# Study of Potential Mode Shift Associated with ECA Regulations In the Great Lakes

Prepared for the

**Canadian Shipowners' Association**

by the

**RESEARCH AND TRAFFIC GROUP**


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# Executive Summary

### Introduction/Background

The U.S. Environmental Protection Agency (EPA) has announced its intention to extend the emissions control areas (ECA), now in effect on the U.S. west coast and east coast, to inland waters. The regulations call for reducing sulphur content in fuel to 1% in 2012 and 0.1% in 2015. The current CSA fleet average sulphur content is 1.7%. The supply industry has told the CSA that no blends can achieve the 1% target. The ECA regulations will force the industry to move from residual fuel oil to refined diesel fuel by 2012, with an associated significant increase in fuel costs. The lake carrier industry is concerned that this fuel cost increase will result in a mode shift from marine to other modes (road and rail) with higher GHG emissions and accident rates. The CSA is concerned that mode shifts could reduce or negate the intended emissions reductions of the regulatory initiative as well as having other unintended negative impacts. The objectives of this study are to assess the potential for mode shift and diminished global competitiveness of key industries as a consequence of operating cost increases for marine operators if ECA regulations are introduced in the Great Lakes/ Seaway area.

The CSA believes it will have to move to 100% marine diesel oil (MDO) by 2012 and to marine gas oil (MGO) by 2015. While all marine vessels use MDO or MGO for auxiliary engines while in port, only a small proportion of the Canadian fleet operating in the GLSLS use MDO or MGO for propulsion. Most vessels use a blend of heavy residual fuel oil (bunker C) and distilled MDO for propulsion. The distillate MDO and MGO fuels are sold at a premium to the residual bunker C fuel and the blended fuels reflect that price difference. MGO has a price premium over MDO at international locations but is close in price to MDO on the Great Lakes. Both MDO and MGO are close in characteristics to highway fuels and consequently exhibits higher price volatility than do the marine blended fuels.

A fleet-average fuel cost increase of 49% for MDO would result for average 2008 fuel prices. If only a very narrow range of distillate is acceptable under post-2015 ECA, it is probable that it would be sold at a premium over historic MDO prices. We refer to this hypothetical premium fuel distillate as MGO-P with an estimated $100/tonne premium. The associated average rate increases of 11% and 14% for MDO and MGO-P respectively. These numbers would vary by vessel and carrier. Vessels using bunker C would experience an 86% fuel cost increase and a rate increase of 20% in moving to MDO. Considering the different fleet compositions of the individual carriers, the fuel cost increase under the average 2008 price scenario ranges from a low of 40% to a high of 58% with 100% MDO.

Marine costs were developed for the base case and for the two post-ECA scenarios. The first case (ECA-Avg) uses fleet-average fuel cost impact for MDO leading to an average rate increase of 11%, while the second (ECA-Hi) applies a 20% rate increase, which can be interpreted as either the rate necessary for specific vessels in the fleet, or an increase in ballast movements due to mode shift and/or market impacts on shippers added to the average fuel-related rate increase. Mode shifts were estimated for competitive trades using fuel price cross-mode elasticities derived from a mode shift analysis undertaken by Transportation Economics & Management Systems (TEMS) for the U.S. Maritime Administration.

**Mode Shift Impacts**

The most vulnerable commodity movement is aggregate/stone where marine rate increases may result in both metallurgical and construction industries sourcing product from local land based quarries instead of from more distant sources served by marine transportation. A mode shift to truck in the order of 20% could result. The aggregate market for the Canadian GLSLS fleet has averaged 9 million tonnes per year over the last decade. Since the economics of these quarries are tied to high volume production, and significant loss of market share could induce a downward spiral of operations cost increases and further loss of market share. The long term impacts for mode shift from marine to truck transport from local quarries could escalate beyond the predicted 20% under such conditions.

The ECA induced rate increases for grain will give rail a short term cost advantage, which would lead to some modal shift to rail delivery to Quebec City and Montreal and alternate export routings via rail deliveries to the port of Churchill (serving Western Europe, North Africa and the east coast of South America) and the West Coast (serving some eastern markets such as Mexico). The current rail car fleet is sized to carry grain in peak seasons to the terminal elevators at Vancouver, Prince Rupert, Thunder Bay and Churchill. While Churchill could be serviced as a substitute for Thunder Bay with the existing fleet, Churchill has a lower storage capacity. Any long term shift of grain to rail for direct service to lower river ports would require additional rail cars. To invest in a larger fleet of covered hoppers, the railways would probably want a long-term contract from the CWB (and the private grain companies if the movement involves non-Board grains). These factors could mitigate the likelihood of mode shifts in excess of 12%.

For petroleum products, the main cost of ECA will be the opportunity cost of not recapturing market share from rail rather than losing additional market share. There is also a potential opportunity cost of the petroleum industry not pursuing rationalizatin of the North American distribution system with more cross-border shipments under a higher marine cost scenario. These opportunity costs were roughly estimated to be in the order of the 11.3%.

**Global Competitiveness**

Meldrum Bay, ON, Calcite, MI and other aggregate producers that are located on the GLSLS system but not near high population areas would suffer from ECA induced rate increases. Similarly, the shift of grain traffic away from Thunder Bay could have competitiveness consequences. Any diversion to rail would further imperil already underutilized grain company assets at Thunder Bay.

Increased rates for iron ore and coal will not be welcomed by the steel industry but are unlikely to have any short term effect on steel production at existing mills. However, if there is to be a longer-term rationalization of steel production within the global corporations increased delivered cost of raw materials would be one factor among many influencing decisions. A rate increase of 10% or more is considered to be an influencing factor.

# Table of Contents

## List of Figures



## List of Tables

# 1 Introduction

The U.S. Environmental Protection Agency (EPA) has announced its intention to extend the emissions control areas (ECA), now in effect on the U.S. west coast and east coast, to inland waters. This move will effectively apply to all commercial vessel movements in the Great Lakes/Seaway, including movements between two Canadian ports because vessels transiting within the Great Lakes/Seaway cross the Canada/U.S. border regularly both in the MLO[1] and while operating on the lakes.

The regulations call for reducing sulphur content in fuel to 1% in 2012 and 0.1% in 2015. No current blended fuels in use are at 0.1%. The current bunker fuel range is 1.6-2.7% sulphur and this is blended with various proportions of marine diesel oil (MDO). The current CSA fleet average sulphur content is 1.7%. The supply industry has told the CSA that no blended fuels can achieve the 1% target. There is also some question of whether 0.1% can be met for 100% MDO — a more narrowly refined distillate (possibly marine gas oil (MGO)), with a further price premium would be required by 2015.

The ECA regulations will force the industry to move from residual fuel oil to refined diesel fuel by 2012, with an associated significant increase in fuel costs. The lake carrier industry is concerned that this fuel cost increase will result in a mode shift from marine to other modes (road and rail). Since the lake carriers have the highest tonne-km efficiency, lowest non-sulphur emissions and lowest accident rate of the modes, the CSA is concerned that mode shifts could reduce or negate the intended emissions reductions of the regulatory initiative as well as having other unintended negative impacts. Also, there is concern that an increased cost of fuel could lead to a reduction in steel production around the lakes, a reduction in CSA members' major cargo flows and a diminution of the lakes carrier industry.

The objectives of this study are to assess the potential for mode shift and diminished global competitiveness of key industries as a consequence of operating cost increases for marine operators if ECA regulations are introduced in the Great Lakes/ Seaway area.

The timelines imposed by the EPA for the CSA to comment on the proposed ECA regulations preclude a detailed analysis and led to a focus on specific trades within a few key industries to gauge the potential for mode shift. Also, the U.S. fleet's operations were not included in the analysis.

# 2 Background

In addition to its low GHG emissions and low accident rate, the marine mode offers the lowest transportation costs per tonne-km of any mode. This is particularly true in open waters, where the only infrastructure requirements are navigation aids. When canal and lock infrastructure is required to facilitate marine movements, the allocated capital and operating costs are directly dependent on the overall utilization of those assets. While vessel operating costs are low on a tonne-km basis, capital costs of marine vessels are much larger on a per-vessel basis than trucks; and, while they have a longer life, the investment decision involves the risks of market forecasts of asset utilization over that

[1] Montreal-Lake Ontario section of the St Lawrence Seaway. Two locks are in the United States.

longer life. Salties have some flexibility in markets/routes over their lifetime, whereas lakers are dependent on the industries within the GLSLS system. The added uncertainties for laker vessels lead to a higher rate of return on invested capital than is required for truck and rail equipment purchases. As a consequence, renewal of these long-life assets is very much influenced by the stability of the economic environment in which they work and the future health of the industries they served.

