, 2026 (plants, output, value). The unit-value comparison is stated qualitatively and declared as derived in the back matter.

> DRI / HBI · direct-reduced iron, and its compacted, shippable form, hot-briquetted iron; the intermediate products through which high-grade ore enters the electric-arc route.

Where the qualifying feed can come from

If the specification is at or above 67 per cent iron, the world's response set has three members, each visible in this paper's own tables. High-grade direct-shipping and premium natural fines, the geology route, of which the newly operating reserve base at 65.0 to 66.4 per cent Fe is the reference case. Concentration and pelletising of lower-grade ores, the processing route, which buys grade with capital, energy and operating cost, and which the 200-billion-tonne global reserve base guarantees is always physically available at some price. And scrap, the recycling route, whose 30 per cent share and 80-to-90-per-cent recovery rates cap how much of the answer it can ever be. The two-speed conclusion follows from comparing the three: the processing and recycling routes set the price ceiling for qualifying iron units, and the geology route earns its premium precisely to the extent that it undercuts them. That is the economics a high-grade deposit should be valued on, and it is written entirely in published numbers.

The open register, stated in print

What remains open, this paper keeps open. The size of the future DR-grade supply-demand gap in any given year; the forward path of DR-pellet premia as a continuous series; and the share of announced direct-reduction projects that will hold their schedules: none of these is in the archived public record this paper is built on, and each is named in the back-matter register of open parameters rather than approximated in the text. A reader with licensed access to the commercial forecasts can lay them directly on top of this chapter's published mechanism; a reader without such access loses no logic, only a magnitude. The mechanism is sufficient for the strategic conclusion the rest of this paper draws: the divide is real, its scarce side is the one the next chapter's new supply serves, and the burden of proof now sits on futures in which high grade is not strategically scarce.

> Where the public record goes silent, this paper names the silence and stops; the scarce side of the divide needs no forecast to be worth building for.

5

EXPLORE · THE SUPPLY-SIDE REVOLUTION

The supply-side revolution

First ore railed in November 2025, first shipment in December. West Africa's entry into the seaborne trade is no longer a scenario.

120 Mt/yr
COMBINED SIMANDOU SYSTEM CAPACITY, AS PUBLISHED (RIO TINTO, 2025)

~1.5 Bt
SIMFER ORE RESERVES AT 65.0–66.4% FE (RIO TINTO, 2026)

10 Bt
MAURITANIA'S CRUDE-ORE RESERVES (USGS, 2026)

Supply revolutions in iron ore are rare, slow and total: Brazil's northern system in the 1980s, Australia's Pilbara expansions in the 2000s. The 2020s revolution is Atlantic and high-grade. In November 2025 the Simandou system in Guinea railed its first ore to the coast; the first shipment followed in December. Behind it stands a reserve and resource endowment, from Guinea's ranges to Mauritania's established operations, that enters the market precisely on the scarce side of Chapter 2's divide. This chapter surveys that entry from the published record, and only from it.

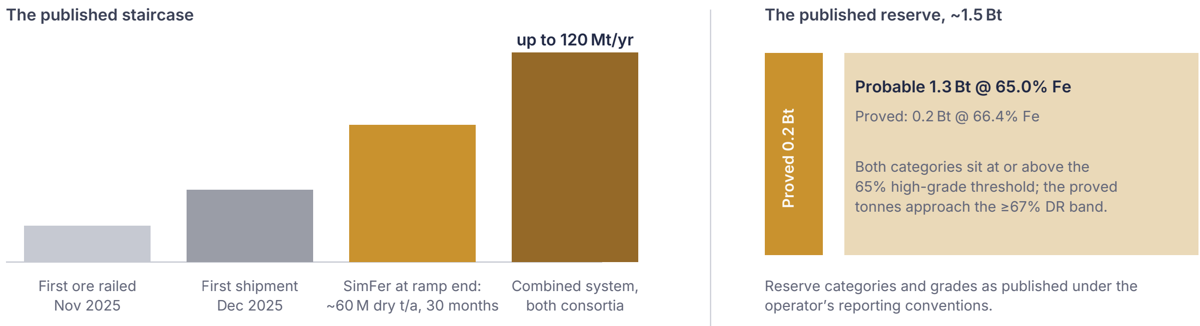
Simandou: the reference project of the second speed

The published parameters are worth stating together. Combined capacity of the two-consortium system: up to 120 million tonnes of mined ore a year. The SimFer mine's own share: about 60 million dry tonnes a year, reached over a published 30-month ramp. The SimFer ore reserves: approximately 1.5 billion tonnes, comprising 0.2 billion tonnes at 66.4 per cent Fe in the proved category and 1.3 billion tonnes at 65.0 per cent probable. Exhibit 11 sets the published staircase and grades side by side; read them against the ladder of Chapter 2: the deposit sits above the high-grade threshold in its entirety, within reach of the direct-reduction specification, and it is now shipping. At full system rate, a single new origin would add up to 120 million tonnes a year to the trade, all of it from reserves graded above the 65 per cent threshold.

EXHIBIT 11

Simandou enters the trade above the high-grade threshold, at system scale

Published Simandou parameters, capacity staircase and reserve grades



Source: Rio Tinto, Simandou start-of-operations and operations-page disclosures, 2025/2026 (capacity, ramp, first ore and shipment; reserves and grades). Bar widths schematic; tonnages and grades as published.

