EMPowered Heat: Mineral Ore Dryer

Project Data Table

Product: EM Powered Heat Minerals Dryer

Date: July 2024

Application: Potash Drying

Potential Analog Applications: Critical minerals and agricultural dryers

Potential Emissions Impact: 50% - 100% CO2 emissions reduction

Energy Impact: 40% - 60% energy impact reduction

Temperature: 40°C – 70°C

Location: Calgary, Canada

Facility: Acceleware Lab

Use Case Overview

Acceleware first tested an electromagnetic (EM) energy bulk solids drying at industrial-scale prototype in 2017, through the drying of 300 m3 of wet sand. Since that time, Acceleware has refined its energy delivery systems to make its EM Powered Heat dryers highly economic, adaptable, energy efficient and flexible.

The company is now building a 1 tonne/hour potash dryer for the International Minerals Innovation Institute and potash producing members, BHP, Nutrien, and The Mosaic Co.. Work to date demonstrates a significant increase in energy efficiency and a decrease in GHG emissions from its EM Powered Heat dryers.

Acceleware sees significant opportunity to immediately apply the EMPowered Heat Dryer to decarbonize the drying of a long list of mineral ore products, as well as various agricultural and other bulk solids products.

"As a member of IMII, we are pleased to support Phase 2 of the pilot. Achieving net zero scope 1 emissions is one of the largest decarbonization challenges for conventional potash producers. The CTI technology being developed has the potential to play an exciting role in decarbonizing potash processing and could provide a pathway to reduced scope 1 emissions,"

Kathlene Jacobson
Principal Innovation, BHP

Energy

40-60%

Expected energy reduction vs. combustion dryers

Emissions

50-100%

Anticipated scope 1 and 2 emissions reduction vs combustion dryers (depending on power source)

Time

6 Months

Time to build, test, and optimize the 1 tonne/hr EM Powered Dryer for new mineral drying applications

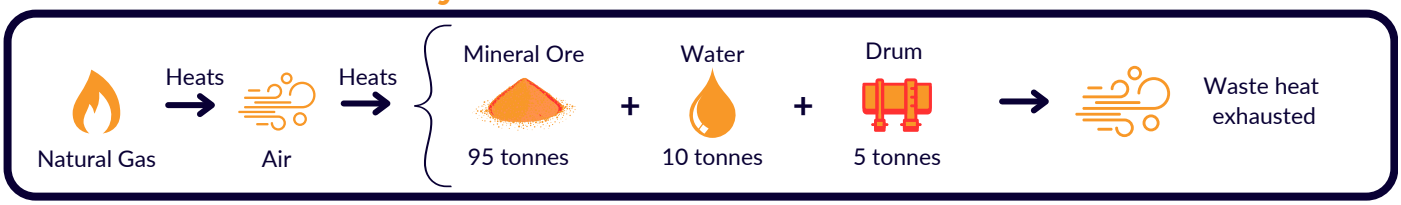
EMPowered Heat:
IMII Mining Dryer Case Study

Economically Decarbonizing Drying - Quickly

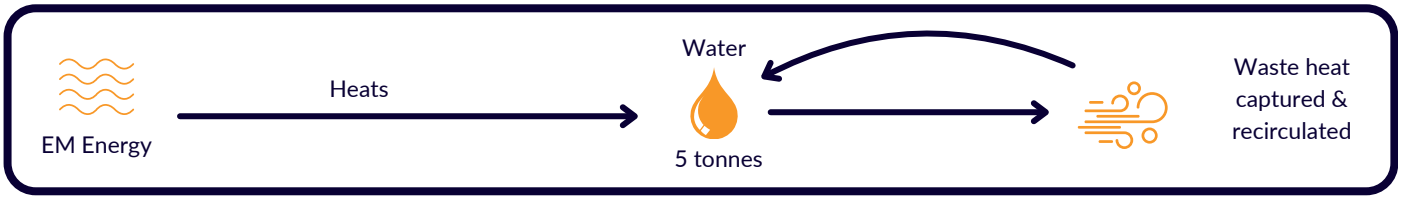
Acceleware's development ensures design of new mineral and analogous bulk solids products based on previously tested dryers. Our process will fast track optimization for your material in parallel with dryer manufacturing.

After product samples are provided by the client, electromagnetic properties are measured and used to run a series of drying simulations. Bench scale drying tests are then completed to validate the simulations. In parallel, the dryer is manufactured along with a CTI power source. Within approximately six months an optimized dryer can be ready to deploy at a client site. If desired, additional optimization and performance tests can be performed at the Acceleware lab to fine tune the design and scale the dryer up to larger sizes.

Traditional Combustion Dryers



EMPowered Heat Dryers



Lessons Learned

- Drying at the molecular level results in extremely efficient energy use. Directly coupling EM energy to the target water molecules means that heat is created only where it is needed. This eliminates waste heat by eliminating heat delivery from source to application, while cutting energy input by drastically reducing the volume of material to be heated. Remaining energy input needed is electrified, reducing scope 2 emissions. This results in the least-cost path for operators to cut emissions without increasing compliance or emissions-related costs for long-term competitive advantage.

- EMPowered Heat Dryers are solid state systems designed for 20-30 year useful life span while operating around the clock. The platform can operate intermittently without any negative efficiency or cost impact. It is low maintenance and lifespan is not reduced by power cycling.

A CTI commercial-scale drying platform with lower operating costs could present an opportunity for a sustainability win for the minerals industry, reducing energy and improving economics, while lowering GHGs..."

Al Shpyth
Executive Director, IMII