

Topic 02 Iron and Steel

Table of contents

Module Source Map	1
T1. Demand Pull + Value-Chain Structure	1
T2. Processing Pathways	2
T3. Science 101	2
T4. Research and Collaboration Landscape	2
T5. Policy, Funding, and Programs	3
T6. Evidence Quality, Gaps, and Confidence	3

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This writeup is the canonical publishable synthesis for Topic 02 (iron and steel). The current version is a documented baseline aligned to the export and geopolitical-leverage screen used in Topic 00.

Module Source Map

- Overview module: `subtopics/00_overview.qmd`
- T1 module: `subtopics/01_T1_demand-pull-and-value-chain-structure.qmd`
- T2 module: `subtopics/02_T2_processing-pathways.qmd`
- T3 module: `subtopics/03_T3_science-101.qmd`
- T4 module: `subtopics/04_T4_research-and-collaboration-landscape.qmd`
- T5 module: `subtopics/05_T5_policy-funding-and-programs.qmd`
- T6 module: `subtopics/06_T6_evidence-quality-gaps-and-confidence.qmd`

T1. Demand Pull + Value-Chain Structure

This section frames demand and market structure for export-facing iron and steel pathways.

Evidence snapshot: - C-001 (E-001): IEA framing indicates demand pressure remains material, with growth shifts concentrated in selected emerging regions. - C-006 (E-006): USGS MCS 2026 reports 2025 world raw steel output at about 1,900 Mt (China about 980 Mt) and provides iron ore baseline context. - C-007 (E-007): REQ Dec 2025 reports Australia iron ore export earnings moving from A\$116.4b (2024-25) to A\$107.4b (2026-27) while volumes trend toward ~1,007 Mt. - C-003 (E-003): Topic00 continues to rank green iron as a core export-leverage anchor under this demand profile.

Current focus: - Keep the demand lens export-first and leverage-aware. - Revalidate concentration and trade baselines before updating rank decisions.

T2. Processing Pathways

This section compares route families by buildability, dependency risk, and export relevance over a 0-10 year horizon.

Evidence snapshot: - C-002 (E-002): IEA roadmap framing treats route transition as central; steel is about 8% of global final energy demand and 7% of energy-sector CO2 emissions. - C-004 (E-004): Power cost and reliability are first-order constraints, with IEA highlighting low-cost clean electricity as critical for hydrogen-linked competitiveness. - C-005 (E-005): Enabling dependencies remain decisive; IEA transition framing includes around 720 TWh additional electricity demand by 2050 for hydrogen pathway deployment.

Current focus: - Apply paired pathway-dependency tests (power, reductants, logistics, qualification). - Separate pre-2030 and post-2030 readiness windows.

T3. Science 101

This section sets the minimum technical baseline needed for consistent interpretation of pathway claims.

Early evidence snapshot: - C-002 (E-002): IEA roadmap framing is used as the baseline source for route-transition logic.

Current focus: - Link reduction chemistry, feed quality, and process integration assumptions directly to T2 rankings.

T4. Research and Collaboration Landscape

This section maps partner and capability requirements for execution.

Early evidence snapshot: - C-009 (E-009): Geospatial project-mapping assets are useful for hub-level opportunity screening. - C-010 (E-010): Topic02 is not yet partner-shortlist ready and needs deeper extraction.

Current focus: - Build hub-by-hub partner archetype inventories and tie them to route families.

T5. Policy, Funding, and Programs

This section evaluates policy and finance settings that affect pathway bankability and execution timing.

Evidence snapshot: - C-008 (E-008): The 2023-2030 strategy explicitly prioritizes resilient supply chains, sovereign processing capability, and enabling infrastructure/services. - C-007 (E-007): REQ market outlook shows iron ore earnings pressure under softer prices, supporting policy focus on value-lift rather than volume-only exposure. - C-004 (E-004): Infrastructure readiness (especially power and logistics) remains a practical gating condition.

Current focus: - Build route-linked policy matrix (instrument, mechanism, time window, affected pathway).

T6. Evidence Quality, Gaps, and Confidence

This section records the current confidence posture and unresolved uncertainties.

Current confidence snapshot: - C-001 to C-005: **medium** (directional strength is adequate; project-level economics are still thin). - C-006 to C-008: **high** (quantitative extraction completed with anchored source notes). - C-009: **high** (method applicability is clear and operational). - C-010: **high** (explicit self-audit of evidence maturity).

Current key gaps: - Project-level route economics for pre-2030 decision use. - Hub-level partner inventory for execution-ready mapping.

Evidence and sources: - `content/topics/topic02_iron-steel/meta/evidence_register.csv`
- `content/topics/topic02_iron-steel/meta/sources.csv`