The wider Atlantic entry

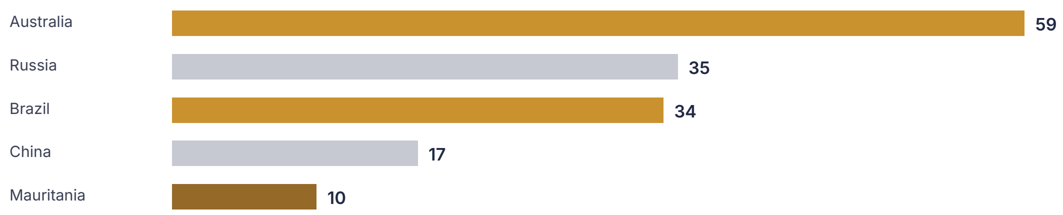
Simandou is the largest entry, but the Atlantic story is broader and older. Mauritania, the Atlantic's established West African exporter, produced an estimated 15 million tonnes in 2025, on crude-ore reserves USGS states at 10 billion tonnes. Brazil, the Atlantic's incumbent giant at 420 million tonnes and 34 billion tonnes of reserves, anchors the basin's premium segment. And the global reserve table puts the endowment question to rest: 200 billion tonnes of crude-ore reserves and better than 900 billion tonnes of resources worldwide. Ore, as such, is not scarce and never will be; ore above the high-grade threshold, deliverable to tidewater at competitive cost, is the scarce article, and the Atlantic basin is where the published record locates the largest untapped block of it.

Central Africa's iron-ore province belongs in that sentence at region-aggregate altitude: publicly reported exploration and development interest spans high-grade hematite occurrences across the region's Archean and Proterozoic belts, and the corridor economics of Chapter 6 apply to it with full force. This paper surveys no individual program there; region-level statements are all its evidence base supports.

EXHIBIT 12

Reserves are abundant; the divide makes quality, not quantity, the scarce article

Crude-ore reserves, billion tonnes, selected holders, 2025



World total: 200 Bt crude ore / 87 Bt contained iron; resources exceed 900 Bt of ore.
Australia's JORC-compliant/equivalent subset: 24 Bt crude, 10 Bt Fe. Gold: seaborne incumbents; ochre: Atlantic Africa.

Reserve figures aggregate all grades; the high-grade subset is not separately published at world level, which is the divide's data problem in one line.

Source: USGS, Mineral Commodity Summaries, 2026. Reserve definitions and country figures as published; the JORC-equivalent note is USGS's own.

> RAMP-UP · the staged climb from first production to nameplate capacity; Simandou's published figure is 30 months for the SimFer mine, inside a system stated at up to 120 million tonnes a year.

THEMATIC ASIDE

Every Atlantic entry is also a corridor project

No high-grade deposit reaches the divide's scarce side without hundreds of kilometres of heavy-haul railway and a deep-water terminal, engineered, governed and financed as one system with the mine. The corridor is where Atlantic entries succeed or stall: capacity is set by the slowest element of mine, rail and port, and tenure over the logistics chain is as decisive as tenure over the orebody. The engineering and governance record of the new African corridor systems is a study of its own; here it is enough to note that the grade divide's supply response is, in physical fact, a corridor-building program.

Reading the ramp

For every audience of this paper, the ramp is the number to watch between editions. A 30-month published climb to about 60 million dry tonnes is a rate of roughly two million annualised tonnes added per month, sustained for two and a half years, across a mine, a railway and a port that must climb together; the companion corridor literature calls the slowest element the slope-setter, and it applies here in full. The published record will mark the climb in quarterly operational disclosures, and each edition of this paper re-verifies the hook before it prints. Until then, the conservative reading is the one this chapter has used: the capacity figures are published ceilings on a published schedule, not tonnes already on the water.

What the entry does to the incumbents

The incumbents' response is already legible in the freight statistics: 2024's iron-ore tonne-miles grew nearly twice as fast as its tonnes, on increased supply and exports from Australia and particularly Brazil, lengthening the long-haul routes serving Chinese buyers. As Atlantic supply grows, the trade stretches further, and the delivered-cost order at each furnace becomes a live recalculation of grade, mine-gate cost and voyage length together. That calculation is Chapter 6's subject. What this chapter establishes is the input: the second speed's supply question, open for a decade, now has an operating, published, high-grade answer, and the market's remaining questions are about cost, freight and time.

Ore is not scarce and never will be. Ore above the threshold, at tidewater, at cost: that is the scarce article.

CHAPTER 5 · THE SUPPLY-SIDE REVOLUTION

6

EXPLORE · COST CURVES AND FREIGHT

Cost curves and freight

When the benchmark eases, margin retreats to the cost curve, and the cost curve ends at the ship’s rail. The trade is stretching beneath it.

12,720 Mt WORLD MARITIME TRADE 2024, +2.2% (UNCTAD, 2025)	+3.5% IRON ORE SEABORNE TONNES, 2024 (UNCTAD, 2025)	+6.4% IRON ORE TONNE-MILES, 2024 (UNCTAD, 2025)

A commodity whose price deck eases toward US$95 pays its producers from one document: the cost curve. And iron ore's cost curve has a property the price chart never shows, which is that its right-hand axis is an ocean. Iron ore moves almost entirely by sea, in bulk carriers, over some of the longest supply lines in world trade; the delivered cost that decides which tonne clears the market is a sum of mine gate, railway, port and voyage. This chapter reads the published freight record, states plainly which cost data are public and which are not, and draws the consequence for the two-speed market.