While marine vessels have a lower transportation cost per unit distance than rail or truck, marine vessels often lack direct access to both originator and receiver of shipments. In such cases, the shipper must rely on other modes to do the final pickup and/or delivery. The transfer costs involved in moving the product between the originating and/or delivery mode and marine vessels can be significant; and the shorter the journey, the less opportunity there is to offset these transfer costs with the per-distance savings marine vessels have. In addition, the slower speed, larger shipment sizes and in some cases seasonal shutdowns in the marine industry leads to higher inventory carrying costs by the shipper and/or receiver of the goods. Similarly, transfer and inventory costs are generally higher when rail is used when compared with truck. However, when goods are received by rail rather than by marine, transfer and inventory costs can be reduced. Consequently, truck has an advantage over both rail and marine for short distance trips, rail has an advantage over truck and marine for medium distance trips and marine has an advantage over truck and rail for long distance trips. All these factors influence the mode-shift potential for specific trades.

The total cost versus distance profile of the three modes is illustrated in Figure 1. The breakeven distances will vary by value, density and packaging of product. Low value products that can use automated loading/unloading such as coal and grain will have much shorter breakeven distances than will high value, light weight manufactured goods. The figure is only illustrative as each mode has different routes for the same OD, and marine, which is the most constrained of the three modes often has a more circuitous route.

Figure 1 shows that the rail mode is the closest cost competitor for marine traffic. A shift in marine costs will lengthen the travel distance for which rail is the lower cost mode. Trucks seldom compete with marine for the long distance shipments but can be competitive for alternate sources of the product being shipped that are closer to the destination than the marine source. An increase in marine costs would make truck more competitive for these shorter distance alternate sources. In addition to these impacts on existing marine markets, a significant increase in marine costs would limit the sector's ability to attract mode shifts if it attempts to pursue short sea shipping shorter distance more service sensitive movements.

Marine’s cost structure has led to large market share in low value, bulk commodities that involve low transfer costs and low inventory costs. Industries such as steel that are dependent on significant quantities of raw materials, locate plants near the water to minimize the transfer costs from marine vessels. Other bulk commodities such as grain and coal require gathering by other modes and transfer facilities from land-modes to marine.

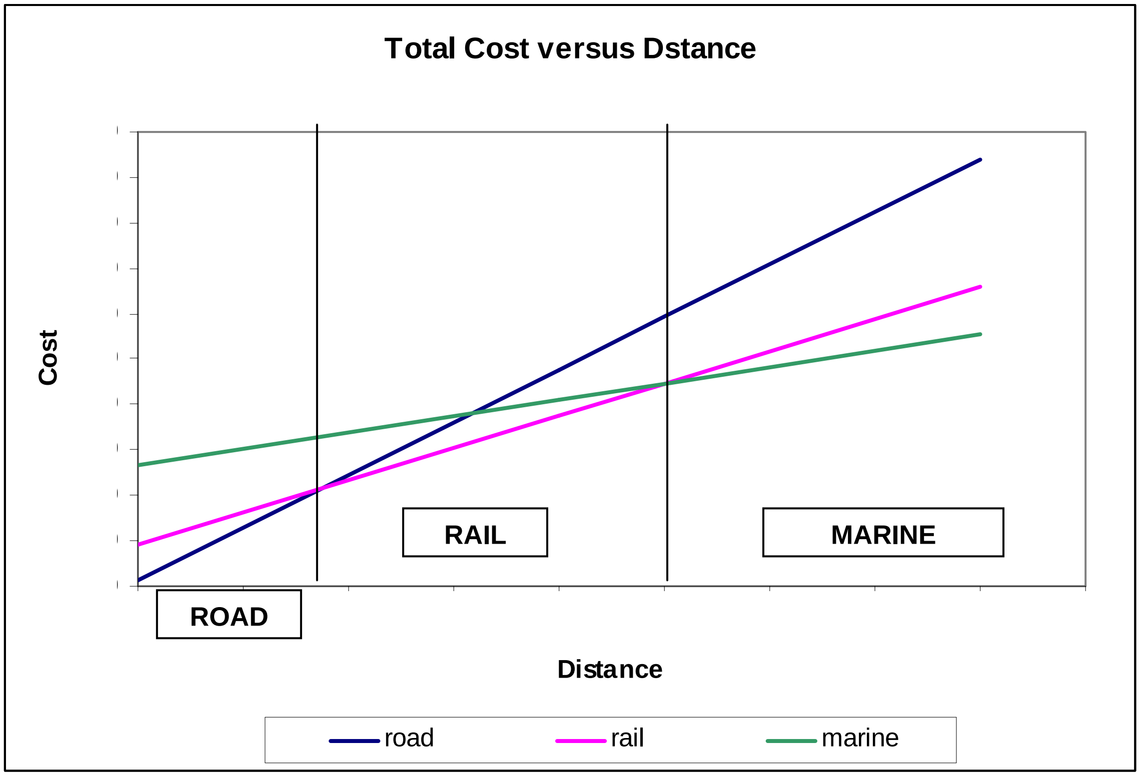



**Figure 1, Surface Modes' Simplified Cost/Distance Profiles.**

# 3 ECA Impact on GLSLS Costs

## *3.1 Composition of the Canadian Fleet*

The Canadian fleet differs from the U.S. fleet in both fuel usage and vessel capacity. A much higher portion of the U.S. fleet is operating on MDO. The Canadian fleet is largely composed of Seaway and Seaway-max sized vessels, which are designed to get efficiencies in transiting the Seaway lock systems. The U.S. fleet is largely composed of laker vessels that are too large to pass through the Seaway locks and smaller vessels that serve smaller ports. Only three of the U.S. large bulker vessels can transit the Welland Canal. Thus the U.S. fleet is focused on the Great Lakes whereas the Canadian fleet is more focused on travel through the Seaway. The CSA indicated that only 10% of the Canadian fleet's trades are within the upper Great Lakes, 20% transit the Welland Canal and 70% transit the MLO. There are some U.S.-Canadian fleet synergies for lake head to lower river trades where larger U.S. vessels transit the lakes and transfer to Canadian vessels for the move through the Welland and MLO locks to St. Lawrence river ports.

While all marine vessels use marine diesel oil (MDO) or marine gas oil (MGO) for auxiliary engines while in port, only a small proportion of the Canadian fleet operating in the GLSLS use MDO/MGO for propulsion. Most vessels use a blend of heavy residual fuel oil (bunker C) and distilled MDO for propulsion. The blended intermediate fuel oils

(IFO) are graded by viscosity. The range and composition of intermediate fuel oils used by the Canadian fleet for propulsion are:

| | |
|---|---|
| Bunker C | 100% bunker C, |
| IFO 380 | 93% bunker C, 7% MDO |
| IFO 180 | 86% bunker C, 14% MDO |
| IFO 60 | 70% bunker C, 30% MDO |
| MDO | 0% bunker C and 100% MDO |

Table 1 illustrates the distribution of vessel fuel usage in 2008 for the principal Canadian operators in the GLSLS. The proportion of MDO usage includes the auxiliary engine usage by those vessels that use IFO fuels for propulsion. While the U.S. fleet was not included in this analysis, we were told that 10 U.S. vessels use 100% Bunker C.

**Table 1, Distribution of Vessels and Fuel Consumption for the CSA members' GLSLS Fleet**

| Fuel Type | Bunker C* | IFO 380 | IFO 180 | IFO 60 | IFO 30/40 | MDO | Total |
|---|---|---|---|---|---|---|---|
| **Number of Vessels** | 6 | 13 | 33 | 5 | 3 | 8 | 68 |
| **Proportion of Vessels** | 9% | 19% | 49% | 7% | 4% | 12% | 100% |
| **Proportion of Consumption** | 11% | 16% | 57% | 9% | 5% | 15% | 100% |

* while vessels on bunker C are 9% of the total fleet, they are 12% of the bulker fleet.
Source: Derived from data provided by the CSA

## *3.2 Fuel Price Differences*

The distillate MDO and MGO fuels are sold at a premium to the residual bunker C fuel and the blended fuels reflect that price difference. MGO has a price premium over MDO at international locations but is close in price to MDO on the Great Lakes. MDO and MGO are very close in characteristics to highway diesel fuel and consequently exhibits higher price volatility than residual fuel. If only a very narrow range of distillate is acceptable under post-2015 ECA, it is probable that it would be sold at a premium over historic MDO prices. We refer to this hypothetical premium fuel distillate as MGO-P with an assumed $100/tonne premium. This is a conservative estimate in relation to the US$100 premium recently estimated in a Lloyd's List article:[2]

> *"Most recent estimates peg demand for LSFO from 2010 and 0.1% distillates from 2015 in European ECAs at around 20 million tonnes. If the additional refining costs referenced by the EC are averaged out over the five years between 2015 and 2020 at $15.15bn and are amortized over 10 years (2010 to 2020) then an investment of $1.515bn per annum, equivalent to a premium of $75.7 per tonne of fuel sold over that period, is required. If the costs of sourcing and producing the fuel are added to that figure then it is probable that refiners will face production bills of well over $100 per tonne over a ten-year period; in line with claims made over two years ago by Concawe."*[3]

[2] Craig Eason, *Sulphur Reductions to Add $23.2bn to Refineries' Costs*, Llloyd's List, June 8, 2009.

