

HydroMOR Patent Granted – India

Highlights:

- HydroMOR Innovation:**
 - HydroMOR (Hydrogen-based Metal Oxide Reduction) is an innovative hydrogen-based iron-making process that can reduce CO₂ emissions by ~30%.
 - Utilises abundant and cost-effective lignite, replacing high-cost coking coal or natural gas.
 - Utilises lower-cost iron ore fines, replacing high-cost premium iron ore.
- Global Patent Achievements:** India patent secured, patents already granted in Australia, the EU, Hong Kong, Canada and Russia
- Decarbonisation Option:** HydroMOR, scalable, cost-effective decarbonisation solution for the steelmaking industry.

Environmental Clean Technologies Limited (ASX: ECT) (“ECT” or “Company”) is pleased to announce the patent for its HydroMOR process has been granted in India, adding to existing patents in Australiaⁱ, the EU, Hong Kongⁱⁱ, Russiaⁱⁱⁱ and the recently granted Canadian patent^{iv}.

HydroMOR Process Overview

The HydroMOR process presents a low-carbon alternative to conventional, CO₂-intensive blast furnace steelmaking. It leverages cost-effective lignite in place of the high-cost, high CO₂-emitting coking coal. HydroMOR employs an innovative hydrogen-based reduction pathway through a proprietary furnace design, which allows the use of low-grade and waste iron ore sources. Consequently, this yields a more cost-efficient production method and contributes to a metal production process with approximately 30% reduced emissions.

Threefold Benefits of the HydroMOR Process

Economic Benefits^v:

- Lower capital cost: save 30% - 40%
- Lower operating cost: save 10% - 15%
- Lower raw material cost: save up to 70%



Environmental Benefits:

- 30% reduction in CO₂ emissions
- Utilisation of low-grade waste resources, reducing tailings and fines

Energy & Resource Benefits:

- Lower temperature, reducing the energy required by up to 60%
- Utilises alternative, low-cost resources, diversifying raw material options and monetising waste streams

Background: Battling Steelmaking Emissions with a New Approach

The steel industry contributes approximately 8% of global CO₂ emissions.

The conventional carbon-based process creates high CO₂ emissions, which are difficult and costly to abate. HydroMOR offers a scalable and cost-effective solution with its unique method for hydrogen-based reduction of iron ore.

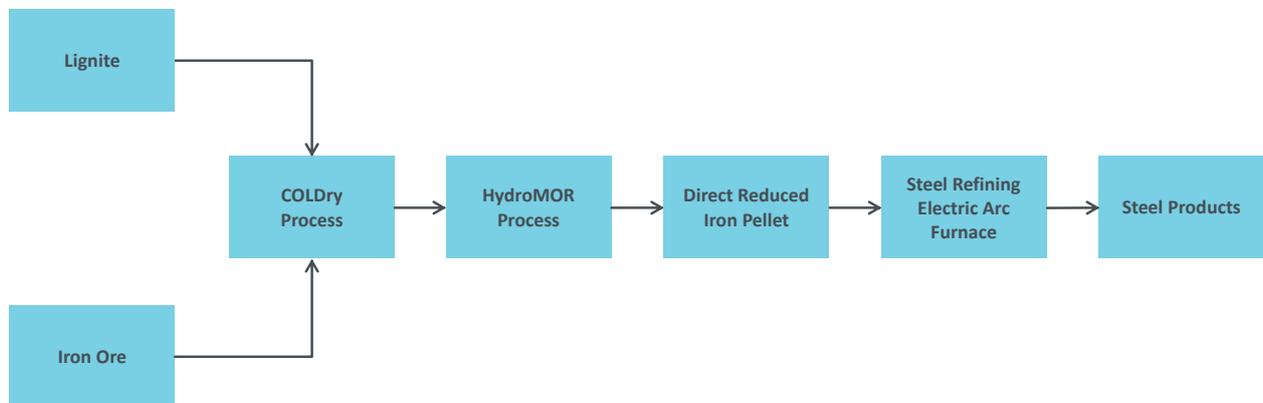
Transitioning from Carbon to Hydrogen Chemistry in Steel Production

The steel industry is responsible for roughly 8% of global CO₂ emissions. This is primarily due to the high CO₂ emissions the traditional carbon-based process produces, which are both challenging and expensive to mitigate. HydroMOR presents a viable and cost-effective solution with its distinctive hydrogen-based method for reducing iron ore.

The concept of employing hydrogen for iron ore reduction isn't new. Yet, there has been resistance to adopting hydrogen-based reduction due to coal's comparative cost advantage, the lack of carbon emission regulations, and the expense involved in upgrading infrastructure to accommodate hydrogen-based direct-reduced iron (DRI).

Despite efforts to decarbonise the industry by producing "green" steel with "green" hydrogen from wind and solar power, the process remains energy-intensive and cost-prohibitive. HydroMOR, however, offers a solution that not only rivals blast furnaces in terms of cost but also achieves approximately 30% lower CO₂ intensity.

The HydroMOR Process



Unique Economic Advantages of HydroMOR

1. Alternative Raw Material Opportunity:

- Utilisation of low-cost, abundant lignite instead of expensive coking coal or natural gas
- Efficient utilisation of iron ore fines, slimes, and industrial wastes.

2. Lower Plant Cost:

- Up to 40% less capital-intensive than equivalent blast furnaces or coal-based DRI plants.
- Reduced land area requirements, low maintenance, and low water consumption.

Next Steps for HydroMOR

ECT is presently in early discussions with partners of projects that are considering utilising HydroMOR for the production of direct-reduced iron (DRI).

Patent Status

The table below outlines the status of the various international patent applications for HydroMOR.

International Patent Application Status - HydroMOR

Case Ref.	Country	Case Status
35519103	India	Granted
35526602	Australia	Granted
35526603	Canada	Granted
35526604	China	Response to Exam Report Filed
35526605	European Patent Office	Granted
35526606	Russian Federation	Granted
35526607	United States of America	Application Published
35527133	Indonesia	Response to Exam Report Filed
35540529	Hong Kong	Granted

This announcement is authorised for release to the ASX by the Board.

For further information, please contact:

INVESTORS

Sam Rizzo
 Managing Director
 info@ectltd.com.au / +613 9849 6203

MEDIA

Adam Giles
 Marketing & Communications Manager
 media@ectltd.com.au / +613 9849 6203

ⁱ See ASX announcement 31 January 2023

ⁱⁱ See ASX announcement 26 April 2023

ⁱⁱⁱ See ASX announcement 29 April 2022

^{iv} See ASX announcement 5 February 2024

^v Based on internal technoeconomic analysis