2024

قمة الصلب العربي الـ 17
و المعرض الدولي للحديد و الصلب

17th Arab Steel Summit
and International Iron and Steel Exhibition

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Vale's Cold Iron Ore Briquettes

an innovative solution

VALE

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an innovative solution

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17 th Arab Steel Summit
14 - 15 October 2024 | Doha - Qatar

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Director – Iron Ore Briquettes

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What is Vale's **Cold Iron Ore Briquette?**

EXCLUSIVE TECHNOLOGY

20 years development of this agglomeration technology
Technology patented[1] in 65 countries

LESS CO2 EMISSIONS

Reduction of up to 10% in BF-BOF route[2]

80% less vs. traditional agglomeration processes[3]

PLANTS IN TUBARÃO

1st plant started Dec23, 2Mty

2nd plant under final stage of construction, 4Mty

Mobile plant started Sep24, 160~200kty

AND MORE TO COME

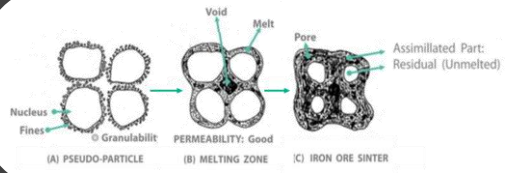
Other plants and partnerships under analysis, with up to 100Mtpy forecasted capacity until 2035

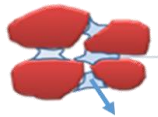
[1] Patented or in submission process.
[2] Considering substitution of sintering.
[3] Considering scopes 1 and 2. Briquetting process also has 99% less SOx, 75% less NOx and 20% less particulates emissions than pelletizing process.

Cold agglomeration can tackle challenges that mining and steel sectors have been facing for years

CO_2, NO_X and SO_X emissions	Substantial reduction in use of fossil fuels due to low temp agglomeration process
Particulate emissions	Substantial reduction in particulate emissions due to very low combustion intensity
Scarcity of water resources	Briquetting does not require water addition for processing and cooling of product
Aging of the world's steel plants	Briquette can be a sinter/pellets substitute, lowering investment on expansions or new steel mills

PELLETIZING	SINTERING	COLD AGGLOMERATION
GRINDING	~~GRINDING~~	~~GRINDING~~
THICKENING	~~THICKENING~~	~~THICKENING~~
FILTERING	~~FILTERING~~	~~FILTERING~~
PRESSING	~~PRESSING~~	PRESSING
MIXING	MIXING	MIXING
PELLETIZING	SINTERING	BRIQUETTING
FIRING ~1300°C	FIRING ~1300°C	CURING ~250°C
SCREENING	SCREENING	SCREENING





high resistance films promoting strong chemical bonds

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LATEST NEWS: PRODUCT

Cold Iron Ore Briquettes Development Cycle

Acid Briquette

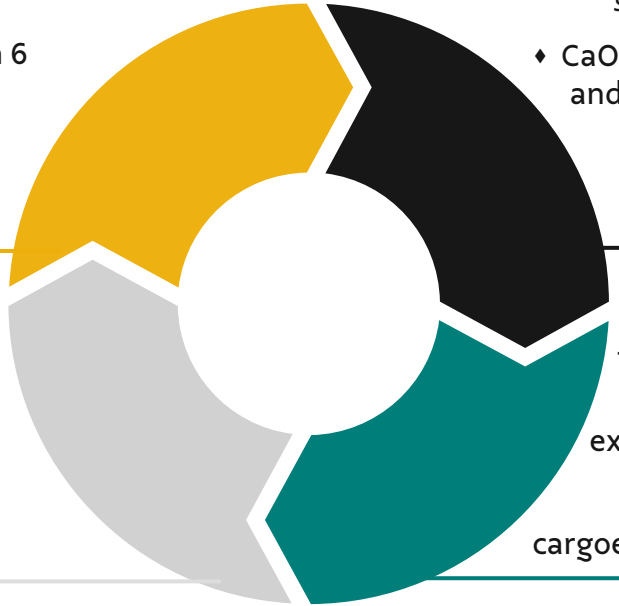
substitute for lump and acid pellets

- Fully developed product used in 6 successful industrial trials
- Excellent results optimizing BF process performance

High Reducibility Briquette

substitute for sinter and fluxed pellets

- CaO and MgO addition to create basic and high reducibility product, driving performance and sustainability
- 3 industrial trials successfully concluded



Process Improvements

- Support for industrial testing and engineering development
- Cost reduction and process simplification initiatives
- Performance improvements

DR Briquette

substitute for DR lumps and DR pellets

- 13 basket tests concluded with excellent results (3 of those in MENA)
- 3 Industrial trials plus another 2 cargoes sent for different MENA clients

Industrial Trials Overview

Blast Furnace Cold Iron Ore Briquettes

Acid and high reducibility

9 tests
briquettes in the burden: 10 ~ 70%
successfully completed

70kt
amount of tested briquettes

7 different BFs
tests performed (150 ~3200m³)