[3] Concawe is an oil industry's European association focusing on environmental issues.

Table 2 compares the different fuel prices for the average of 2008 and for two specific days (June 7, 2008 and July 10, 2009). As illustrated in the last column, the average price of MDO was 86% higher than bunker C in 2008 and the price premium for MDO increases with the average price of fuel.

**Table 2, Marine Fuel Price Variations at Sarnia and MGO-P projections ($/tonne)**

| Reference Period | Measure | Bunker C | IFO 380 | IFO 180 | IFO 60 | MDO | MGO-P* |
|---|---|---|---|---|---|---|---|
| **2008-Average** | Price | $488 | $506 | $523 | $585 | $906 | $1,006 |
| | %-Bunker-C | 100 | 104 | 107 | 120 | 186 | 206 |
| **June 7, 2008** | Price | $616 | $630 | $679 | $726 | $1,330 | $1,430 |
| | %-Bunker-C | 100 | 102 | 110 | 118 | 216 | 232 |
| **July 10, 2009** | Price | $461 | $475 | $495 | $542 | $686 | $786 |
| | %-Bunker-C | 100 | 103 | 107 | 118 | 149 | 170 |

* Estimated post-2015-ECA marine fuel sold at a $100 premium to historic MDO prices.
Source: Canada Steamship Lines from publicly posted price at Sarnia for other than MGO-P.

We assessed the cost increase of switching to 100% MDO in 2012 for the GLSLS fleet's fuel consumption in 2008 and using the prices shown in Table 2. We also assessed the incremental costs for the scenario of moving to a premium MGO-P fuel in 2015. We then estimated the impacts on average daily costs (and rates) by applying the various fuel costs to the 2008 average daily fuel consumption, and using an estimated average daily time charter cost of vessels with a 10% increment for trade costs (stevedoring, pilots, seaway tolls, tugs). The resulting increase in fuel costs and estimated rate impacts are summarized in Table 3.

**Table 3, Average Increase if the GLSLS Canadian Fleet switched to MDO or MGO-P**

| Fuel Price Reference | MDO (2012) | | MGO-P* (2015) | |
|---|---|---|---|---|
| | Fuel Cost Increase (%) | Required Rate Increase (%) | Fuel Cost Increase (%) | Required Rate Increase (%) |
| Average 2008 | 49 | 11 | 66 | 14 |
| June 7, 2008 | 63 | 17 | 76 | 21 |
| July 10, 2009 | 28 | 6 | 47 | 9 |

* Estimated post-2015-ECA marine fuel sold at a $100 premium to historic MDO prices.

The numbers in Table 3 reflect fleet-average conditions and would not necessarily apply to any specific vessel or trade. For example; while the first data row indicates a fleet-average fuel cost increase of 49% for average 2008 fuel prices, vessels using bunker C would experience an 86% fuel cost increase. Similarly, vessels using bunker C would require a rate increase of 20% under 2008 fuel prices, almost double the 11% shown in the table for fleet-average conditions. Also, considering the different fleet compositions of the individual companies, the fuel cost increase under the average 2008 price scenario ranges from a low of 40% to a high of 58%.

These are the direct cost/rate impacts of applying ECA to the GLSLS fleet. There are potential secondary impacts. If the rate increases lead to loss of market share from GLSLS carriers to other modes/routes or loss of business volume by shippers, there will be potential reductions in filling vessels on return trips of specific trades or on average fleet utilization across all trades. For example an increase in ballast travel distance from

30% to 50% of loaded travel distance would increase costs by another 10%. It is possible that the average resulting rate increase for the fleet would be in the range of the maximum exhibited for those vessels on bunker C. In addition, the more stringent 2015 requirement of 0.1% sulphur, which could require a move to premium distillate (MGO-P), would increase the average rate from 11% to 14%. Thus, the 20% rate increase experienced by those specific vessels on specific trades could also represent the average increase expected under some scenarios (e.g. if there are losses in key trade volumes, higher crude oil prices and post-2015-ECA fuel premiums). In our impact of potential mode shift, we use these two reference increases.

# 4 Mode Shift Assessment

The methodology used was a combination of literature review, quantitative analysis of competitive services and interviews with shippers and carriers to assess the relative impact and potential for mode shift resulting from ECA-induced cost increases.

The presence of modal competition was assessed by applying modal cost models, reviewing published rates where available and obtaining confidential rates via interviews. Confidential rates were used as a check of reasonableness of estimated costs and were not used directly in the assessments. Nonetheless, since confidential information was provided, all cost comparisons are made on a normalized basis such that absolute rates are not disclosed.

## *4.1 Quantitative Assessment*

Transportation Economics & Management Systems (TEMS) assessed the mode shift impact of fuel price increases in seven areas, including the GLSLS system.[4] Service attributes such as delivery time and frequency of supply are important for high value goods and were used in TEMS's analysis of containerized cargo. However, the existing marine trades within the GLSLS are bulk commodities which are extremely price sensitive and consequently, price is the main determinant in assessing mode shift for existing GLSLS traffic. TEMS evaluated bulk commodities in less detail, but concluded that the GLSLS (along with the Mississippi and Gulf Coast) has the best opportunity for mode shift from rail to marine under an increasing fuel price scenario.

TEMS illustrated elasticities (i.e. the percentage change in marine shipments for a given percentage change in fuel price) were scaled from the reported mode-shift plot for grain and [petroleum. The resulting elasticities were 0.38 for grain and 0.35 for petroleum (crude and products). Thus, for example a 100% increase in fuel price to both rail and marine modes was predicted by TEMS to produce a 38% increase in marine grain traffic and a 35% increase in liquid bulk traffic.

The predicted mode shift is due to the higher energy intensity of rail compared with marine. TEMS cites an Inland Rivers Ports and Terminals Association (IRPT) website in its comparison of relative efficiency, where barges were compared with carload rail

4 Transportation Economics & Management Systems, INC., *Impact Of High Oil Prices On Freight Transportation: Modal Shift Potential In Five Corridors Technical Report*, Maritime Administration, U.S. Department of Transportation, October 2008.

freight.[5] Rail's energy intensity was indicated to be 2.5 times that of marine. Thus, the fuel price elasticity for mode shift of bulk materials is levered by a 2.5 rail/marine energy intensity multiple. In our assessment of the impact of a price increase that only affects marine, this rail/marine multiplier is not at work. The fuel elasticities for a fuel price increase that only applies to marine (e.g. following ECA regulations) would be 0.243 and 0.225 for grain and petroleum respectively. TEMS' elasticities can be used to estimate the mode shift away from marine to rail in the GLSLS due to a marine fuel price increase. Thus, for example a 100% increase in marine-only fuel costs would produce a 24.3% loss of grain traffic and a 22.5% loss of petroleum traffic for the TEMS elasticities. We used these elasticities as a guide in estimating the impact on trades where modal competition exists.

Table 4 summarizes the TEMS-based mode shift potential for competitive trades under the projected cost and rate increases shown previously in Table 3. As illustrated in Table 4, the potential shifts on competitive routes with an average 2008 fuel price reference (first data row) are: 12% in 2012 with 100% MDO and 16% in 2015 with MGO-P for grain; and 11% in 2012 with 100% MDO and 15% in 2015 with MGO-P for petroleum.

**Table 4, Rate increase and Mode Shift Potential on Competitive Routes**

| Fuel Price Reference | MDO (2012) | | | MGO-P* (2015) | | |
|---|---|---|---|---|---|---|
| | Required Rate Increase (%) | Potential Modes Shift (%) | | Required Rate Increase (%) | Potential Modes Shift (%) | |
| | | grain | petroleum | | grain | Petroleum |
| Average 2008 | 11 | 12 | 11 | 14 | 16 | 15 |
| June 7, 2008 | 17 | 15 | 14 | 21 | 18 | 17 |
| July 10, 2009 | 6 | 7 | 6 | 9 | 11 | 11 |

* Estimated post-2015-ECA marine fuel sold at a $100 premium to historic MDO prices.

## *4.2 Interview Process*

We interviewed representative shippers and receivers of bulk commodities selected by the client. Many were conducted in person with others by telephone. Interview guides were prepared in order to ensure consistency but discussions with interview subjects were conducted in an open-ended manner in order to gather as much information as possible.

Each respondent was offered a confidentiality agreement and asked to identify any information disclosed that was considered confidential. In all cases respondents received drafts of the interviewer's notes and confirmed their accuracy. Regardless of the offer of confidentiality most respondents considered specific rate information to be too sensitive to disclose. Tonnage information was provided in most cases but specific origin/destination information was often identified as confidential. While the consultant has used the data provided to offer some conclusions about the potential consequences of the proposed fuel regulations the confidentiality agreements preclude disclosing all the calculations by which they have been developed.