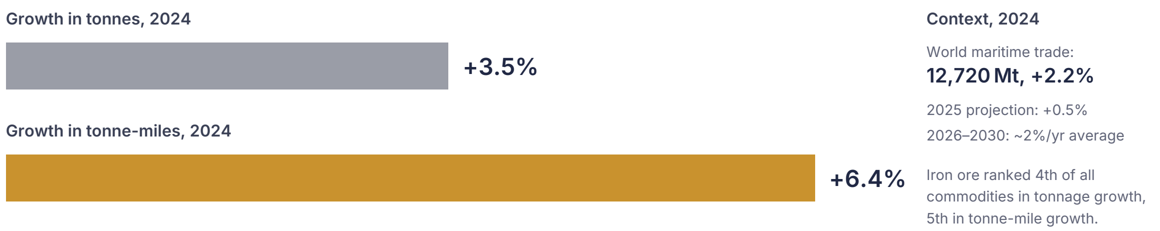
What the freight record shows

UNCTAD's Review of Maritime Transport puts world maritime trade at 12,720 million tonnes in 2024, up 2.2 per cent, ahead of the 1.8 per cent average of 2013 to 2023. Within that total, iron ore was among the year's best performers twice over: fourth-fastest in tonnes at plus 3.5 per cent, and fifth-fastest in tonne-miles at plus 6.4 per cent. The near-doubling between the two growth rates is the chapter's central fact. UNCTAD attributes the tonnage strength to solid Chinese steel production and healthy industrial activity, and the tonne-mile strength to increased supply and exports from Australia and particularly Brazil, lengthening the long-haul routes serving Chinese buyers. In plain terms: the trade did not merely grow in 2024, it stretched, because the incremental tonnes loaded farther from their buyers. Every Atlantic entry of Chapter 5 stretches it further.

EXHIBIT 13

The trade grew 3.5 per cent; the hauls grew 6.4 per cent

Iron ore in the 2024 seaborne record, growth in tonnes vs tonne-miles



Published driver, tonnes: "Solid Chinese steel production and healthy industrial activity."
Published driver, tonne-miles: "Increased supply and exports from Australia and particularly Brazil, supporting long-haul imports from China *(source wording)* (iron ore)."

Source: UNCTAD, Review of Maritime Transport, 2025 (Table I.2; UNCTAD calculations based on Clarksons Research). Growth rates, rankings and driver wording as published. The (source wording) note marks UNCTAD's own phrasing of the ton-mile driver, transcribed verbatim; it flags the wording, not any doubt about the figure.

> TONNE-MILE · one tonne of cargo carried one nautical mile; the demand unit of the shipping market. When tonne-miles outgrow tonnes, the average haul is lengthening and effective vessel demand is rising faster than the trade itself.

The cost curve: what is public, and what is not

Producer-by-producer cash-cost curves for iron ore are commercial research products, and this paper does not reproduce them. What the public record offers instead is the curve's endpoints and its slope-setters. On revenue: the benchmark's published averages and forecasts, and Vale's realized prices, US$85.1 (derived) to a disclosed US$95.4 per tonne across 2025's quarters, which bracket what a large diversified producer banked. On cost structure: the physical shape of each system, where a direct-shipping operation's cost is dominated by mine-to-port logistics while a beneficiating producer adds processing capital and energy; and the voyage, which the tonne-mile record prices for the market as a whole. On value-in-use: the US iron-metallics disclosure, 5.2 million tonnes valued at US$874 million in 2025, an implied unit value far above any ore benchmark, showing what embodied grade earns once it leaves the ore market for the metallics market. A reader does not need the proprietary curve to draw the strategic conclusion: in an easing deck, survival in the mainstream is a logistics contest, and escape from the mainstream is a grade contest.

THEMATIC ASIDE

Reading a cost curve you are not allowed to see

Three public disciplines recover most of what the paywalled curve would tell a strategist. First, revenue discipline: set every plan against the published forecast deck, never against the spot spike. Second, logistics arithmetic: a corridor's railway distance, terminal draft and vessel class are public engineering facts, and they set the freight leg of delivered cost within narrow bounds. Third, disclosure triangulation: realized-price and premium disclosures from listed producers bracket where quality is clearing. The residual uncertainty, individual producers' mine-gate costs, matters for equity analysis; for development strategy, the three public disciplines already rank the decisions.

Freight and the two speeds

The divide changes what freight means. For the mainstream tonne, freight is a cost to be minimised: the shortest haul to the marginal furnace wins. For the high-grade tonne, freight is a toll on a premium product with fewer qualified buyers, and the question becomes which basin's direct-reduction and premium-burden demand grows fastest relative to its supply. The published record already shows the trade's centre of gravity stretching, and UNCTAD projects total seaborne volumes nearly flat in 2025 at plus 0.5 per cent before returning to about 2 per cent a year over 2026 to 2030. A stretching trade inside a slow-growing total is a market re-sorting itself by origin, exactly as the grade divide re-sorts it by quality. The two sorts favour the same entrant: high grade, Atlantic, new.

> CAPESIZE · the largest standard dry-bulk vessel class and the workhorse of long-haul ore trades; the vessel class whose economics decide whether an Atlantic origin's grade premium survives the voyage east.

The delivered-cost question every entrant must answer

The chapter's discipline condenses to one question per tonne: at the buyer's gate, after mine, rail, port and voyage, does the cargo's value-in-use exceed its delivered cost by more than the benchmark alternative's? For a high-grade Atlantic tonne, each term of that inequality is now readable from sources this paper cites: value-in-use from the specification record, the benchmark from the published deck, the premium from producer disclosures, and the voyage from a freight record whose stretching this chapter has measured. What no publication supplies is the entrant's own mine-gate and corridor cost, which is exactly as it should be: that number is the one part of the two-speed equation a development program controls, and the closing chapter's diagnostic asks for it in writing.

> In an easing deck, survival in the mainstream is a logistics contest, and escape from the mainstream is a grade contest.

7

EXPLORE · SCENARIOS TO 2040

Scenarios to 2040

This paper forecasts nothing. It assembles the published decks, labels intact, and reads what they jointly permit a strategist to conclude.

