



M1000 IsaMills™ at Caribou concentrator, Canada



Internal view of grinding discs in M10,000 IsaMill™

Reducing your Carbon Footprint with the IsaMill™

Introduction

Responding to climate change policy is a significant business challenge for resource companies. Companies are rising to this challenge by seeking ways to reduce their carbon emissions by improving energy and resource efficiency and by deploying low emission fuels and technologies.

Comminution of ore is often the most energy intensive step in metal production. The IsaMill™ is a new generation grinding mill that significantly improves the energy efficiency of mineral processing. The IsaMill™ offers resource companies a means to reduce their carbon footprint and opens opportunities to the global carbon trading market.

IsaMill™ Technology

The IsaMill™ is a radical departure from conventional tumbling mills. The IsaMill™ was originally designed for ultra-fine grinding (less than 7 microns) but, following the success in these applications, has been further developed for use in coarser grinding. The special features of the IsaMill™ include multiple grinding discs arranged along a horizontal shaft, an internal centrifugal classifier and fine inert grinding media (2mm–5mm). A striking feature of an IsaMill™ installation is the small footprint; the grinding chamber of a 3MW IsaMill™ is only 10 cubic meters – less than one tenth the volume of an equivalent-power ball or Tower mill.

The IsaMill™ is available in three sizes, M1000, M3000 and M10,000 drawing 0.5MW, 1.5MW and 3MW of power respectively.

How will greenhouse gas policies affect grinding?

Governments and policy makers are driving a global regulatory effort to reduce greenhouse gas (GHG) emissions under the guidelines of the 1997 Kyoto Protocol (see box below). Increasingly, businesses throughout the world will be required to manage and reduce their carbon footprint by using low emission fuels and technologies and by adopting energy efficient processes. With its superior energy and processing efficiency, the IsaMill™ can significantly reduce a resource company's carbon footprint.

Generating carbon credits from grinding efficiency

Plant owners who adopt the IsaMill™ technology may be in a position to generate carbon credits which can be used to meet their current or future emission reduction obligations or, alternatively, could be sold on global carbon markets. There are two main pathways by which the IsaMill™ could generate carbon credits through the Kyoto Protocol mechanisms of the Clean Development Mechanism (CDM) and Joint Implementation (JI).

Under the CDM, companies can generate credits by investing in GHG reduction projects in countries that are classified as 'developing'. The IsaMill™ has the potential to generate CDM credits from projects in the mineral-rich countries of Africa, South America and Asia.

Under the JI, companies can generate carbon credits from GHG reduction projects implemented in either another developed country or in a country with an economy in transition who have ratified the Kyoto Protocol. The IsaMill™ has the potential to generate JI credits from projects in countries such as Russia and the Ukraine.

How is the IsaMill™ different?

The IsaMill™ has several key benefits over conventional grinding technologies including greater energy efficiency, smaller footprint, simpler grinding circuit design and improved downstream metallurgical performance. These benefits are described briefly below.

The high energy efficiency of the IsaMill™ is due to its ability to use very fine media. The mill is stirred at high speed to create many grinding events in a small space. As a result, an IsaMill™ installation is much more compact and is 30-50% more energy efficient than conventional grinding technology.

The use of fine media is enabled by the patented internal centrifugal classifier which effectively retains the fine media and coarse particles in the mill. As a result, the IsaMill™ produces a sharp product size distribution in open circuit which, in turn, leads to a simpler grinding circuit without the extra footprint and energy consumption associated

with hydrocyclones and high recirculating loads.

The IsaMill™'s inert grinding media has a big advantage over conventional steel media as it greatly reduces the generation of ferric ions which inhibit the performance of downstream flotation and leaching circuits. When improved energy efficiency is coupled with the improved metallurgy and lower reagent consumption associated with inert grinding, the IsaMill™ can increase the mineral recovery per unit of power consumed by over 100% in some cases.

The combination of energy efficiency, small installation size, inert grinding and simple circuit configuration combine to give the IsaMill™ an extremely favourable "life cycle analysis" when compared with conventional grinding.

Further information is available on www.isamill.com

Kyoto Protocol

The Kyoto Protocol is a legally binding agreement under which the governments of industrialised countries have agreed to reduce their collective GHG emissions to 5.4% below their 1990 emission levels by 2012. It came into effect in 2005 and has been ratified by 174 countries and the European Economic Community.

The Kyoto Protocol has three major "flexible mechanism" instruments that help governments or companies meet their emission reduction commitments. These mechanisms include the *International Emissions Trading (IET)*, *Clean Development mechanism (CDM)* and *Joint Implementation (JI)*.

The International Emissions Trading (IET) allows industrialised countries to buy and sell emission credits based on a "cap-and-trade"¹ model. The principal trading platform for IET is the European Union Emissions Trading Scheme (EU ETS). In 2007, the EU ETS traded 1.6bn carbon credits (European Union Allowances) worth over \$US40 billion.

The Clean Development Mechanism (CDM) is a project-based approach under which governments or companies in developed countries can create carbon credits called Certified Emission Reductions (CERs). CDM projects are implemented in developing countries and the CERs created from them may be used to meet Kyoto targets set for developed countries. This mechanism aims to channel foreign investment into developing countries in order to reduce emissions globally, transfer new technologies and contribute to sustainable development. In 2007, the global CDM market was worth over \$US15 billion.

Joint Implementation (JI) allows governments or companies in developed countries to generate carbon credits from GHG reduction projects implemented in either another developed country or in a country with an economy in transition. Carbon credits from JI projects, called Emission Reduction Units, can be generated from 2008.

¹ A "cap and trade" scheme works by setting an upper limit to emissions, a "cap" and then allowing participants to trade their emissions assets under this cap hence allowing emitters with low cost reduction potential to invest in that potential and those with higher emission reduction costs to purchase newly created emissions assets from the market.

Realising the full carbon benefit from IsaMill™

Xstrata Technology and its carbon partner Sigma Global can assist plant owners in deriving the maximum carbon benefit from this new technology. This service includes the investigation of suitable carbon credit schemes for the project site, approval and verification of the project by the relevant authorities and expert advice on the most appropriate strategy for your company to realise the full benefit from the carbon credits.

To ensure that projects qualify for and realise carbon trading opportunities enabled by the IsaMill™, it is important that the carbon considerations are included in the earliest stages of project planning and decision making.



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