5 http://www.irpt.net/irpt.nsf/LinksView/EnvironmentalAdvantages?Opendocument

The primary objective of the shipper/receiver interviews was threefold:

- Determine the extent to which increases in marine freight rates may cause diversion to another transportation mode.
- Determine the extent to which increases in marine freight rates may cause a shift to alternate sources of material.
- Determine the extent to which increases in marine freight rates may influence the competitiveness of the client's end product and/or cause the product to be produced or sourced elsewhere.

## *4.3 Major Commodity Movements by the Canadian Fleet*

Table 5 provides the quantities (tonnes) and associated work-load (tonne-km) of the various product categories carried by the Canadian GLSLS fleet in 2008. Iron ore is the largest category by both quantity and work-load. Coal is the second highest quantity and third highest work-load and grain is the third highest work-load but ranks 6$^{th}$ in quantity.

Many of the commodity trades have scheduling interdependencies as the carriers try to minimize ballast movements to sourcing ports. The strongest traditional interdependence has been between grain from Thunder Bay and Duluth[6] to ports in the lower river and iron ore return shipments from the lower river to steel mills in the lakes. Salt and stone, also offer movement synergies. Tanker product carriers have fewer opportunities for backhaul than do the dry bulk carriers.

**Table 5, GLSLS Canadian Fleet Cargo Volumes 2008**

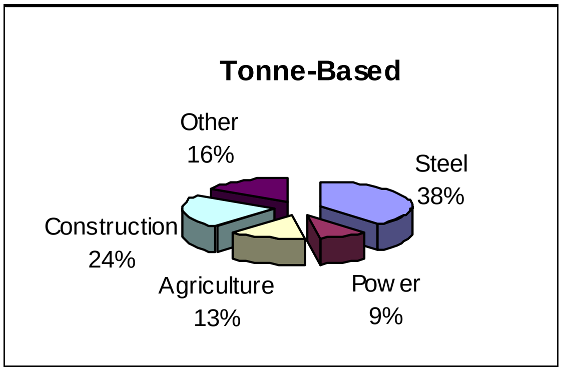
| Product | Tonnes | % | Tonne-km (000) | % |
|---|---|---|---|---|
| Cement | 811,374 | 1.3 | 1,183,165 | 1.6 |
| Coal | 13,111,126 | 21.1 | 10,645,455 | 14.6 |
| Coke | 1,882,559 | 3.0 | 3,472,347 | 4.8 |
| General Cargo | 96,103 | 0.2 | 700,019 | 1.0 |
| Grain | 5,178,002 | 8.3 | 11,431,472 | 15.6 |
| Gypsum | 807,453 | 1.3 | 1,344,170 | 1.8 |
| Iron Ore | 16,908,934 | 27.2 | 24,747,107 | 33.9 |
| Limestone | 7,183,476 | 11.5 | 3,698,122 | 5.1 |
| Misc. Bulk | 1,947,863 | 3.1 | 1,861,665 | 2.5 |
| Potash | 255,226 | 0.4 | 328,456 | 0.4 |
| Salt | 8,239,788 | 13.2 | 6,223,059 | 8.5 |
| Tanker Products | 5,802,325 | 9.3 | 7,433,489 | 10.2 |
| TOTAL | 62,224,229 | | 73,068,525 | |

Source: Canadian Shipowners' Association, *2008 Annual Report.*

Figure 2 illustrates the estimated distribution by industry served by the Canadian GLSLS dry bulk fleet. The left chart is tonnage based while the right chart is vessel-day or tonne-km based. As indicated, steel is the largest industry sector by both measures,

[6] At present most U.S. western grain exported through the GLSLS moves in Canadian registered lakers to transfer elevators in the lower St Lawrence for elevation, storage and then shipment overseas by salty.

while construction is the second largest by tonnage and agriculture is the second largest by vessel-days or tonne-km.



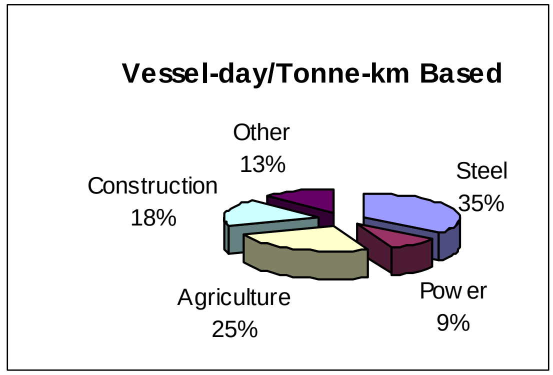




**Figure 2, Industry Breakdown of the GLSLS Dry Bulk Movements**
Source: Canadian Shipowners' Association

Some of the existing markets are not susceptible to mode shift. For example, much of the iron ore is shipped from Sept Iles and Port Cartier, which do not have access to the mainline rail network. The impact of price increases to these movements would be on the global competitiveness of the steel companies that ship the iron ore.

Some of the grain is shipped from Thunder Bay to transfer elevators in Port Cartier and Baie-Comeau, which are not accessible by rail.

The specific trades assessed were:

Grain (Thunder Bay to Quebec City and to Montreal)

Salt (Goderich/Windsor to Toronto)

Stone and aggregate (Manitoulin to Cleveland)

In addition, petroleum products were assessed at a cursory level. Each is discussed in turn in the following sections.

# 5 Grain Assessment

## *5.1 Canadian Grain Exports*

Canada is a major producer and exporter of grain. Most of the grain exported from Canada is grown in the prairie provinces of Manitoba, Saskatchewan and Alberta and is primarily transported by rail to terminal elevators at Vancouver, Prince Rupert, Thunder Bay and Churchill. Exports via Vancouver, Prince Rupert and Churchill go directly overseas via ocean-going vessel (salty). Most grain loaded onto ships at Thunder Bay is transported by lakers to transfer elevators in the St Lawrence River for furtherance overseas by salty although some is loaded directly into salties for overseas shipment at Thunder Bay. In addition, grain is exported from prairie elevators by rail and truck directly to the United States and Mexico. Canadian Grain Commission (CGC) export data for primary grain types for the 2008-2009 crop year (to July 19, 2009) are contained in Table 6.

**Table 6, Exports of Western Canadian Grain by Type of Grain and Sector or Clearance Crop Year 2008-2009 Year to July 19, 2009 (000 tonnes)**

| EXPORTS FROM | Wheat | Durum | Oats | Barley | Flaxseed | Canola | Peas | Corn | Rye | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| Vancouver | 4,830 | 293 | 15 | 664 | 26 | 6,178 | 1,802 | - | 3 | 13,811 |
| Prince Rupert | 4,011 | 17 | - | 57 | - | 362 | - | - | - | 4,447 |
| Churchill | 424 | - | - | - | - | - | - | - | - | 424 |
| Prairie Elevators Direct/ | 989 | 541 | 1,288 | 582 | 80 | 881 | 1 | 3 | 25 | 4,388 |
| Thunder Bay Direct/ | 163 | 128 | 186 | 119 | 299 | 106 | 54 | - | - | 1,054 |
| Bay and Lake Ports/ | 165 | - | 0 | 0 | 0 | - | - | 12 | - | 178 |
| Montréal | 252 | 474 | - | 0 | - | - | 2 | 98 | - | 827 |
| Sorel | 112 | 30 | - | - | 124 | 113 | 9 | 17 | - | 405 |
| Trois-Rivières | 55 | 419 | - | - | - | - | - | - | - | 474 |
| Québec | 1,231 | 511 | - | - | - | - | - | 11 | - | 1,753 |
| Baie-Comeau | 307 | 922 | - | - | - | - | - | - | - | 1,229 |
| Port-Cartier | 982 | 175 | - | - | - | - | - | - | - | 1,157 |
| Halifax | - | - | - | - | - | - | - | - | - | 0 |
| Total | 13,522 | 3,508 | 1,489 | 1,421 | 530 | 7,639 | 1,867 | 141 | 28 | 30,145 |
| Same Period Year Ago | 11,286 | 3,099 | 1,913 | 2,888 | 513 | 5,334 | 1,637 | 527 | - | 27,196 |

Source: Canadian Grain Commission, *Grain Statistics Weekly: Crop Year 2008-2009, week ending July 19, 2009*, p.4
Note: Prairie elevators direct indicates grain shipped by rail and truck to the US and Mexico.

During the winter when the St Lawrence Seaway is closed, the Canadian Wheat Board (CWB) has a "winter wheat program"[7] whereby grain is delivered by direct rail in trainload quantities from *High Throughput Elevators* (HTEs) to the transfer elevators at Montreal, Trois Rivieres and Quebec. The volumes on this program during the winter of 2008-2009 were higher than usual.

***Western Canadian Grain through the Eastern System***

As the data in Table 6 indicate, the principal grains that route through the eastern system are durum wheat (for pasta, etc.) and milling wheat (for bread, etc.). In this report, we will concentrate on wheat and durum wheat.