US$95.0
2027 FORECAST, 62% FE, PER DMT (WORLD BANK CMO, APRIL 2026)

1,773 Mt
2026 STEEL-DEMAND FORECAST (WSA SRO, OCTOBER 2025)

2050
HORIZON OF THE IEA SUSTAINABLE DEVELOPMENT SCENARIO MARKERS (IEA, 2020)

Every number in this chapter already appeared once in this paper. That is deliberate. A scenario chapter earns trust by refusing two temptations: inventing a house forecast, and quietly blending other institutions' scenarios into one unlabeled consensus. This chapter does neither. It assembles the four published decks this paper stands on, each with its institution, vintage and scenario label intact, orders them by horizon, and then asks the only question a strategist can honestly ask of other people's forecasts: what do they jointly permit, and what do they jointly rule out, for the two-speed market between now and 2040?

EXHIBIT 14

Four institutions, four horizons, one direction of travel

The published scenario decks this paper cites, labels preserved as published

INSTITUTION, VINTAGE	SCENARIO LABEL	HORIZON	WHAT IT STATES
World Bank, CMO April 2026	Baseline forecast	2026–2027	62% Fe benchmark US$97.0/dmt in 2026 (−3.2%), US$95.0 in 2027 (−2.1%)
World Steel Association, SRO October 2025	Short Range Outlook	2026	Steel demand 1,773 Mt (+1.3%); China −1.0%; developing world ex-China +4.7%
UNCTAD, RMT 2025	Projection	2025–2030	Maritime trade +0.5% in 2025; ~2%/yr average 2026–2030
IEA, Iron and Steel Technology Roadmap 2020	Sustainable Development Scenario	to 2050	CO_2 intensity −60% to 0.6 t/t; hydrogen-based DRI just under 15% of primary steel; +720 TWh electricity

Source: World Bank, Commodity Markets Outlook, April 2026; World Steel Association, Short Range Outlook, October 2025; UNCTAD, Review of Maritime Transport, 2025; IEA, Iron and Steel Technology Roadmap, 2020. Each row cites its own scenario label; the rows are not a single coherent scenario and must never be read as one.

What the decks jointly permit

Read together, with their different vintages respected, the four decks bound a corridor of futures. On price, the near-term deck slopes gently down: US$97.0 then US$95.0, an environment that funds no complacency and forces the cost-curve discipline of Chapter 6. On volume, demand is a plateau with a moving centre: a flat-to-plus-1.3-per-cent world total whose growth sits in India and the developing world while China recedes. On the trade itself, near-stagnation in 2025 giving way to modest growth, with the stretching-haul pattern already established. And on technology, the longest deck bends the furnace mix toward routes whose feed specification the mainstream cannot meet. None of the four institutions publishes the intersection of these curves, the future price of the high-grade differential, and this paper follows them in not publishing it either.

Three futures the corridor contains

Within those bounds, a strategist should hold three futures at once. In a **slow-transition future**, the blast furnace persists, the differential stays a modest per-tonne productivity premium of the kind Vale's disclosures already show, and the mainstream's cost contest decides everything; high-grade entrants still win, but on logistics, not scarcity. In a **policy-led transition** tracking the IEA's scenario shape, direct-reduction growth tightens the qualifying-feed balance through the 2030s and the divide widens into two visibly different markets, the future in which Chapter 4's unpublished deficit numbers become the industry's central price story. In a **demand-shock future**, where steel demand disappoints even the flat outlook, the easing price deck compresses the mainstream hardest and quality becomes a defensive position rather than a growth story. The strategic point is that the high-grade Atlantic entrant is the only actor advantaged in all three futures, which is what Chapter 8 turns into implications.

EXHIBIT 15

Three futures, one advantaged position

The corridor of futures the published decks jointly permit; an arrangement of the chapter's cited scenarios, adding no figures

FUTURE	WHAT CARRIES IT	WHAT THE CITED RECORD ANCHORS IT TO	CONSEQUENCE FOR THE DIVIDE
Slow transition	Blast furnace persists; premium stays a productivity term	Disclosed all-in premium near US$1 a tonne (Vale, 2026)	Cost contest; high grade wins on logistics
Policy-led transition	Direct reduction scales on the roadmap's shape	H2-DRI just under 15% of primary steel by 2050, IEA SDS (2020); ≥67% Fe feed preference (2025)	Divide widens into two markets; scarcity prices the threshold
Demand shock	Steel demand disappoints the flat outlook	Benchmark deck already easing: US$97.0 / US$95.0 (World Bank, April 2026)	Mainstream compressed hardest; quality is the defensive book

Source: an arrangement of the scenarios cited in this chapter, each retaining its institution, vintage and label; Vale, 2026; IEA, 2020 (Sustainable Development Scenario); World Bank, April 2026; published direct-reduction technical practice, 2025. The rows are alternative futures, not a blended forecast.

> VINTAGE · the publication date of a forecast, which fixes what its authors could know. This paper prints the vintage beside every forward figure and re-verifies dated hooks at each edition.

What would move this chapter at the next edition

Four events would rewrite these bounds and are worth a standing watch: a new World Bank deck materially re-sloping the benchmark forecast; a World Steel Association outlook moving world demand off its plateau; a published, archivable DR-grade supply-demand balance from a whitelisted institution, which would close this paper's largest named gap; and Simandou ramp disclosures confirming or re-timing the 30-month climb. Each is checkable in the sources this paper already cites, and the evidence dossier pre-registers the checks for the next edition.

> Between the deck that eases and the specification that tightens runs the corridor of futures this paper is willing to plan in.

What the record supports is stated. What it does not support is named. Nothing here is forecast on the house's authority.

BEFORE THE CLOSING CHAPTER

8

EXPLORE · IMPLICATIONS, AND THE AURUS VIEW

Implications, and the Aurus view

What developers, traders and lenders should each do differently in a two-speed market, and the grade-aware development discipline this house applies.

