

# Opportunities for and Barriers to Value-added Gypsum Businesses in Nova Scotia

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## Introduction

In the United States, new housing starts plummeted from a high of nearly 2 million units in 2005 to less than 0.5 million in 2009 (Satterthwaite, 2013). For businesses that export gypsum from Nova Scotia to wallboard manufacturing plants in the U.S., this was a disaster. Gypsum production in Nova Scotia, the vast majority of which is exported to U.S. wallboard plants, peaked in 2005 at 9.6 million tonnes (Whiteway, 2014). Production fell to just 2.0 million tonnes in 2012.

As a result of the significant reduction in demand for gypsum, two gypsum mine operators (CGC and Georgia-Pacific) decided to place four large Nova Scotia quarries (Wentworth, Miller Creek, Melford and Sugar Camp) on care-and-maintenance. That resulted in the lay-off of about 300 employees and left just two major gypsum quarries (Milford Station and Little Narrows) operating in the province in 2013 (operated by National Gypsum and CGC, respectively).

Housing starts in the U.S. typically average about 1.5 million units per year with each unit using about 10 tonnes of gypsum wallboard. In 2013, the number of housing starts in the United States did not return to the one-million-unit level (Satterthwaite, 2013).

Reducing the dependence on a single end-use application would support the long-term development of Nova Scotia's gypsum resources. One way to accomplish this would be to encourage businesses that can add value to natural gypsum in non-traditional end-use applications (Whiteway, 2014). Encouraging a diversity of end-use applications would create new employment in the province and would potentially reduce the volatility in gypsum demand caused by the ups and downs of

demand for wallboard in the U.S., which is tied to new housing starts.

To this end, the Minerals Development and Policy Section of the Department of Natural Resources (DNR) has taken a two-pronged approach to facilitating a sustainable gypsum industry:

- Communicating geological information on the province's vast gypsum resources to decision-makers in gypsum-using companies outside of Nova Scotia; and
- Learning more about how gypsum is used in large, growing economies around the world so as to encourage the establishment of new businesses in Nova Scotia that could export gypsum products to those markets.

This paper describes the progress made in 2013 in achieving the goals of this communications and marketing strategy.

## Method

In 2013, an excellent opportunity to promote Nova Scotia's gypsum resources to the users of gypsum arose. The 13<sup>th</sup> Annual Global Gypsum Conference and Exhibition was held in Toronto, Ont. on Oct. 20 to 22, 2013. In the past, this conference was held in far-away Asia and Europe, which were too distant for DNR to participate. Therefore, the close proximity of the 2013 conference offered a low-cost opportunity to attend.

The event attracted 280 people from 37 countries. This provided an opportunity for the author to meet representatives of companies that are either expanding or building new manufacturing facilities that use gypsum. When a conference delegate demonstrated sufficient interest, the author

provided them with a memory stick containing all of the available published information about Nova Scotia gypsum resources, legislation and taxes. In addition, they were invited to contact the Department of Natural Resources if they are interested in pursuing opportunities or if they were interested in contacting local producers.

## Discussion

For existing producers of gypsum in Nova Scotia, there are both opportunities and barriers to selling their product. End-use applications, other than wallboard, exist both locally and outside of the province, and there are also several potential new end-use applications for gypsum on the horizon. Some of these opportunities and barriers are discussed here.

### Wallboard Plants in the Growth Economies of South and Central America

As a result of rapid urbanization, Argentina, Brazil, Venezuela, Mexico, Honduras and Jamaica all have rapidly growing housing markets. In addition, gypsum wallboard has become an accepted product for building these new homes (Morrow, 2013). All of these countries are either expanding existing or building new wallboard plants. To be successful, these facilities need low-cost, quality gypsum. Existing capacity to manufacture wallboard in this region is shown in Table 1.

For comparison, annual wallboard manufacturing capacity in Canada is 395 million m<sup>2</sup> and the capacity in the United State is 3,800 million m<sup>2</sup> (McCaffrey, 2013). Existing capacity in Brazil is notably low compared with the rate of urbanization in that country. To illustrate the potential for wallboard manufacturing growth in Brazil, consider the amount of wallboard used per capita. In the U.S. in 2012, this was about 10 m<sup>2</sup> for each person a year, whereas in Brazil it was only 0.5 (and about 2.0 in China).

The potential for shipping gypsum from Nova Scotia to wallboard plants in South and Central America would be greatly improved if the ships

**Table 1.** Wallboard manufacturing capacity (in millions of square metres per year).

Country	Capacity
Brazil	47
Argentina	63
Columbia	74
Mexico	142
Canada	395
U.S.	3,800

used to transport the product could also bring back another product to Nova Scotia. This so-called ‘back-haul’ advantage might be applicable to, say, coal which is presently imported to Nova Scotia from Columbia. The bulk storage holds of such ships are routinely washed out to prevent cross-product contamination.

Only in rare instances is wallboard shipped to distant export markets. It is typically manufactured close to markets where it is sold within weeks of being manufactured. This ‘just-in-time’ manufacturing reduces the cost of inventories (Morrow, 2013). Also, shipping wallboard to tropical climates is problematic because moisture can enter the wallboard, creating an ideal environment for sulphide-reducing bacteria to thrive, thus producing unpleasant odours. This is postulated to be the case in the recent Chinese wallboard incident in Florida that resulted in a multi-million-dollar settlement between manufacturers and end users (Brosig, 2013).