Information gathered during the study process indicated that the prime determinant of grain shipments to the east or west is market location. Grain is not always available in the primary catchment area for the respective markets so there is some cross-hauling and the Canadian Wheat Board (CWB) told us that it attempts to minimize its extent of such cross hauling.[8]

Of the almost 3 million tonnes of durum exported offshore, all but about 310,000 tonnes went through the eastern system. It can also be seen that the main export points are elevators in the St Lawrence River. CGC data indicate that the largest volume of wheat (excluding durum) exported through the eastern system is Canada Western Red Spring (CWRS).[9]

[7] The Canadian Wheat Board, established under the *Canadian Wheat Board Act*, is responsible for the marketing of wheat (including durum) and barley grown in western Canada in Canada and around the world.
[8] Cross hauling refers to a situation where grain is located in an area that would normally route one way (e.g. via Vancouver) but because of market demand routes another way ( e.g. via Thunder Bay).
[9] Canadian Grain Commission, *Canadian Grain Exports, Crop Year 2007-2008*.

The primary markets for durum are Western Europe, North Africa and the east coast of South America. Major country markets for durum are Belgium, Italy, the Netherlands Algeria, Morocco, Tunisia and Venezuela. These markets are primarily served via the eastern system although shipments to Belgium, Africa and South America can also go via Churchill. Because of market location and other factors, it is expected that there will always be customers to be serviced via Thunder Bay, particularly in Europe and Africa. CGC data indicate that some customer's shipments can go either East or West, examples include Sudan, Brazil, Mexico and Venezuela. Amongst other factors, capacity at port and availability of ocean going vessels can play a role in routing decisions.

Crop volumes and quality vary from year to year and within regions in western Canada and these factors influence how and where the grain moves, as does international competition from other grain producing countries. Crops such as canola and lower grades of wheat consistently move via West Coast ports and most durum and substantial amounts of milling wheat goes through the eastern system and Churchill, all because of the markets served.

***Grain Handling and Transportation***

The types of grain produced in the western division vary from area to area with the higher grade grains principally grown in the more southern parts of the Canadian prairies where the Canadian Pacific Railway is the predominant rail carrier. From a transport perspective, this means that most of the eastbound rail shipments of grain must go to or through Thunder Bay.[10] Accordingly, we were advised that the best origin to choose for examining the costs of such movement is Moose Jaw, Saskatchewan which is in the heart of the durum growing region.

In the past 10 to 15 years, there has been enormous change in the grain handling and transportation system in western Canada. Where the countryside was once dotted with small elevators able to load a few rail cars at a time, the norm is now a limited number of High Throughput Elevators (HTEs) capable of loading 100 car trains in 24 hours. The railways now offer lower rates for multiple carload quantities, usually for 50 or 100 cars (CN) and 56 or 112 cars (CP). The statutory based rates[11] apply to the west coast terminals, Churchill and Thunder Bay (and to Armstrong, ON for shipments via CN to eastern Canada). The ability to set rail rates based on trainload quantities in western

[10] By far, the largest share of durum production is on CP. Major prairie delivery points include: Weyburn (360.0k tonnes), Corinne (103.9k tonnes), Moose Jaw (220.1k tonnes), Swift Current (297.1k tonnes) Assiniboia (100.8 k tonnes), Gull Lake (156.1k tonnes) Dunmore (104.8k tonnes), Maple Creek (62.9k tonnes), Redcoat (77.7k tonnes) Lethbridge (70.1k tonnes), Sterling? (61.3k tonnes), and Vulcan (135.9k tonnes). Moose jaw, Swift Current and Assiniboia are on the same train run #78 which collected 752.2k tonnes of durum in 2007-2008 and total grain deliversies of 1,795.6k tonnes. The largest durum car block loading area on CN was Regina West, train run #35, at 77,300 tonnes of durum.
Source: *Grain Deliveries at Prairie Points 2007-2008*, Canadian Grain Commission.

[11] While the statutory system no longer specifies individual carload rates, the overall levels are constrained by a *revenue cap* calculated each year by the Canadian Transportation Agency based on provisions contained in the *Canada Transportation Act*.

Canada[12] has made rail competition with marine to eastern Canada more of a reality than previously.[13] There is no shortage of HTE capacity around Moose Jaw.

At its peak in 1983, over 17 million tonnes of grain flowed through the Port of Thunder Bay. Annual volumes now range between just under 6 million tonnes to just over 7 million tonnes.[14] Grain elevator capacity has been substantially reduced at Thunder Bay (currently 1,171,770 tonnes) but it still slightly exceeds capacity at Vancouver and Prince Rupert combined (currently 1,163,800 tonnes).[15] Capacity (currently 1,476,220 tonnes)[16] in the St Lawrence was built to handle the larger volumes of previous years and is now in surplus. The elevator at Churchill has a listed capacity of 140,020 tonnes[17] and can load 1,200 tonnes per hour.[18] We were told that there is ample grain in the Churchill catchment area but exports via that route are limited by the short navigation season and how much grain can be put through the elevator.

### Rail-Lake Shipments

The grain company (Cargill, Viterra, JRI, etc.) pays for elevation, etc on the prairies and for the rail to Thunder Bay and for inward elevation at Thunder Bay. The CWB pays for the movement of wheat and durum from instore Thunder Bay to instore St Lawrence. The lake carrier pays the Seaway cargo tolls and the CWB reimburses the carrier.

Fobbing charges at Thunder Bay and Vancouver terminals are similar but are lower at Churchill and Prince Rupert. The CWB is the major customer for elevators in the River and can receive discounts on elevator rates because of competition between elevators in an overbuilt system

The railways publish uniform discounts to Thunder Bay, Vancouver and Prince Rupert on statutory rail rates. CP does not provide any incentives to Churchill while to Churchill, CN provides one-half of the incentive that it provides to Thunder Bay/Armstrong and the West Coast.

As a practical matter, the elevators at Port Cartier and Baie Comeau are filled before close of navigation.[19] This is because salties prefer to call at Port Cartier and Baie Comeau rather than having to navigate further up the river to Quebec, Montreal and Trois Rivieres during the winter because of insurance costs and icebreaking fees associated with such extended navigation.[20]

### All-rail Prairies to River

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[12] This pricing mechanism has been available for the transport of western grain east of Thunder Bay and Armstrong - and for all other commodity movements anywhere in Canada served by federally incorporated railways since the implementation of the *National Transportation Act* in 1967. Confidential contracting was introduced with the *National Transportation Act, 1987*.
[13] The railways have been able to capture domestic milling wheat to Montreal and Eastern Canada from the marine mode because of increased pricing flexibility and the millers' desire to carry less inventory.
[14] Thunder Bay Port Authority
[15] *Grain Elevators in Canada Crop Year 2008-2009, as at March 30, 2009*, Canadian Grain Commission.
[16] Ibid.
[17] Ibid.
[18] Port of Churchill website.
[19] These elevators only receive grain by marine shipment. The grain can be of Canadian or U.S. origin.
[20] The cost of pilotage further upstream is probably also a factor.

The CWB only uses three elevators in the St. Lawrence for the direct rail winter wheat program: Montreal, Trois Rivieres and Quebec which can receive 100/112 cars, 40 cars and 100/112 cars respectively. All rail rates are published. The railways pay neither per diem nor mileage on non-railway owned cars used east of Thunder Bay/Armstrong for the winter wheat program.[21]

As with rail-lake movements, the grain companies pay for rail transport to Thunder Bay with the CWB reimbursing the grain companies for rail transport on the basis of single carload movements. Any discount earned by shipping in trainload quantities is retained by the grain companies and used for their programs. On direct rail shipments to the St. Lawrence, Canadian Pacific publishes rates from prairie origin to Thunder Bay and rates from Thunder Bay to destination. On direct shipments to the river via Canadian National, the CWB pays the entire charge from prairie origin to destination because that is how CN's rates are published. The CWB then refunds the incentive portion of the statutory part of the rail movement (origin to Armstrong) to the grain company.

Our analysis of rail transport costs is based on the use of low capacity hopper cars which can load 91 tonnes of wheat as the supply of high capacity cars, which can load 100 tonnes, is quite limited.

CN charges fuel surcharge all the way from country loading point to the River. CP charges from Thunder Bay east.[22]

**Ocean Rates**

Since the economic downturn, ocean rates have declined drastically. The Economist recently reported:

> *. . . a lot of attention has been paid to the plunge in the Baltic Dry Index, a composite measure of the cost of shipping bulk cargoes such as iron ore and coal. It fell by over 90% between June and October last year, although it has since recovered slightly and is hovering at just about a quarter of its peak[23].*

The United States, Department of Agriculture recently reported that: *Ocean rates for shipping grain from the U.S. Gulf to China are presently at $55 per metric ton—down 60 percent from a record high in May of 2008.[24]* Information we were provided indicates that a similar reduction in ocean rates from elevators in the St Lawrence to traditional markets in Europe and Africa has taken place between summer 2008 and the present. Similarly information received indicates that rate from Churchill are higher than from the St Lawrence but well below the levels that would apply from the lakes. The largest ocean ships capable of reaching Thunder Bay are Handysize vessels which can load about 22,000 tonnes there with a top-off of a further 9,000 tonnes in the River Ships chartered to carry grain overseas are chartered on an all-in basis. There is therefore no fuel charge add-on.

