

Identification and Economic Assessment of Business Opportunities that Could Add Value to Nova Scotia's Gypsum Resources

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Introduction

Nova Scotia's gypsum resources are second to none in North America in terms of quantity and quality. Annual production, at its peak in 2005, amounted to about 9.6 million tonnes, accounting for more than 90% of Canada's total gypsum output. In that year, Canada ranked fourth (by weight) among gypsum-producing nations of the world.

In 2008, the dual impact of competition from synthetic gypsum (a byproduct of coal-fired electric generating plants), the sub-prime mortgage crisis in the United States and subsequent drop in new housing starts, combined to reduce gypsum production in Nova Scotia. By 2011, output was less than 3 million tonnes and Canada placed fifteenth among producing nations (Fig. 1). During the same time period, however, demand for gypsum world-wide grew at an average rate of about 3% per year.

With three gypsum mines on care-and-maintenance status, including Bailey, Miller Creek and Melford, and one being reclaimed (Sugar Camp) in 2011, the Mineral Resources Branch decided to rethink how the province's gypsum resources are developed and used. The intent was to create opportunities for developing a value-added industry over the next 5-10 years that is sustainable over the long term.

Background

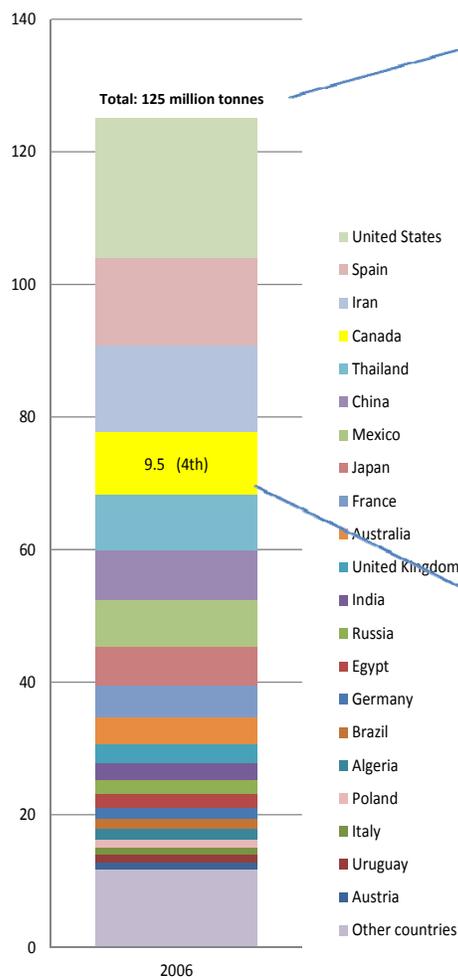
The gypsum resources of Nova Scotia are hosted in the Early Carboniferous Windsor Group and occur near to surface at numerous locations throughout the province (Adams, 1991). This, and the fact that they tend to be of high quality (> 98%

$\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ in some locations), has resulted in profitable development over a significant period of time. Initially, 200 years ago, gypsum was quarried in Nova Scotia on a small scale for the benefits that calcium sulphate dihydrate brings to agricultural soils (e.g. Adams, 1991), including buffering pH of acidic soils, reducing high salt levels in alkali soils, neutralizing aluminum and magnesium toxicity in soils, improving soil structure, and improving nutrient availability for better crop growth (Shaw, 1992, 1993; Ward, 2012).

Since the invention of wallboard in the U.S. in 1894, however, the province's gypsum resources have been mined on a large scale almost exclusively for this single end-use application. Only a small percentage of total production goes to the manufacture of cement. Three large U.S.-based wallboard manufacturing companies (USG Corporation, Georgia-Pacific and National Gypsum) have mined gypsum in Nova Scotia in order to provide high-quality raw material at low cost to supply their wallboard-manufacturing plants. These plants are located close to cities in the United States where demand for wallboard is high. This meant that the majority of gypsum mined in Nova Scotia was exported as low-value, raw rock. In addition, this dependency on a single end-use application and a single geographic market meant the Nova Scotia gypsum mining industry was vulnerable to competition from substitute materials and to fluctuations in the U.S. housing market.

