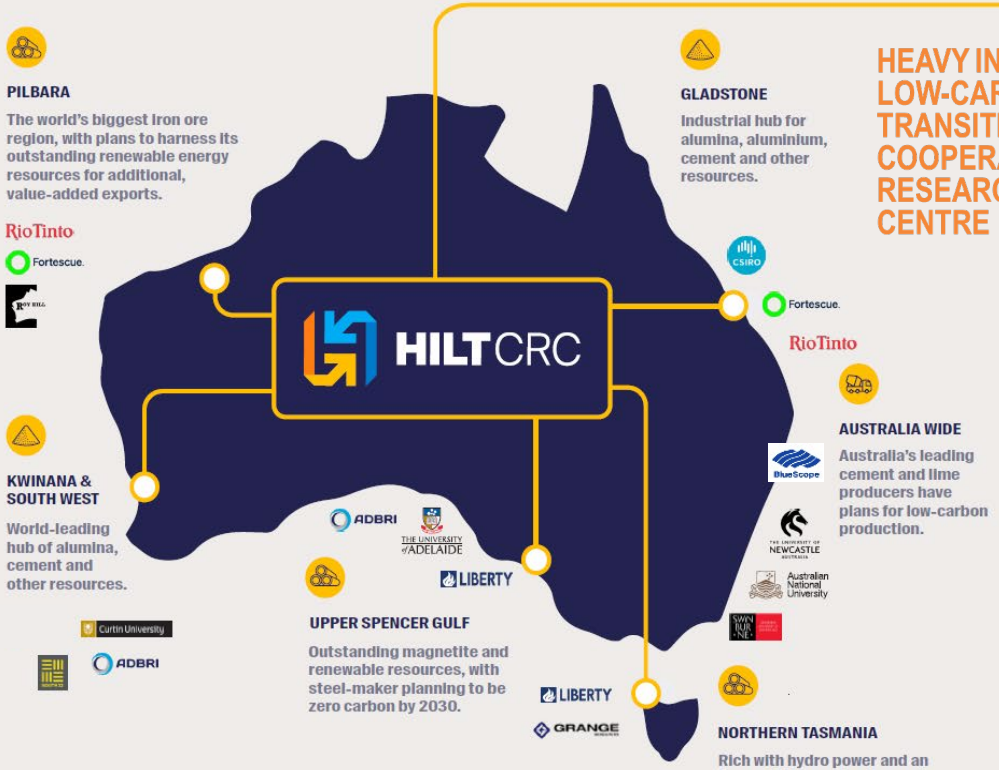
The HILT CRC is a 10-year program established in 2021 with industry, research organisation and government funding of $200M cash + in-kind. ANU is a core partner.

Australian Government
Department of Industry, Science and Resources

Cooperative Research Centres Program

HEAVY INDUSTRY LOW-CARBON TRANSITION COOPERATIVE RESEARCH CENTRE



PILBARA
The world's biggest iron ore region, with plans to harness its outstanding renewable energy resources for additional, value-added exports.

RioTinto
Fortescue.

GLADSTONE
Industrial hub for alumina, aluminium, cement and other resources.

CSIRO
Fortescue.
RioTinto

AUSTRALIA WIDE
Australia's leading cement and lime producers have plans for low-carbon production.

BlueScope
THE UNIVERSITY OF NEWCASTLE AUSTRALIA
Australian National University

KWINANA & SOUTH WEST
World-leading hub of alumina, cement and other resources.

ADBRI
THE UNIVERSITY of ADELAIDE
LIBERTY
Curtin University
ADBRI

UPPER SPENCER GULF
Outstanding magnetite and renewable resources, with steel-maker planning to be zero carbon by 2030.

LIBERTY
GRANGE

NORTHERN TASMANIA
Rich with hydro power and an iron pellet exporter, the region has plans for hydrogen.

