

Assessment of Australian Pilbara Iron Ores in an Electric Smelting Furnace Process for Low Carbon Emission Steelmaking

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PROJECT AIM

The Project will evaluate the metallurgical behaviours, performance and viability of direct-reduced Pilbara ore products for use in the electric smelting furnace (ESF) process to produce hot metal.

PROJECT OVERVIEW

The Project Aim will be achieved through combining high-temperature experimental and computational modelling within two research phases. The Project will

KEY TECHNOLOGY

Development of the ESF process technology combined with direct-reduced iron process technology using higher levels of hydrogen, represents a breakthrough pathway for hot metal production through an innovative steelmaking route viz. Direct Reduction (DR)-ESF-Basic Oxygen Furnace (BOF).

be pursued in partnership with BlueScope.



Research **Commercialisation** Phase





METHODS AND EXPECTED RESULTS



TOC:

Melting bath in an operating ESF for iron sands (https://teara.govt.nz/en/iron-and-steel)

POTENTIAL BENEFITS OF DR-ESF-BOF ROUTE

Emissions Abatement

- \succ Normal reduction of CO₂ emissions up to 50%^[1]
- Near-zero emissions potential*
- Efficient energy and material usage
- Utilisation of low-medium grade iron ore
- Reaching up to 12% of global steel production by 2050^[2]

of hydrogen-mix DR Pilbara ore products

Pilbara ore products (and/or equivalent) and thermodynamic study of slag formation

High temperature metalslag reaction and partitioning studies for key elements

Development and application of computational fluid dynamic models to describe physical phenomena in an ESF

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* Utilisation of green hydrogen, renewable electric energy and bio-carbon [1] Natural gas - based DR - ESF - BOF route, https://www.bluescope.com/content/dam/bluescope/corporate/bluescopecom/investor/documents/2023_BlueScope_Presentation_Investor_Day_September.pdf [2] Fleischanderl A. 9th Int. Conf. on Sci. and Techn. of Ironmaking. Bremen, Germany; 2022

NEXT STEPS

- Preparation of raw materials with low-medium grade Pilbara iron ores
- Thermodynamic study of slag formation
- Development of computational fluid dynamic simulation models for the ESF process

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