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[21] For example, see Canadian Pacific tariff CPRS 4617-N Item 37736, Effective March 16, 2009, expired June 30, 2009.

[22] A grain company interviewee indicated that the CN fuel surcharge is, in reality, only applied on the basis of that part of the movement east of Armstrong.

[23] *Sea of Troubles*, The Economist, August 1-7, 2009, p.55.

[24] *Grain Transportation Report*, United States Department of Agriculture, August 20, 2009.

It is worth noting that, there has been a decline in available salties on the lakes in recent years due to the decline in imported raw steel destined for Canadian and US steel mills along the lakes. There is a good supply of inbound project cargo ships but the maximum for outbound grain loading is only 8,000 - 10,000 tonnes.

## *5.2 Modal Cost Comparison for Grain*

Marine and rail costs were compared for movements from Thunder Bay to transfer elevators in Quebec City and Montreal. The cost comparison, normalized to rail cost and distance[25], is presented in Figure 3 for Quebec City and Figure 4 for Montreal. Marine has a more circuitous route with a 22% longer haul than rail. Marine costs were developed for the base case and for the two post-ECA scenarios discussed in Section 4.1. The first case (ECA-Avg) uses fleet-average fuel cost impact leading to an average rate increase of 11%, while the second (ECA-Hi) applies a 20% rate increase, which can be interpreted as either the rate necessary for specific vessels in the fleet, or a conjoint increase in ballast movements due to mode shift and/or market impacts on shippers added to the average fuel-related rate increase.

One can see in Figure 3 and Figure 4 that for both destinations marine moves from a cost advantage to a slight cost disadvantage under ECA-Avg rate increases and to a reversal of cost advantage ratios for ECA-Hi. There would be incentive to shift traffic from marine to rail within the capacity constraints of the existing car-supply system. It is feasible that the 12.2% mode shift derived from TEMS fuel price elasticity would be realized for this specific trade. If more significant quantities were shifted it would require an investment in equipment. The base rail costs assume sunk costs in the CWB and government owned cars that are used in this trade. A major shift to rail would require investment in new cars and a long term commitment. The incremental impact on rates of investing in new cars is illustrated in the two figures as rail+WB-car. Under this scenario, the marine ECA-Avg rate is lower than rail while the ECA-Hi rate is still higher than rail.

We note that there are significant quantities of agricultural products that move across the border from Ohio and also between U.S. ports that were not included in our scope. These trades could also have mode shift potential.

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[25] Normalized to the base rail values means that distances are divided by the rail distance and the costs are divided by the rail cost. Thus, the rail distance is 1.0 and the rail cost is 1.0 while all other values are proportional to rail.

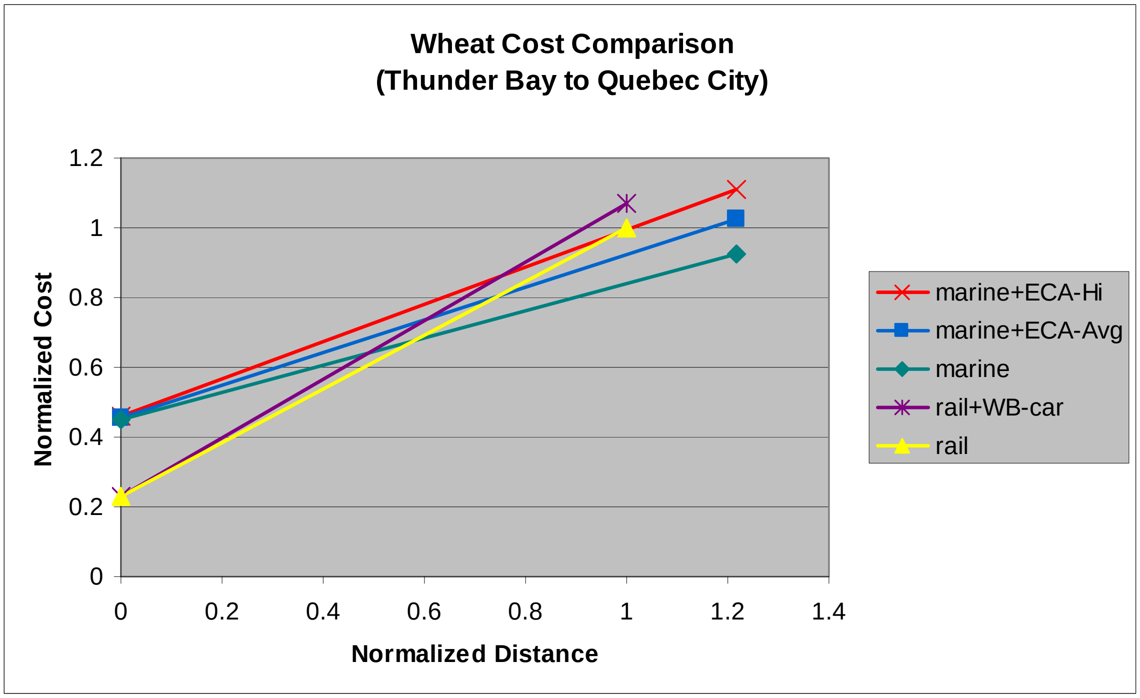


**Figure 3, Marine Costs Relative to Rail for Wheat Trade Thunder Bay to Quebec City**

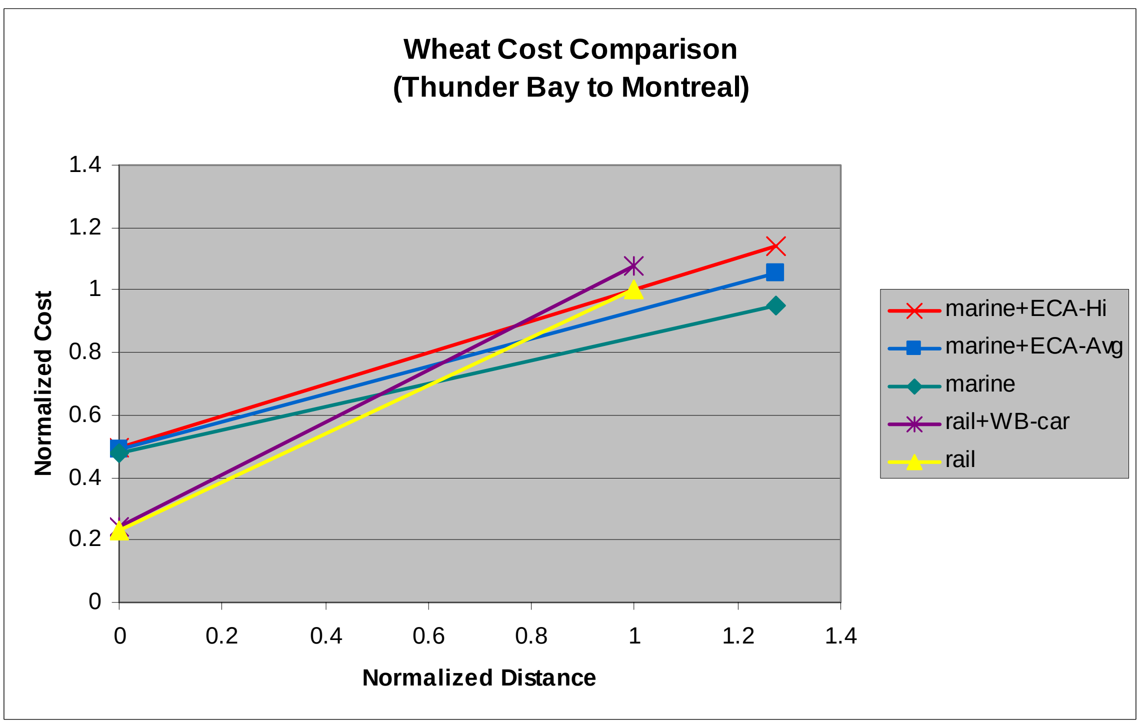


**Figure 4, Marine Costs Relative to Rail for Wheat Trade Thunder Bay to Montreal**

# 6 Salt Assessment

## *6.1 Canadian Salt Movements*

For the purpose of this study, we will concentrate on mined rock salt used primarily for winter road deicing. The volume of rock salt produced and shipped in any given year fluctuates with the severity of the winter expected or experienced. There are three major salt mines in Eastern Canada at Goderich and Windsor in Ontario and on the Magdalen Islands in Quebec. Being on an island, the Quebec mine is limited to shipping by marine to mainland points. Goderich and Windsor have easy access to both rail and highway transport. Also, salt is produced at several locations on the US side of the Great Lakes.

In 2007, Canada produced 11.8 million tonnes of salt of which 10.7 million was mined rock salt. The major producing area was Ontario at 7.6 million total tonnes of salt. The United States is the major destination for salt exports from Canada, 4.4 million tonnes in 2007.[26] Canada's share was 49% of total US salt imports and 71% of salt exports although US imports far exceeded US exports.[27] Table 7 provides an overview of Canadian shipments, imports and exports for 2007.