Iron & Steel Alumina Cement & Lime

ANU participates in 19 out of 40 projects in the HILT CRC (and leads 11 projects)

P1: Process technologies program

RP1.004 Impact of Hydrogen DRI on Melting in an Electric Furnace

RP1.005 Hydrogen Ironmaking: Fluidised Bed H_2DRI with Australian Focus
John Pye

RP1.008 Green Pyromet /Hydromet Beneficiation Pathways

RP1.010 Hybrid Hydrogen Direct and Plasma Reduction of Iron Ore
Alireza Rahbari

RP1.012 Prevention of Sticking in H_2 Fluidised DRI Production

RP1.013 Alumina Refineries' Next Generation Transition (ALUMINEXT)

Names of ANU project leaders indicated (where applicable)

P2: Cross cutting technologies program

RP2.001 Green Hydrogen Supply Modelling
Joe Coventry

RP2.003 Green Heat for Industry
John Pye

RP2.006 Hydrogen Supply within HILT Regional Hubs

RP2.008 Lost Production and Variability
John Pye

RP2.009 / 2.017 High Temperature Thermal Energy Storage for Industrial Applications
Joe Coventry

RP2.014 Low-Cost Reliable Green Electricity Supply for Low-Carbon Heavy Industry
Bin Lu

RP2.016 Physical and chemical properties of Australian ores

P3: Facilitating transformation program (Fiona Beck)

RP3.004 Intermediate Product Exports for Australia-China Green Steel
Jorrit Gosens

RP3.005 Analysis of Market, Cost and Locational Factors for Green Iron and Steel in Australia
Frank Jotzo

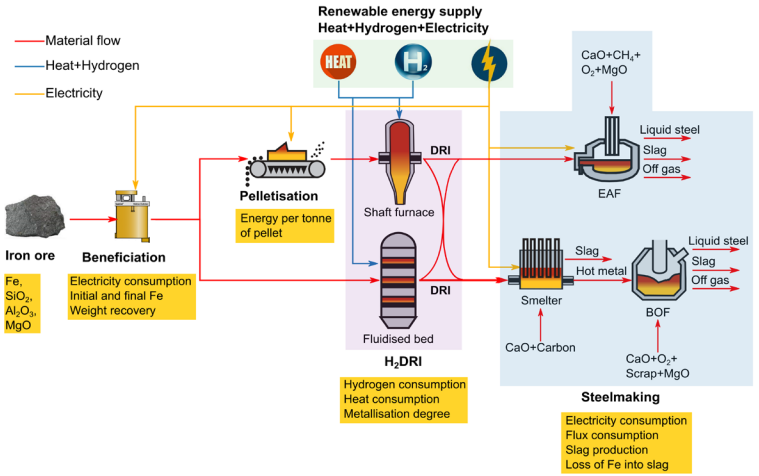
RP3.006 Certification and Verification to Enable a Successful LCT for Heavy Industry
Emma Aisbett

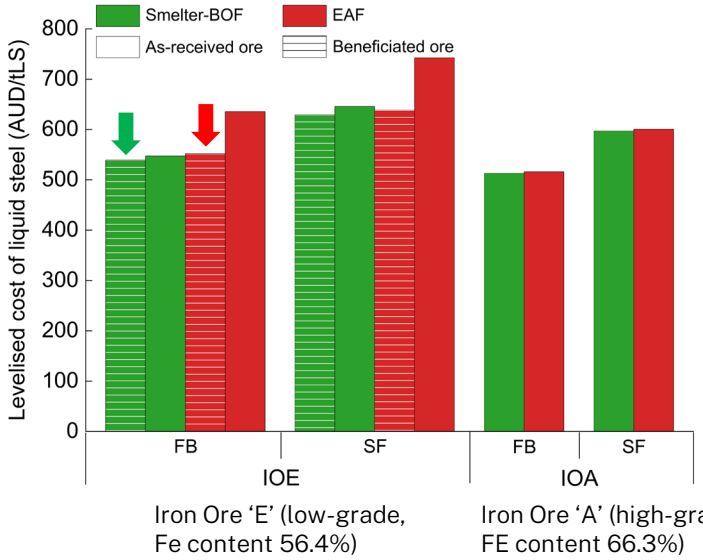
RP3.007 Unlocking Investment in Energy Infrastructure for Net Zero Industrial Hubs