3
AUDIENCES ADDRESSED: DEVELOPERS, TRADERS, LENDERS (THIS CHAPTER)

3
THRESHOLDS EVERY DECISION IS PRICED AGAINST: 62 / 65 / 67% FE (CHAPTERS 2–4)

10
QUESTIONS IN THE CLOSING GRADE-AWARE DIAGNOSTIC (AURUS DISCIPLINE)

A two-speed market punishes single-speed strategies. The preceding chapters established the divide from the published record: a flat, easing mainstream; a technology-driven specification at 67 per cent Fe; an Atlantic supply answer now operating; and a freight map stretching beneath both. This closing chapter converts that record into implications for the three audiences this paper addresses, and states the view of the house that wrote it.

For developers and owners

The divide re-orders the development checklist. Grade moves from a line in the resource statement to the first strategic variable: a deposit's position against the 65 and 67 per cent thresholds now determines which of two markets it will sell into, and the two markets are diverging in buyer class, contract form and pricing basis. Logistics moves from a cost line to a tenure question: in an easing deck, the corridor is the margin, and control of railway and terminal capacity is as decisive as control of the orebody. And timing moves from a market call to a specification call: the relevant question is no longer "what will the benchmark do" but "when does the qualifying-feed balance tighten", a question whose published skeleton Chapter 4 assembled and whose magnitude remains, honestly, open. Developers who write those three sentences into their stage gates will make different, and better, decisions than developers still planning against the single-speed market of the 2010s.

For traders

The trading implication is basis complexity. One public benchmark now anchors a market whose premium segment discloses only points, not series; whose qualifying-feed specification is technical rather than financial; and whose haul structure is lengthening. Physical traders positioned across the divide, with quality books on one side and freight books on the other, are holding the market's two scarcest kinds of information at once. The published record's asymmetry, a transparent mainstream and an opaque premium segment, is itself the opportunity, and it will persist until a whitelisted institution publishes a continuous high-grade series, an event this paper's next edition would register immediately.

For lenders and investors

The lending implication is that grade is credit. A revenue line built on the 62 per cent benchmark carries the World Bank's easing deck as its base case; a revenue line built above the divide carries a premium whose history is disclosed only in fragments and whose future depends on a technology transition with published direction but unpublished pace. Neither is unbankable; they are differently bankable, and the difference belongs in the term sheet: grade-linked pricing assumptions stress-tested against both of Chapter 7's transition futures, completion tests that treat corridor throughput as seriously as mine throughput, and independent verification of the resource's grade continuity, since the entire premium case rests on it. The two-speed market, properly underwritten, is a diversification: its speeds respond to different risk factors, and a portfolio can hold both.

AURUS PRACTICE NOTE · THE DISCIPLINE BEHIND THIS PAPER

The grade-and-corridor reading of this chapter is the discipline on which Aurus was built. The firm authored a ~1,550-page environmental and social impact assessment, aligned with the IFC Performance Standards and Equator Principles (Category A), for a US$10-billion-class integrated iron-ore program in Central Africa (open-pit direct-shipping-hematite deposits, a heavy-haul rail corridor and a deep-water mineral terminal assessed as one system), with resources and reserves framed to JORC/NI 43-101 conventions.

The Aurus view

The house view follows from the record and is stated in the record's own terms. First, the divide is structural, because its driver is the buyer's installed technology, not a price cycle. Second, the Atlantic entry now in operation, a third-party supply event this paper reads only from the public record and treats at

Chapter 5's arm's length, is the decade's defining supply event, because it arrives on the scarce side of the divide at system scale. Third, the binding constraints on the next entrants are logistics tenure and evidence quality, not geology: the reserves exist, and what separates a stranded deposit from a financed program is a corridor and a data room.

That reading is one the firm keeps current rather than pronounces once. Aurus maintains it quarter by quarter: the firm's practice includes recurring quarterly commodity supply-and-demand studies, iron ore among the commodities covered across editions, for a maritime and mining-logistics operator in Central Africa, and the discipline of those editions, ranges over points, labels over blends, sources over memory, is the discipline this paper has applied throughout.

The grade-aware development diagnostic

The house instrument distils this paper into ten questions a high-grade development program should be able to answer in writing before each stage gate. It is a capability instrument, argued from the cited public record of the preceding chapters; it carries no project data.

EXHIBIT 16

The Aurus grade-aware development diagnostic: ten questions before every gate

Capability instrument · no project data · argued from the cited record of Chapters 1–7

#	QUESTION	WHAT A PASSING ANSWER CONTAINS	EVIDENCED IN
1	Which speed are we?	The resource's grade distribution stated against the 62/65/67% thresholds, with the marketing consequence drawn	Ch. 2, 4
2	Whose furnace buys us?	Named buyer classes by route (BF-BOF, DR-EAF) and the specification each applies	Ch. 3, 4
3	What does the deck pay?	Economics run on the published forecast deck, not spot; both transition futures stress-tested	Ch. 1, 7
4	Where is our premium evidence?	Point-in-time premia cited from disclosures, never from a proprietary series the file cannot archive	Ch. 2
5	What is the corridor plan?	Rail and terminal capacity, tenure and phasing engineered with the mine as one system	Ch. 5, 6
6	What does freight do to us?	Delivered-cost arithmetic by basin and vessel class; the stretching-trade record acknowledged	Ch. 6
7	How firm is the ramp?	A published-comparator ramp assumption (the operating reference is 30 months) with slippage cases	Ch. 5
8	Is the grade continuous?	Resource-definition drilling and QA/QC sufficient to evidence grade continuity at reserve confidence	Ch. 2, 5
9	What would falsify us?	The program's own two-speed tests written down, with the public sources that would show them failing	Ch. 2, 7
10	Is every number traceable?	An evidence file in which each market figure carries institution, publication, year and an archived artifact	Method page

Framework exhibit: capability instrument, no data sources by design. The comparator figures referenced trace to the chapters cited in the final column.