**Table 7, Canadian Salt Data 2007 (preliminary)**

| **Canadian Shipments** | **Tonnes 000** | **$ 000** | **$/t** |
|---|---|---|---|
| All salt | 11,818 | 426,645 | 36.10 |
| Mined rock salt | 10,656 | 323,142 | 30.32 |
| All salt Ontario | 7,618 | 244,209 | 32.06 |
| | | | |
| Salt Exports | | | |
| Total | 4,361 | 87,927 | 20.16 |
| to US | 4,358 | 87,390 | 20.05 |
| | | | |
| Salt Imports | | | |
| Total | 1,225 | 62,232 | 50.80 |
| From US | 739 | 38,632 | 52.28 |
| From Mexico | 350 | 6,608 | 18.88 |
| Tot US and Mexico | 1,089 | 45,240 | 41.54 |
| | | | |
| Imports by Province of Clearance | | | |
| Total | 1,225 | 6,232 | 5.09 |
| Ontario | 699 | 32,760 | 46.87 |
| Quebec | 70 | 7,819 | 111.70 |
| British Columbia | 420 | 18,579 | 44.24 |

Source: Salt, Canadian Minerals Yearbook, Natural Resources Canada, 2007 (preliminary data)

Eastern Canadian rock salt mines are:

- Canadian Salt, Pugwash, NS, daily capacity 7,800 tonnes.
- Mines Seleine (Canadian Salt), Iles de la Madeleine, daily capacity 7,800 tonnes;

[26] *Salt*, Canadian Minerals Yearbook, Natural Resources Canada, 2007 (preliminary data).
[27] *Salt* (Advance Release), 2007 Minerals Yearbook, USGS.

- Canadian Salt, Ojibway, daily capacity 10,500 tonnes; and
- Sifto Canada Corp, Goderich, daily capacity 20,000 tonnes.[28]

US Great Lakes based rock salt mines are:

- Detroit Salt Co. LLC, Detroit, MI, annual production capacity 1.3 million short tons;
- Cargill, Inc., Cleveland, OH, annual production capacity 2.9 million short tons; and
- Morton International, Inc., Fairport Harbor, OH, annual production capacity 2.0 short tons.[29]

Rock salt transported to Great Lakes destinations is all produced within the Great Lakes. The Lakes Carriers' Association lists the same Great Lakes origins as the foregoing bullets as utilizing the marine mode for shipments. The LCA lists numerous ports from Cote St Catharine, QC to Duluth-Superior as receiving shipments in this area. The LCA listed total Great Lakes salt tonnage as 8.9 million short tons.[30] As shown previously in Table 5, the CSA fleet carried 8.2 million tonnes of salt in 2008. It carried 7.0 million tonnes in 2007[31] some of which would be from Mines Seleine and perhaps other Atlantic Coast mines (Pugwash, NS has a production capacity of 7,800 tonnes per day of rock salt) although the bulk would be carried within the lakes. Accordingly, it is probably safe to conclude that Canadian flag vessels carried most of the salt transported on the lakes.[32]

### *6.2 Modal Cost Comparison and Mode Shift Potential for Salt*

Virtually all the quantitative information provided by a major Ontario salt producer is confidential. Salt is mined and shipped by companies in Goderich, Windsor/Detroit, and the Cleveland area. Unlike the other commodities considered in this report most salt demand is recession proof being driven by weather and climate rather than economic cycles. Increased transportation cost is unlikely to affect demand.

Salt for road maintenance is sold to provincial, state, and municipal governments throughout Ontario, the Great Lakes States, and western Quebec. Great Lakes producers encounter competition in the Lower St. Lawrence from a source in the Magdalen Islands. Reports of salt being imported into Quebec City from the UK and Chile in 2008 were explained as a Canadian producer importing to meet peak demand rather than a foreign competitor being price competitive in the Quebec market.

Salt for road maintenance is sold on a tendering process with the lowest bid delivered price normally receiving the contract. Suppliers in Windsor and Cleveland have a slight transportation cost advantage in accessing markets in the lower lakes and St. Lawrence River. The supplier in Goderich has a transportation cost advantage in accessing

[28] Ibid.
[29] *Salt* (Advance Release), 2007 Minerals Yearbook, USGS.
[30] *2007 Statistical Annual Report*, Lake Carriers' Association
[31] *Statistical Report 2007*, Canadian Shipowners' Association
[32] As of the end of July 2009, U.S. flag dry-bulk carriers had handled 584,000 short tons of salt (LCA Press Release August 14, 2009). This is slightly above the average of the past five years.

markets in the upper lakes. Generally, salt is shipped via the least costly mode and most road salt is shipped via marine service to Great Lakes and St. Lawrence River ports except for short local distances from the mines where trucking is used. Some salt is shipped by rail but this is primarily product for chemical or industrial purposes and is a minor portion of the total salt tonnage.

Salt is produced year round but, since consumption is seasonal, extensive product storage, normally at the destination port is required. During the closed navigation season it is sometimes necessary to ship by truck or rail to meet unforeseen demand or in order to maintain production and access suitable storage locations. Due to the significantly higher cost of the land based modes this is avoided whenever possible.

When transported by truck in Ontario and Quebec, salt moves in similar equipment to that of aggregate (tandem tractor – quad dump semi-trailer) in 39 tonne loads usually with an empty return trip. The cost of operating 7-axle, twin-trailer trucks of a similar gross vehicle weight capacity was assessed by Logistic Solutions Builders in 2005.[33] The costs varied with annual utilization and profit margins from $1.80 to $2.50 per km.

Individual cost components of truck transport in Canada were updated in 2008 for general freight trucks by Ray Barton and Associates.[34] We applied these cost escalation factors to the 7-axle twin-trailer costs of 2005 in deriving our estimate of 2008 trucking costs for salt. Finally we adjusted the common carrier cost structure applied in the above reports to a contract rate structure in recognition of the significant volume of traffic involved in competing with marine quantities.

The closest major Ontario urban area to a salt producer is the Greater Toronto Area and Hamilton (GTAH) with road distances of 176km (Goderich – Hamilton) and 221 km (Goderich – Toronto). Windsor and Cleveland are closer by water but farther by road and rail. The comparison of cost estimates for the three modes was based on the shortest road distance and the average water distance for Goderich and Windsor. The comparison is presented in Figure 5. The costs and distances are normalized to the truck mode, such that truck distance and cost is shown as 1.0 and all other distances costs are relative to truck's. As indicated, marine has a much more circuitous route than either road or rail. However, it is the lowest cost provider of rock salt to the dockside storage facilities. Even with increased ECA costs, rail and truck would not compete for this trade.

The road-competitive situation is less favourable for service to lower Lake Michigan from Detroit/Windsor and Cleveland. The road/marine distance ratio is higher than the above comparison and marine does not suffer the Welland lock delays or draft limitations. Thus, the mode shift potential for those trades would also be very low.

The one possible impact for the existing salt trade is on the opportunity cost of attracting some of the inland shipments that go by rail and truck. Rail is used for supply of product

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33 Logistics Solution Builders Inc, *Operating Costs of Trucks In Canada 2005,* Economic Analysis Directorate, Transport Canada, 2005.

34 Ray Barton Associates Ltd., Logistics Solution Builders Inc. and Research and Traffic Group, *Operating Costs Of Trucking And Surface Intermodal Transportation In Canada*, Economic Analysis Directorate, Transport Canada, 2008.

to industrial plants and truck is used in the winter to ship direct to distribution depots when demand exceeds the dockside storage. The TEMS analysis of mode shift (discussed in section 4.1) was conducted in relation to increasing fuel prices across all modes, which due to varying energy intensities of the modes affect truck the most, marine the least, and rail between the other two modes. The predicted shifts of cargo under increasing fuel price scenarios would be significantly mitigated by a 50% increase in marine-only fuel prices post-ECA.