Meanwhile, gypsum is used around the world in many different end-use applications, including: agricultural soil additives, ground control, absorbent products and several non-wallboard architectural applications such as floor screeds and decorative elements. In order to make Nova Scotia

Global Natural Gypsum Production 2006
(millions of tonnes)



Global Natural Gypsum Production 2011
(millions of tonnes)

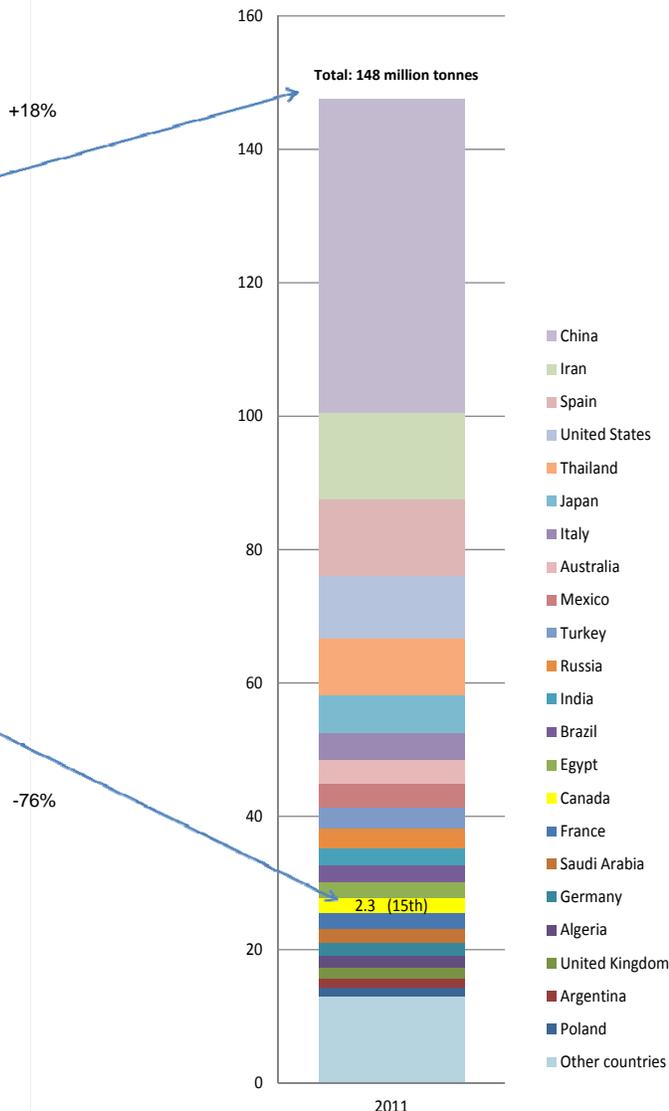


Figure 1. Global gypsum production by country in 2006 and 2011. Note that while world production has increased, Canada's gypsum production has dropped to 1/4 of 2006's level.

less vulnerable to down-turns in demand from a single end-use application or regional market, gypsum businesses could be encouraged to make products in Nova Scotia in addition to wallboard for export to international markets. Diversification of the end-use applications for Nova Scotia gypsum and the building of capacity to add value to gypsum in Nova Scotia prior to export could contribute to a more sustainable industry over the long term.

Creating value-added activities related to gypsum in the province has several economic advantages. These activities would bring many more jobs, and the resultant expertise developed could be used to bring further business revenue to the province. The intellectual content created could be leveraged into the development of new technology and technology transfer activities for the expanding global gypsum market.

Methods

In early 2012, the Mineral Resources Branch of DNR addressed the challenge of the future of gypsum production and use in the province (Fig. 2). The first step was to identify stakeholders, and technical and marketing experts. They were invited to a one-day strategy session where they could meet and discuss the issues. The objectives of that session, which was held in Halifax on February 23, 2012, were to provide an understanding of the future of gypsum supply and demand; develop a strategy to achieve the overarching objective of reviving gypsum mining in Nova Scotia and to make it more sustainable over the long term; and to identify and prioritize projects and actions to implement the strategy (actions that can be initiated in 6 to 12 months) to increase demand in traditional markets and to supply new markets over the long term.