RP3.008 Policy Roadmap for Australia's Heavy Industry Low-Carbon Transition

Hydrogen ironmaking

- Competitive green steel production is feasible without high-grade ores
- Fluidised bed iron making is appealing compared to a shaft furnace process because of saved pelletisation costs
- At a H_2 cost of 3.5 USD/kg, green steel is estimated to cost ~45-60% more than conventional steel

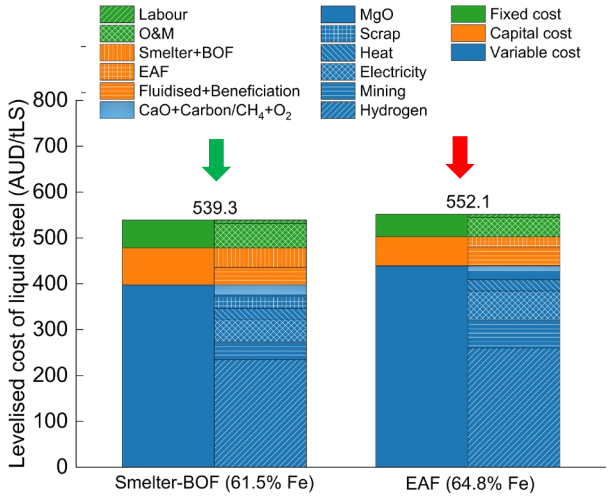




Iron Ore 'E' (low-grade, Fe content 56.4%)

Iron Ore 'A' (high-grade, FE content 66.3%)

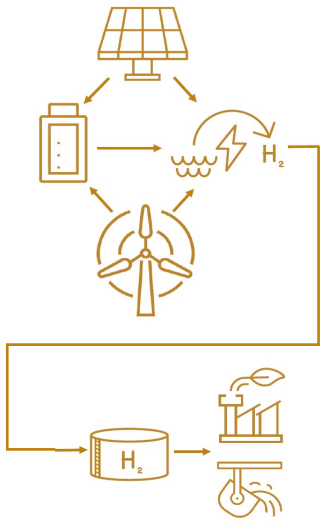
Levelised cost of steel for two sample ores: low-grade (left) and high-grade (right)

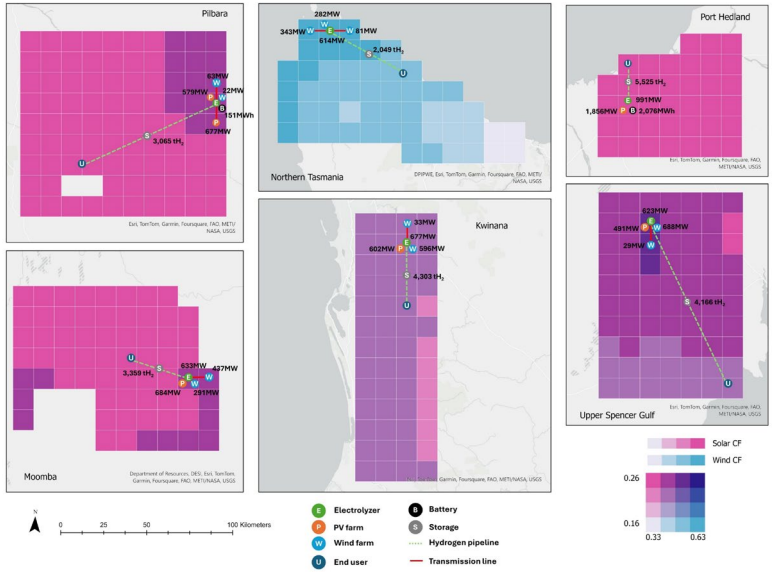


Process cost breakdowns for the low-grade ore with optimal beneficiation and fluidised bed reduction (with H_2 cost of 3.5 USD/kg)