Using the diagnostic

Three usage rules keep the instrument honest. **It is answered in writing, per gate, or not at all.** The questions are designed so that a passing answer is a document, a grade-tonnage statement, a corridor tenure schedule, an evidence file, never a meeting assurance; a program that cannot produce the document does not have the answer. **It is re-answered when the record moves.** Half the questions cite dated hooks, the forecast deck, the ramp comparator, the disclosed premia, and an answer inherits the vintage of its evidence; the watch list of Chapter 7 names the publications that reset the clock. **And it is deliberately public-source.** Every comparator in the table traces to the cited record of Chapters 1 through 7, so a counterparty, a lender's adviser or a board can audit an answer without access to anything proprietary. The instrument's authority is exactly the paper's: evidence before assertion.

What this paper commits to

A house view is only worth holding to a standard, so this edition closes with its own. The two-speed reading will be re-tested, not merely re-asserted, at every edition: against the falsifiers written into Chapter 2, against the watch list of Chapter 7, and against whatever the six-feed evidence circuit of the back matter delivers next. Figures that fail re-verification will be withdrawn rather than repaired, as this series' method page records. And if the divide closes, in the disclosures, in the premia, or in the furnace statistics, this paper's successor will say so in its first chapter, because the discipline this house sells is not a market opinion. It is the habit of preferring the record to the story, even when the story is its own.

> One commodity, two markets. The winners will be the programs that knew, gate by gate and in writing, which market they were building for.

BACK MATTER

References

Citation policy of this series: every market or project statistic in this paper is transcribed from a cited public source and attributed by institution, publication and year, in the sentence, the exhibit source line or this list, and, with one disclosed exception, traces to an archived source in the paper's evidence dossier. That exception is the direct-reduction feed-grade threshold at Reference 6, an established specification from published direct-reduction practice used only qualitatively, not a transcribed market figure, and so not tied to a single archived artifact. Every cell of Exhibit 2, the United States 2026 steel-demand figure included, verifies against the archived World Steel Association capture. Forecasts carry their scenario and vintage labels as published. Ranges and qualifiers are preserved as published; no point figure is derived from a published range, and the few values computed from published figures are labelled as derived where they appear.

1. USGS, Mineral Commodity Summaries, 2026 (iron ore).
2. World Bank, Commodity Markets Outlook, April 2026.
3. FRED (Federal Reserve Bank of St. Louis), "Global price of Iron Ore" (PIORECRUSDM), monthly series January 2015 to May 2026, retrieved July 2026.
4. World Steel Association, Short Range Outlook, October 2025 (figures via SAISI republication; archived capture).
5. IEA, Iron and Steel Technology Roadmap, 2020 (Sustainable Development Scenario attributions as published).
6. Published direct-reduction and hydrogen-metallurgy technical practice, 2025 (preferred DR feed-grade threshold at or above 67 per cent Fe). An established industry specification used qualitatively, not a transcribed market statistic; the single citation here not tied to a discrete archived artifact, as the citation policy above discloses.
7. Vale, quarterly production and sales, and financial, disclosures, 2025–2026 (public filings; 4Q25 capture archived).
8. Rio Tinto, Simandou start-of-operations release, 2025, and Simandou operations-page disclosures (riotinto.com), 2026 (archived captures held with the corridor paper's dossier in this series).
9. UNCTAD, Review of Maritime Transport, 2025 (chapter I; UNCTAD calculations based on Clarksons Research; archived capture).

Exhibit source index

Each exhibit's primary sources, by reference number above. Framework exhibits carry no data sources by design.

EXHIBIT	SUBJECT	REFERENCES
1	Mine production 2025, selected producers	1
2	Steel demand by region, 2025–2026	1, 4
3	The US year in four figures	1
4	The two-speed grade divide (signature spread)	2, 3, 6, 7, 8
5	The grade ladder: 62 / 65 / ≥67% Fe	2, 3, 6, 7, 8
6	Vale realized prices by quarter, 2025; 4Q25 premium	7
7	Steel's footprint and metallic-input mix	5
8	IEA Sustainable Development Scenario markers	5, 6
9	The DR-grade mechanism in three clauses	6
10	The US iron-metallics segment, 2025	1
11	Simandou capacity staircase and reserve grades	8
12	Crude-ore reserves, selected holders	1
13	Iron ore tonnes vs tonne-miles, 2024	9
14	Published scenario decks, side by side	2, 4, 5, 9
15	Three futures, one advantaged position	2, 5, 6, 7

EXHIBIT	SUBJECT	REFERENCES
16	Aurus grade-aware development diagnostic	· (framework)

Archived captures and data artifacts held with the evidence dossier

Retrieved and archived 8 July 2026 unless noted.