The session was chaired by the author, who provided an outline of recent developments in the industry that precipitated the current situation; Dr. Robert Ryan of the Mineral Resources Branch provided a summary of gypsum supply by describing the geology of gypsum deposits in Nova Scotia; Dr. Robert Bruce of Innogyps and Kent Ward of Gypsum Consulting Services Inc. provided a summary of global demand trends; Keith Robertson, an architect with Solterre Design, explained the details of the Leadership in Energy and Environmental Design (LEED) program and how it relates to gypsum in architecture; and representatives of the province's gypsum producers and users provided their perspectives on the industry and outlook for gypsum markets. Based on the unique properties of gypsum, potential new markets and applications were discussed by all and a list of action items was developed.

The next step in the process, which is planned to take place in 2013, is to develop detailed five-year business plans for the highest priority business opportunities identified by the strategy session. To facilitate this step, the Mineral Resources Branch (MRB) in April and May of 2012 presented a briefing on the outcomes of the strategy session to directors in the Nova Scotia Department of

Agriculture and to staff and directors in the Department of Economic and Rural Development and Tourism (ERDT). MRB also approached five local gypsum businesses, briefed them on the process, and canvassed their interest in participating in an assessment of the economic feasibility of the two top priority businesses: agricultural soil additives and absorbent products.

Other value-added businesses that presently exist elsewhere in the world that could be viable in Nova Scotia include: ground control applications (subsidence prevention and slope stability) and architectural applications other than wallboard (self-leveling floors and decorative elements). It is anticipated that work on the five-year business plans will be completed in the first half of 2013.

Conclusions

Several factors suggest that an export-oriented, value-added gypsum industry could be developed

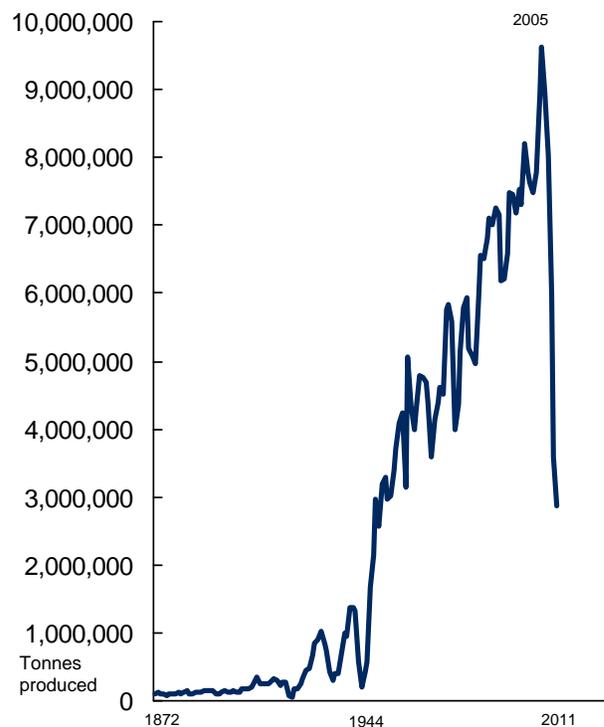


Figure 2. Nova Scotia gypsum production from 1872 to 2011. Note the peak of production in 2005 (9.6 million tonnes) and the 2011 trough (2.4 million tonnes).

in Nova Scotia over the next five to ten years. First, Nova Scotia has the natural advantage of hosting the Windsor Group gypsum deposits, which occur close to surface in many areas of the province where gypsum quarries could be economically developed. Second, Nova Scotia has access to natural gas, which could provide a low-cost energy source for calcining gypsum for various value-added, end-use applications. And third, Nova Scotia has an educated, talented workforce that could be engaged in making this industry a success.

Based on the outcomes of the strategic approach described above and the support expressed by local business leaders for this project, we are optimistic that gypsum value-added businesses can be successfully developed in Nova Scotia and sustained over the long term.

References

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