MAGNETITE

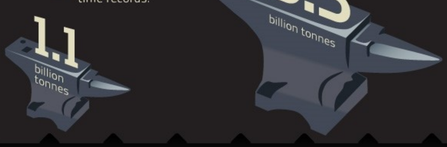
THE FUTURE OF IRON ORE

IRON IS ONE OF THE MOST IMPORTANT COMMODITIES IN THE WORLD.

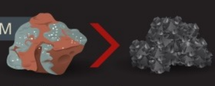
When processed into steel, it is used in almost all modern day infrastructure.

If the iron industry was a country, it would have the **24TH** largest GDP in the world worth **$512 BILLION IN 2011**

Iron now accounts for **95%** of all metal produced per year, and the world's developing economies are driving iron demand to all time records.



WITH RAPIDLY GROWING DEMAND, AN IMPORTANT PARADIGM SHIFT IS OCCURRING IN THE IRON SECTOR:

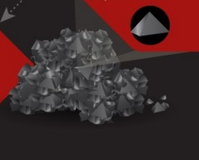


Magnetite Ore, long the leading source of domestic iron supply in North America, Europe and China, is now increasingly relevant across the globe. The perception that Magnetite Ore is an inferior substitute to Hematite Ore is now firmly changing.

These two main types of iron ores have important differences:

Hematite Fe_2O_3

Magnetite Fe_3O_4



Magnetite is magnetic and hematite is not. This is mainly because of different crystal structures.

Hematite gets its name from its blood red colour, as it resembles hemoglobin.

Magnetite is the most magnetic mineral found in the natural world.

Magnetite ore typically has much lower iron content than hematite ore (25% to 40%)

Therefore it must be 'concentrated' before it can be used in iron and steel production.

56% TO 64%

Hematite ores often have high levels of iron content of between 56% and 64%. At this grade, these ores are known as Direct Shipping Ores.

[DSO]

DSO can be shipped immediately to blast furnaces for iron and steel production with little costly processing.

Concentration takes advantage of the magnetic properties. Powerful electromagnets help separate magnetite from the waste rock.

Honey bees, homing pigeons, and dolphins all contain magnetite in their brains. These internal compasses allow them to navigate over long distances.

Recently, we have begun to exhaust high grade, easily accessible DSO deposits.

In response, explorers have begun targeting other types of iron ore, namely Magnetite.

Despite the extra cost of upgrading magnetite ore to concentrate, there are

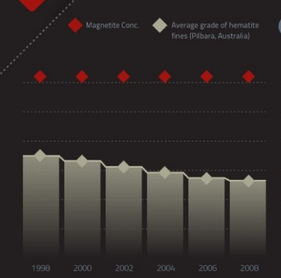
TWO MAJOR ADVANTAGES

01 Consistently High Iron Content

DSO's iron content can vary, but the iron content of magnetite is consistently high with low impurities.

02 Less Carbon Emissions

Magnetite concentrate's purity and high iron content translates to lower carbon emissions during iron production than DSO ore.



A life cycle analysis by the Crucible Group produced the following numbers:

(per tonne of magnetite concentrate)

64 kg It takes 64kg of CO_2 to concentrate the magnetite...

but it generates **172 kg** less emissions than DSO, which is put directly into a blast furnace.

for a net reduction of 108kg **108 kg**

Magnetite Concentrate is a premium product consistently > 68% Fe

As a result, magnetite concentrate is suitable for the production of premium quality iron and steel.

Conclusion

Despite the additional costs involved in concentrating magnetite ore, magnetite concentrates do have significant advantages over DSO ores.

As easily accessible, economic hematite deposits become rarer, magnetite ore will continue to emerge as a important source of the world's iron.