### Competition from Quarries in Spain

Nova Scotia has one major competitor for gypsum exports: Spain. Gypsum from three large quarries and many small-scale ‘mom-and-pop’ operations in Spain is trucked a short distance (about 20 km) to tidewater at a total cost of US\$7 a ton. This gypsum is shipped to customers as far south as Uruguay and as far north as Maine (Herrero *et al.*, 2013). Costs, delivered to the Hudson River in New York State, are estimated to be US\$15 a ton. This compares with a cost of US\$20 a ton to

deliver Nova Scotia anhydrite to Montreal (Global Industry Analysts Inc., 2012).

One of Spain's competitive advantages is having products that can be back-hauled in the shipping process. This significantly reduces transportation costs.

Another competitive advantage enjoyed by Spanish gypsum producers is the natural dryness of the gypsum being shipped to customers. Since the quarries are located in a desert region of the country, the amount of 'free' water in the rock is about 1.2%. This compares with 3 to 5% in Nova Scotia gypsum and 20% for synthetic or Flue Gas Desulphurization (FGD) gypsum. Free water content is important because in order to make wallboard, gypsum must be dried in an initial step of the manufacturing process. Drying gypsum, typically using natural gas as a fuel to evaporate this free water, significantly increases the cost of producing wallboard.

The producers of gypsum in Nova Scotia could potentially compete with producers in Spain if the cost of delivering gypsum to the customer plus the cost of heating the rock to evaporate the free water is less than the cost of delivering drier Spanish gypsum to the same customer.

## **Agricultural Gypsum Opportunities**

In the agricultural sector, gypsum is used as a soil amendment. It serves as a source of calcium and sulphur, whereby calcium ions displace sodium in salty soils. In addition, gypsum opens the soil, allowing water and air to penetrate. It also adjusts the pH of the soil and provides nutrients that improve crop yields and product shelf life (Flumiani, 2013).

One local gypsum producer (National Gypsum) sells a limited amount of gypsum to farmers in Prince Edward Island. A method of increasing the demand for agricultural gypsum might include educating farmers of the benefits noted above.

Companies outside Nova Scotia pursue this business. An example is U.S.-based Harrison

Gypsum, which specializes in selling gypsum as an agricultural product in the Texas and Oklahoma market. If this company were to be interested in diversifying geographically into northeastern North America, Nova Scotia would be a natural location to consider.

## **Floor Screeds from Anhydrite**

One of the growing applications for gypsum in the architectural market is so-called 'self-leveling' floors. The fluidity of specially formulated stucco is such that when it is 'poured' onto plywood floors, gravity quickly creates a level surface prior to the stucco setting to form a hard floor.

All gypsum types (beta-gypsum, anhydrite, etc.) can be used to make such self-leveling floors (Thome, 2013); however, natural anhydrite would likely be of most interest to Nova Scotia producers due to its availability. Keeping grinding costs low would be the main challenge. Anhydrite from the Little Narrows quarry in Nova Scotia, operated by CGC, is among the purest anhydrites available anywhere in the world.

## **Specialty Architectural Details**

Another growth market for gypsum is in specialized architectural projects. Small-scale businesses could supply various gypsum products to clients in this global market.

One example of this type of small business that could thrive by using high-quality Nova Scotia gypsum is DECO Systeme of Paris, France. This company, which employs just seven people, uses about 4,000 tons of fine-ground gypsum a year and makes specialty architectural products, such as mouldings that mimic 17<sup>th</sup> Century art and decorative details in homes. The company has sales of about 1.5 million Euros a year (Potin, pers. comm., 2013).

## **Expert Consultants**

Another business opportunity for Nova Scotia is the provision of technical, analytical, marketing and information expertise to value-added businesses. Modelled on successful market

development associations and research organizations in the metals industry, Nova Scotia could potentially support a Gypsum Centre of Excellence (Ward, 2012).

Such a Centre of Excellence would provide a critical mass of professionals that could provide independent advice, technology, information and services related to all aspects of gypsum and gypsum-related businesses.

## Materials for 3D Printing

A new potential market for gypsum is as a material for 3D printing. This ‘disruptive’ technology could create new demand for gypsum worldwide and could help architects to realize the dream of custom designing rooms for large buildings (Bruce, 2013).

In 1894, gypsum wallboard was a ‘disruptive’ technology. However, it only became widely used in the 1950s (Bruce, 2013). Similarly, gypsum that is ground to 20 µm and specially formulated to be load-bearing, conductive and insulating could also become the disruptive technology in the 21<sup>st</sup> Century. Such a material could potentially be used to ‘print’ entire rooms. These custom-designed rooms could then be assembled ‘Lego-style’ to create an entire building. For architects, this idea opens up a whole range of aesthetic possibilities and has the potential to lower the cost of buildings by an estimated 20% (Bruce, 2013).

## Conclusions

The marketing and communications strategy described here could potentially increase the level of interest in Nova Scotia’s gypsum resources. The impact of the progress made in 2013 is difficult to assess. Once the conference delegates that were contacted at the 13<sup>th</sup> Global Gypsum Conference have taken the time to assess the large volume of technical information provided, they may act independently of DNR to acquire gypsum from existing producers or to acquire gypsum rights in the province for their own use. In 2014, the author will follow-up on the contacts made to measure the effectiveness of this approach.

## Recommendations

Reducing Nova Scotia’s dependence on a single end-use application of gypsum would support the long-term development of the province’s gypsum resources. One way to accomplish this would be to encourage businesses that can add value to natural gypsum in non-traditional end-use applications. In order to accomplish this, it is recommended that the Mineral Resources Branch continue to encourage opportunities for growth in gypsum value-added markets and continue to communicate these opportunities to both the producers and end-users of Nova Scotia gypsum. The 14<sup>th</sup> Global Gypsum Conference will be held in Berlin, Germany in October 2014. This would be an excellent opportunity to make a presentation to delegates on the quality and extent of gypsum resources in Nova Scotia.

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