RP3.009: AUSTRALIAN GREEN IRON EXPORTS: MODELLING GLOBAL MARKETS IN A DECARBONISED STEELMAKING INDUSTRY

OVERVIEW

As steelmakers move towards low-emissions production, demand for iron ore, green iron and steel will shift in ways that are critical for Australia's export outlook. Australia is a major supplier of iron ore to China, but its future competitiveness will depend on how Australian ores and production compare with emerging green iron hubs in regions such as Brazil, the Middle East, North Africa, Guinea, Sweden and North America.

RP3.009 will extend the technoeconomic model developed in RP3.004 (Intermediate product exports for Australia-China green steel) to cover major global markets for green iron and steel. It will quantify how and under what policy settings Australia can be a competitive supplier of ore, green iron and green steel as the global industry decarbonises.

By integrating detailed process modelling of iron ore beneficiation and ironmaking with regional hydrogen and energy cost projections, the project will identify promising export pathways and key technoeconomic and policy levers. The work will provide governments and industry with an evidence base for investment, infrastructure and policy decisions for Australia's emerging green iron industry.

PROJECT DETAILS

Building directly on the RP3.004 model, RP3.009 will:

- Expand coverage from China to global demand centres to evaluate how much Australian ore, green iron and green steel could be sold into major markets under different decarbonisation pathways.

- Differentiate key Australian production regions – modelling location-specific costs and ore qualities for the Pilbara, Geraldton, Kwinana, Braemar, Eyre Peninsula, Tasmania and NSW – to compare export competitiveness across prospective green iron hubs, including regions represented by project partners.

- Model competitor production regions for green iron to position Australian regions on global cost curves.

- Integrate hydrogen and technology cost modelling from other HILT projects, incorporating green and blue hydrogen cost estimates from energy infrastructure projects RP2.006 and RP3.007, as well as magnetite processing (RP1.008), green beneficiation (RP1.016) and electric smelting furnace (ESF) (RP1.014) routes.

The expanded model will be used for extensive scenario and sensitivity analysis to explore:
- different global demand and scrap-supply scenarios for green steel
- technology performance and cost trajectories (e.g. ESF, electrolysers, beneficiation and magnetite processing)
- early investment in hydrogen, DRI and ESF capacity in competitor regions
- the implications of carbon prices, carbon border adjustment mechanisms and other trade-related policies in major markets.

A core focus will be the role of Australian policy in shaping export competitiveness. The project will test the effects of measures such as hydrogen production incentives, concessional finance for green iron and renewable energy infrastructure, special economic zones in regions such as the Pilbara, and broader taxation or regulatory reforms. Policy scenarios will be co-designed with governments and industry partners, informed by the policy mapping and analysis undertaken in RP3.008 A policy roadmap for Australia's heavy industry low-carbon transition.

Engagement activities will include scenario-design workshops with industry and government stakeholders and a final results workshop. Outputs will include policy briefs, a final HILT CRC report and academic working papers. Model code and non-proprietary data will be released as an open-source repository for use by HILT CRC partners and the wider community.

PROJECT LEADER

Dr Jorrit Gosens,
Australian National University

PARTNERS

- Australian National University
- Swinburne University of Technology
- The University of Adelaide
- CSIRO
- Fortescue
- Grange Resources
- OneSteel Manufacturing
- Minerals Research Institute of WA
- SA Department for Energy and Mining
- The Superpower Institute

INDUSTRIES

- Iron & Steel

TOTAL PROJECT VALUE

$784,619 (cash and in kind)

COMMENCED

01 October 2025

END DATE

30 June 2027

CONTACT

For more information on this project, contact enquiries@hiltcrc.com.au

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HILT CRC MILESTONES

- 3.1 Developing supporting frameworks for emerging low-carbon technologies
- 3.2 Assessing barriers and policy enablers for the production and trade of low-carbon products and commodities

RESEARCH AREAS

- Industry roadmaps and transition strategies
- Sustainability assessments and technoeconomic analysis
- Low-carbon transition policy review and design

PLANNED OUTCOMES & BENEFITS

- A global view of export opportunities for Australian green iron and steel:
  - Quantitative estimates of potential export volumes of iron ore, green iron and green steel into major markets (China, Japan, Korea, India, Taiwan, EU, North America) under different decarbonisation and demand scenarios.
  - Insights into how dependent Australian green iron prospects are on particular markets and policy settings.

- Regional competitiveness assessments within Australia:
  - Comparative analysis of key regions such as the Pilbara, Geraldton/Kwinana, Braemar, Eyre Peninsula, Tasmania and NSW, considering ore quality, energy and hydrogen costs, and infrastructure requirements.
  - Identification of which regions are competitive in which markets and under what conditions (e.g. hydrogen cost differentials, ESF deployment, carbon pricing).

- Identification of critical technoeconomic leverage points:
  - Sensitivity analysis showing which technology or cost parameters (e.g. ESF costs and efficiency, beneficiation performance, hydrogen prices) most strongly influence Australian export potential.
  - Guidance on where R&D, demonstration and early-deployment efforts are likely to have the greatest impact on long-term competitiveness.

- Policy analysis to support investment and market development:
  - Evaluation of the impact of policy instruments such as hydrogen production incentives, concessional finance, special economic zones and trade-related measures on Australian export outcomes.
  - Policy briefs and targeted engagement with federal and state governments to inform the design of policies that enable globally competitive green iron and steel supply chains.

- Open-source modelling tools for ongoing use:
  - An enhanced, open-source optimisation model covering global green iron and steel value chains, with documentation to enable partners to adjust scenarios, update assumptions and apply the model in their own analysis.

For industry partners, the project will clarify where Australian ores and prospective green iron hubs are likely to be competitive, helping to prioritise project development, infrastructure and technology choices. For governments, it will provide a robust analytical base for designing policies that de-risk private investment and position Australia as a leading supplier of low-carbon iron and steel products in global markets.