- USGS: Mineral Commodity Summaries 2026, iron-ore sheet (publication PDF)
- FRED: Global price of Iron Ore (PIORECRUSDM), 137 monthly observations, January 2015 to May 2026 (CSV data pull, retrieval-dated)
- World Bank: Commodity Markets Outlook, April 2026 (publication PDF CMO-April-2026-Forecasts.pdf, mirrored into this paper's evidence pack from the series' standing commodity fact base so the trace is self-contained)
- World Steel Association: Short Range Outlook October 2025 figures (page capture via SAISI republication; WSA cited as the institution)
- IEA: Iron and Steel Technology Roadmap report page (capture)
- Vale: 4Q25 production and sales disclosure page (capture)
- Rio Tinto: Simandou start-of-operations release (2025, capture capture_riotinto_com_en_news_releases_2025_simandou-partners-celebrate-start-o_2026-07-08.html) and Simandou operations page (2026, capture capture_riotinto_com_en_operations_africa_simandou_2026-07-08.html), held with the corridor paper's dossier in this series and listed here so this paper's trace is self-contained
- UNCTAD: Review of Maritime Transport 2025, chapter I (publication PDF via Wayback Machine snapshot of 22 January 2026)

Citing this paper

Cite as: Aurus Technical Committee, The Two-Speed Iron Ore Market: High-Grade Scarcity, Green Steel and West Africa's Entry into the Seaborne Trade, Aurus Institute for Resource Development, Flagship Report WP-15, July 2026. Statistics quoted from this paper should carry their original institutional source as listed above, rather than this paper, as the primary attribution; this paper transcribes, it does not originate.

Archived captures. Every reference above marked "archived" is held as a saved page, document or data-series copy in the paper's evidence dossier, together with the transcription of each figure in its exact published form. The dossier's verification trail records the retrieval date of every artifact, including the UNCTAD chapter retrieved as the publication PDF via a Wayback Machine snapshot when the origin server declined automated requests.

Exhibit conventions. Across all exhibits: gold marks the seaborne incumbents and the paper's case figures; ochre marks Atlantic Africa, this paper's pillar tint; grey marks context; dashed strokes mark forecasts or schematic elements; and every value derived rather than transcribed is labelled as derived at the point of use. Framework exhibits carry no data by design and say so in their source lines.

Dated hooks. The Simandou ramp, the World Steel Association's April/October outlook cycle and the World Bank's April/October deck are all dated hooks; readers using this paper after mid-2026 should treat those figures as snapshots of the record at press time, and the next edition re-verifies each before it prints.

Method and evidence

Every figure in this paper was transcribed, archived and audited before it was typeset. This page records how, so that a reader, or a lender's technical adviser, can test the paper the way the paper tests the market.

The evidence chain

Each statistic traces through three layers. First, a **source line** in the sentence or exhibit where it appears, naming institution, publication and year. Second, an entry in the paper's **evidence dossier**, which transcribes the figure in its exact published form and records every correction made during review; this paper's dossier extends the series' standing commodity fact base, and its freight rows were added by a pre-registered pull executed before drafting began. Third, an **archived artifact**: a saved capture of the source page, document or data series, held with the dossier so the citation survives live-source changes. Sources outside the standing whitelist were admitted through a recorded extension protocol; where a needed series is proprietary, the paper says so and uses the published fallback recorded in the dossier rather than an unarchivable number. One figure is a deliberate exception to the third layer, disclosed at the point of use and in the References note. Reference 6, the direct-reduction feed-grade threshold, is a qualitative specification rather than a market figure; it carries a source line and a dossier entry but no discrete archived artifact. Every other figure in the paper, including every cell of Exhibit 2, traces to an archived artifact.

Derived values, declared

This paper computes the following from published figures, and no others; each is labelled or phrased as derived where it appears.

DERIVED VALUE	COMPUTED FROM	WHERE USED
Annual and part-year means of the monthly benchmark series (US$56.1 for 2015; US$158.2 for 2021; US$103.7 for 2025; US$107.4 for January to May 2026)	The 137-observation archived FRED monthly series, arithmetic means	Chapters 1–2; Exhibit 4
"Roughly two million annualised tonnes added per month" on the ramp, stated qualitatively	Published ~60 M dry t/a over the published 30-month ramp	Chapter 5
"Nearly a factor of two" between tonne-mile and tonnage growth	Published +6.4% against +3.5%	Executive summary; Chapter 6
"An implied unit value materially above the ore benchmark" for US iron metallics, stated qualitatively	Published US$874 million over 5.2 million tonnes; no point figure printed	Chapters 4 and 6
"Well over half" of seaborne-relevant production from two producers, stated qualitatively	Published country production estimates	Chapter 1
Vale 2Q25 realized fines price (US$85.1 per tonne)	Disclosed 3Q25 price US$94.4 less the disclosed US$9.3 quarter-on-quarter step	Chapters 1–2 and 6; Exhibit 6
Steel-sector indirect-inclusive CO_2 (~3.7 Gt per year)	Published ~10 per cent share of the energy-sector total against the published 2.6 Gt direct at 7 per cent	Exhibit 7

Open parameters, named

Where the archived public record is silent, this paper states the silence rather than filling it. As of this edition the open set is: the size of the future DR-grade supply-demand gap in any year; any continuous public price series for 65 per cent Fe or DR-grade ore, including pellet premia; per-producer mine-gate cash costs, which sit in proprietary cost curves; and the realized schedule of announced direct-reduction projects. The evidence dossier's gap register pre-registers the checks by which a future edition would close each of these from whitelisted sources; none of these silences is bridged by estimation anywhere in this paper.

The public evidence circuit

Six public feeds, on fixed calendars, carry the paper's recurring spine, and each edition re-runs the circuit before it prints; two standing references stand outside the cadence, the IEA roadmap and the direct-reduction feed-grade reference.

FEED	CADENCE	WHAT IT ANCHORS HERE
USGS, Mineral Commodity Summaries	Annual (January)	Production, reserves, the US vignette (Chapters 1, 4, 5)
World Bank, Commodity Markets Outlook	April / October	The benchmark deck (Chapters 1, 2, 7)
FRED monthly benchmark series	Monthly	The signature chart's spine (Chapter 2)
World Steel Association, Short Range Outlook	April / October	Demand and its composition (Chapters 1, 7)
Producer disclosures (Rio Tinto, Vale)	Quarterly	Ramp, reserves, realized prices and premia (Chapters 2, 5)
UNCTAD, Review of Maritime Transport	Annual	The freight record (Chapter 6)

How to re-verify any figure in this paper

Four steps, no privileged access required: read the source line where the figure appears; find the institution, publication and year in the References; consult the archived capture named in the evidence dossier; and compare. A difference the dossier does not record is a defect this series commits to correcting.