144 days
industrial test days

Direct Reduction Cold Iron Ore Briquettes

13 basket campaigns
over 3000 baskets evaluated

3 industrial trials concluded
+2 others ongoing

Main Technology Providers
Tested with Hyl and Midrex

Over 98% Metallization

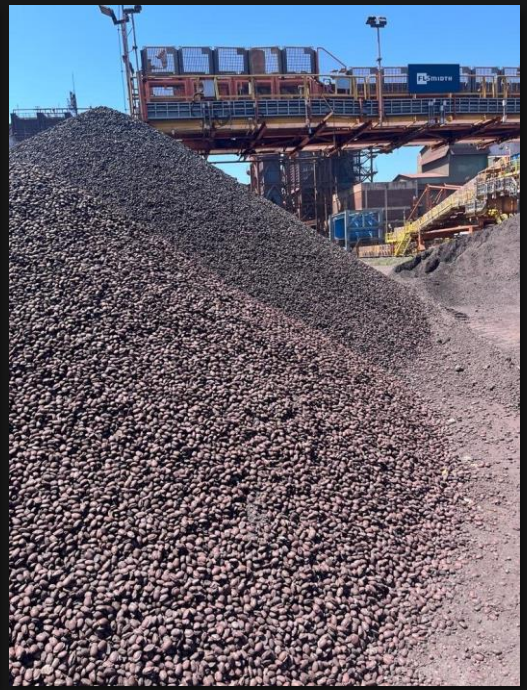
Industrial Trials Overview

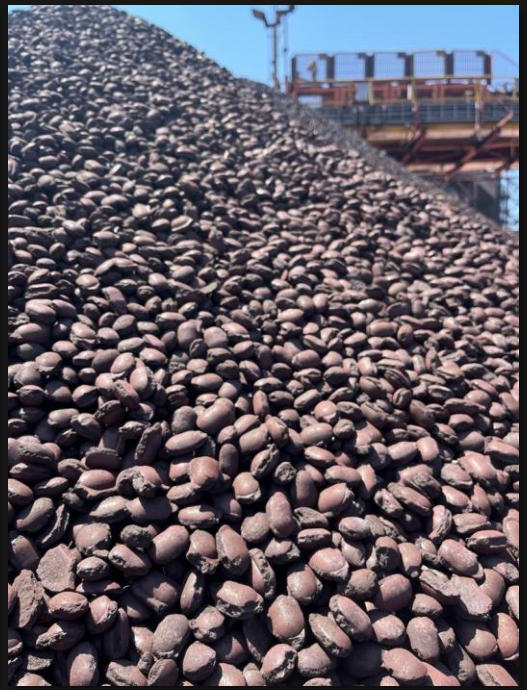
03

LATEST NEWS: TUBARÃO PLANTS 1&2

Vale's first cold iron ore briquetting plants overview (drying area) – Vitória / Espírito Santo - Brazil

Tubarão BT01 Cold Iron Ore Briquette Production





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LATEST NEWS: MOBILE PLANTS

Mobile Plant – Cold Iron Ore Briquetting: Concept and highlights

CONTROLLED INFORMATION

Mobile Plant – Cold Iron Ore Briquetting: Modules

CONTROLLED INFORMATION

Mobile Plant – Cold Iron Ore Briquetting: Tubarão Plant

CONTROLLED INFORMATION

Mobile Plant – Cold Iron Ore Briquetting: Tubarão Plant

Production started in September/24

CONTROLLED INFORMATION

05

LATEST NEWS: BUSINESS DEVELOPMENT

DOE Award Selection Overview – Vale

Project Highlights Presented to DOE and Public Stakeholders: March, 2024

Value and Impacts

- Cleaner agglomerated iron ore for steel production in USA
- Modular design and replicable business model
- Circular economy and synergies in the US Gulf region
- Near elimination of SO_x and particulate emissions
- Significant reduction in CO_2 and NO_x emissions

Plant capacity 1,5Mty

US$ 282,9 MM Grant

Vale's in-house technology

Seaborne fines + byproducts/residues usage

Business Models for Integrated Solutions

VALE

CONTROLLED INFORMATION

Business Models for Integrated Solutions

1

Vale's Operational Units

2

Clients Operational Units

DR Reactor

Blast Furnace

3

HBI Hubs

CONCENTRATION
Focus on Fe recovery

DR Reactor

HBI Production

Steel Production

Vale's Main Initiatives in Decarbonization for the Steel Industry

CONTROLLED INFORMATION

Cold Iron Ore Briquettes – an innovative solution

- **Emissions**
  Aiming targets for Vale and Customers
  Minimum SOx and particulates, low NOx emissions
- **Chemical bond instead of metallurgical bond**
  Low energy intensity
- **Wide Range of Applications**
  Alternative to Lump, Sinter and Pellet
- **Seamless Operational Performance**
  Good Handling and Low Degradation
  Equal to or better than Lump, Sinter or Pellet
- **Optimized business solutions & partnerships**
  Customized solution, use of by-products and residues, flexibility of iron ore supply, synergies with customers and competitive Capex and Opex
- **Megahubs and co-located plants**
- **Production**
  Start-up of first plant in Tubarão (2Mty)
  Mobile plant production (160~200kty)

Thank you!

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