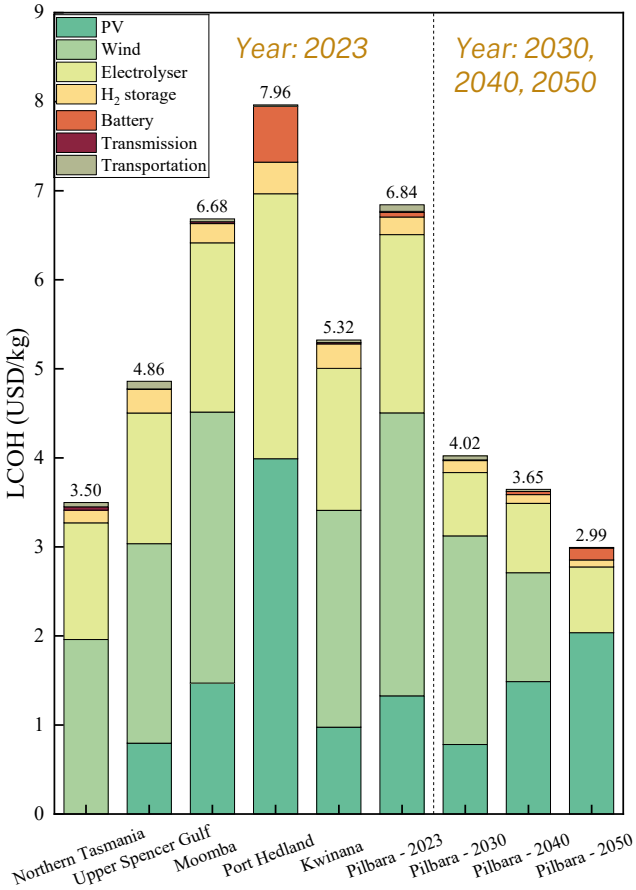
Green hydrogen supply

- Continuous hydrogen supply is possible without significant cost penalty
- Optimal PV/wind infrastructure mix varies greatly by region
- Locational factors significantly influence the cost of hydrogen
- Hydrogen cost is projected to reduce significantly in future





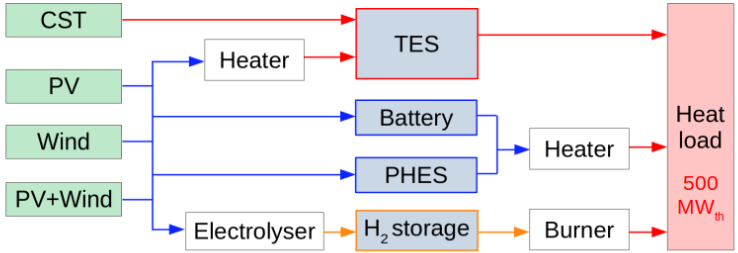
Integrated GIS and techno-economic assessment optimises infrastructure locations at each regional hub

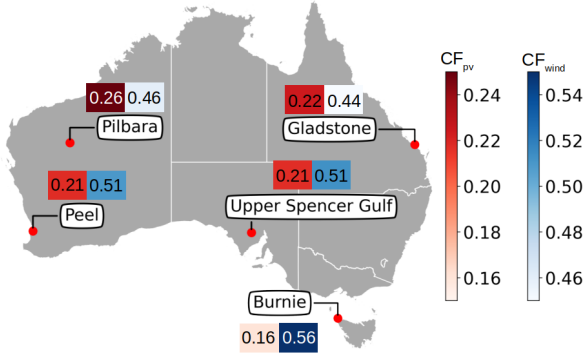


LCOH results for 100% supply capacity factor (underground H_2 storage)

Green heat supply and thermal storage

- Thermal energy storage is the most attractive storage option for heat supply in all locations





Levelised cost of heat (LCOH) in Gladstone and Burnie (2020 costs)