What this paper never does

No figure is remembered, averaged from undisclosed sources, or taken from a paywalled series the dossier cannot archive. Ranges, floors, qualifiers and scenario labels are preserved exactly as published, and forecasts from different institutions are never blended into an unlabeled consensus. Client-derived data appears nowhere. The market analysis throughout is the cited institutions', assembled and read; where the house speaks in Chapter 8, it speaks in the record's own terms.

> A market paper is only as strong as a stranger's ability to check it; this one was built so that the checking, figure by figure and source by source, is the easiest thing it invites.

BACK MATTER

Glossary of grade, furnace and freight terms

The vocabulary used in this paper, stated precisely. Terms marked with a chapter number also appear as margin definitions at first use.

Assay / grade · the measured iron content of an ore, expressed as a percentage; the variable this paper's title calls a speed.

Beneficiation · processing that raises an ore's iron content by removing gangue; buys grade with capital and operating cost, where DSO deposits receive it from geology. (Ch. 2)

Benchmark (62% Fe CIF) · the reference price for iron ore fines assaying 62 per cent iron, quoted cost, insurance and freight into China (USGS basis); the mainstream's price. (Ch. 1)

BF-BOF · blast furnace plus basic-oxygen furnace: the dominant primary-steel route, fed by sinter, pellets and coke. (Ch. 3)

Capesize · the largest standard dry-bulk vessel class, the workhorse of long-haul iron-ore trades; too large for the Suez and Panama canals, hence the name.

CIF · cost, insurance and freight: the basis on which USGS quotes the 62 per cent benchmark, the seller paying voyage and insurance to the named port (also quoted cost-and-freight, CFR, in the trade).

Crude ore vs usable ore · ore as mined, against ore as marketable product after crushing, screening or beneficiation; USGS publishes reserves in crude terms and production in usable terms. (Ch. 1, 5)

DMT · dry metric tonne: a tonne of ore net of moisture, the basis of the benchmark price quotes in this paper.

DR-grade · iron ore, usually pellet feed, meeting direct-reduction specifications: iron content at or above about 67 per cent with low impurities. (Ch. 2, 4)

DRI / HBI · direct-reduced iron and hot-briquetted iron, its compacted shippable form; the intermediates through which high-grade ore enters the electric-arc route. (Ch. 4)

DSO (direct-shipping ore) · ore of sufficient in-situ quality to ship after crushing and screening, without beneficiation. (Ch. 2)

EAF · electric-arc furnace: melts scrap or direct-reduced iron with electricity; the growing route on every published decarbonisation pathway. (Ch. 3)

Fines / lump / pellets · the physical product classes of traded ore: fine particles requiring sintering or pelletising; naturally sized lump; and fired spheres engineered for furnace feed.

Green steel · shorthand for steel produced on low-emissions routes, principally hydrogen-based direct reduction with electric-arc melting; used in this paper only as the title's shorthand, with the routes named precisely in the text. (Ch. 3)

Ore reserve (proved / probable) · the economically mineable part of a resource, stated under a public reporting convention at graded confidence levels; Simandou's published categories are quoted as disclosed by the operator. (Ch. 5)

Pellet premium · the price increment for pelletised, higher-grade feed over benchmark fines; disclosed in this paper only as published point-in-time figures, its continuous series being proprietary. (Ch. 2)

Premium / differential · the amount by which a cargo trades above or below the benchmark on account of iron content and impurities. (Ch. 2)

Ramp-up · the staged climb from first production to nameplate capacity; Simandou's published figure is 30 months for the SimFer mine. (Ch. 5)

Scrap ratio · scrap's share of steelmaking's metallic input, about 30 per cent, bounded by how much old steel retires each year. (Ch. 3)

SDS · the IEA's Sustainable Development Scenario, the labelled pathway from which this paper's 2050 steel markers are drawn; a scenario, not a forecast. (Ch. 3)

Short Range Outlook · the World Steel Association's twice-yearly demand outlook, published each April and October; this paper cites the October 2025 edition, which carries the full 2025 and 2026 country detail this analysis rests on and remains the current annual anchor at this printing. (Ch. 1)

Sinter · agglomerated fine ore prepared at the steelworks for blast-furnace feed; the mainstream's largest product destination. (Ch. 3)

Tonne-mile · one tonne carried one nautical mile; the shipping market's demand unit. (Ch. 6)

Two-speed market · this paper's name for the divergence between the 62 per cent mainstream and the high-grade segment whose demand is tied to low-carbon routes. (Exec. summary)

Value-in-use · the worth of an ore to a specific furnace, netting grade, impurities and productivity effects; the economic content of the grade divide. (Ch. 2)

Vintage · a forecast's publication date, printed beside every forward figure in this paper. (Ch. 7)

AURUS INSTITUTE FOR RESOURCE DEVELOPMENT

The Two-Speed Iron Ore Market: High-Grade Scarcity, Green Steel and West Africa's Entry into the Seaborne Trade
A Flagship Report in the Aurus white paper library, on the Explore pillar. Prepared by the Aurus Technical Committee, July 2026.

Every market and project statistic in this paper traces to the cited public sources listed in the References; forecasts carry their institution, scenario and vintage as published; ranges are preserved as published. Nothing in this paper draws on client-derived data, and none of the cited figures is Aurus analysis.

Set in Fraunces (display), Source Serif 4 (text) and Inter (captions and data).
Imagery generated and art-directed in-house.

Wave-1 edition on the standard white-paper series template.

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