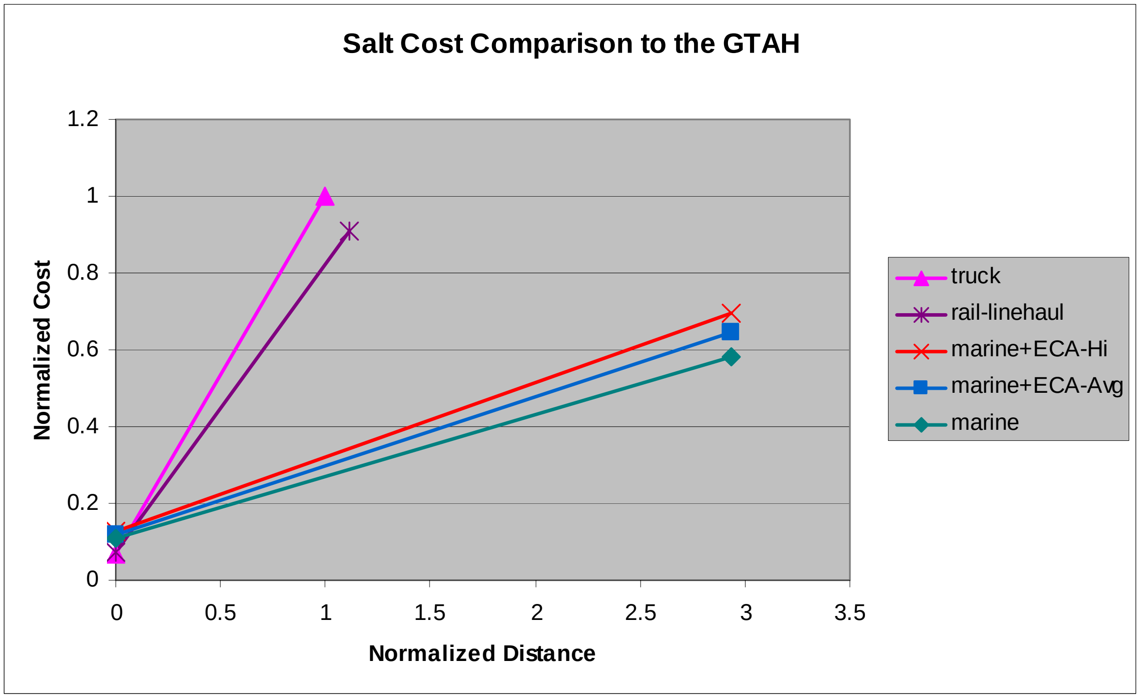


**Figure 5, Marine Costs Relative to Rail and Truck for Salt Trade to the GTAH**

# 7 Stone/Aggregate Assessment

## *7.1 Canadian Stone Movements*

In the context of traffic moved by Great Lakes carriers, aggregate is predominantly crushed limestone from Manitoulin Island and from nearby parts of the United States (e.g. Calcite, MI is a major supplier). The traffic is predominantly "aggregate" to be used in construction but also includes fluxing stone for iron ore pelletization and steel making and stone for the chemical industry. The traffic does not include dimensional stone. Table 8 indicates the volume of crushed stone produced in Canada in 2005, the latest year for which data are available.

**Table 8, Stone Production in Canada, 2005**

| | Product | All stone | | Limestone | | |
|---|---|---|---|---|---|---|
| | | **000t** | **$0** | **000t** | **$0** | **$/t** |
| Crushed Stone for | | | | | | |
| | Concrete aggregate | 35,813 | 278,644 | 29,478 | 234,346 | 7.95 |
| | Asphalt aggregate | 13,366 | 95,503 | 6,425 | 46,780 | 7.28 |
| | Road metal | 38,228 | 243,761 | 26,880 | 177,189 | 6.59 |
| | Railroad ballast (incl. traprock) | 2,420 | 21,178 | 70 | 524 | 7.49 |
| | Other uses | 40,591 | 282,183 | 27,158 | 188,386 | 6.94 |
| Chemical and metallurgical | | | | | | |
| | Cement plants, Canada | 17,298 | 56,587 | 16,500 | 63,130 | 3.83 |
| | Cement plants, foreign | 1,750 | 8,953 | 1,733 | 8,879 | 5.12 |
| | Flux in iron and steel furnaces | 216 | 702 | 216 | 702 | 3.25 |
| | Flux in Nonferrous smelters | 47 | 845 | 47 | 845 | 17.98 |
| | Glass factories | 18 | 118 | 18 | 118 | 6.56 |
| | Lime plants, Canada | 3,270 | 24,057 | 3,270 | 24,057 | 7.36 |
| | Lime plants, foreign | 730 | 7,828 | 730 | 7,828 | 10.72 |
| | Pulp and paper mills | 80 | 679 | 80 | 679 | 8.49 |
| | Sugar refineries | 2 | 10 | 2 | 10 | 5.00 |
| | Other chemical uses | 2,545 | 15,951 | 1,175 | 11,289 | 9.61 |
| Total crushed stone | | 162,423 | 1,197,182 | 116,453 | 796,010 | 6.84 |

Source: *Stone*, Canadian Minerals Yearbook, Natural Resources Canada, 2007

From the table, it can be seen that crushed stone has a low value per tonne, generally in the range of $6-8 per tonne although some stone is much less valuable (to cement plants) and some is considerably more valuable (to nonferrous smelters and to lime plants). The large volumes produced indicate a plentiful domestic supply and, when nearby US operations are included indicate a competitive international environment. Because of the low value of the commodity, individual producers' market competitiveness can be implied by transport costs to market.

Canada is a small producer when compared with the United States which produced 1.6 billion tonnes of crushed stone in 2006 (limestone was 1 billion of the total) with an average value of $US8.66 per tonne.[35] In 2007, states adjacent to the Great Lakes produced far more crushed limestone than Ontario produced stone in 2006. Table 2 provides data to illustrate this.

[35] *Stone, Crushed (Advance Release)*, 2007 Minerals Yearbook, US Geological Survey.

**Table 9, Crushed Limestone Production in the United States, 2007**

| Location | Production | Value | |
|---|---|---|---|
| | 000 tonnes | $US '000 | $US/t |
| Illinois | 51,800 | 409,000 | 7.90 |
| Indiana | 50,900 | 333,000 | 6.54 |
| Michigan | 19,800 | 84,600 | 4.27 |
| Minnesota | 3,780 | 41,000 | 10.85 |
| New York | 27,500 | 243,000 | 8.84 |
| Ohio | 63,200 | 425,000 | 6.72 |
| Pennsylvania | 60,500 | 556,000 | 9.19 |
| Wisconsin | 20,300 | 117,000 | 5.76 |
| US Total | 1,020,000 | 8,280,000 | 8.12 |
| Source USGS *Stone, Crushed (Advance Release)*, 2007 Minerals Yearbook, US Geological Survey | | | |
| | '000 tonnes | $CDN '000 | $CDN/t |
| Ontario (2006) | 55,712 | 493,142 | 8.85 |

Source: *Stone*, Canadian Minerals Yearbook, Natural Resources Canada, 2007

On its website, the Lake Carriers' Association (LCA) lists the following ports (from west to east) as shipping limestone:

- Port Inland, MI
- Drummond Island, MI
- Calcite, MI
- Presque Isle, MI
- Kellys Island, OH
- Marblehead, OH
- Thessalon, ON
- Bruce Mines, ON
- Meldrum Bay, ON
- Port Colborne, ON

While these are the only ports listed as shipping limestone, there are many locations in these states and Ontario that ship limestone by surface transport, primarily over local roads. In its July 2009 Press Release on limestone carriage, the LCA notes Kelly's Island is not shipping and that the quarry at Port Colborne no longer ships by marine.[36]

Upon reviewing the volumes shipped in recent years, the Lake Carriers Association indicates that limestone shipments fluctuated between 34 million short tons (2003) and almost 43 million short tons in 2005. 2007 shipments were 41.7 million short tons.[37] More recently, volumes have been hard hit by the overall downturn in construction with year to date July 2009 tonnages down 15.5% from 2008 volumes. More importantly for this analysis, CSA member companies carried 7.3 million tonnes in 2007, the lowest volume during the 1997-2007 period.[38] If the LCA data are any indication, CSA members' volumes will be even lower in 2009. Statistics Canada data (year 2005)

[36] *Great Lakes Limestone Trade Struggles Again in July*, Lake Carriers' Association, August 4, 2009.
[37] *2007 Statistical Annual Report*, Lake Carriers' Association.
[38] *Statistical Report 2007*, Canadian Shipowners' Association

indicate that the major receiving point for US originated stone is Windsor, Ontario (1.6 million tonnes).[39, 40] Being predominantly an international movement, this traffic can move in either Canadian or US bottoms.

### *7.2 Modal Cost Comparison and Mode Shift Potential for Aggregate*

We interviewed one aggregate company that supplies about half the demand for aggregate delivered by marine service in the Great Lakes Region. Product comes from locations in northern Ontario, northern Michigan and Ohio. Southwestern Ontario (Windsor) is a significant destination port. Other significant destinations are in Michigan and Ohio. 2008 volumes were slightly lower than normal but 2009 will likely be 40% lower than usual.

Movements of aggregate from northern Ontario and northern Michigan to ports located on the Detroit and St. Clair Rivers and Lake Erie provide a backhaul for salt movements into Lake Michigan.

Primary competition is from local quarries and pits located close to market areas. For example, the Greater Toronto Area and Hamilton are supplied primarily by truck from quarries and pits located on the Niagara Escarpment and deposits north east of the urban area.

As transportation cost can be 40 – 50% of the delivered cost of material it is a major factor in determining source. An industry executive noted that from 2005 to 2008 marine rates increased 17% (partly due to US/CDA$ exchange rate changes) and this resulted in the loss of specific projects and overall market share to land based competitors.

Market share in metallurgical stone in the U.S. has become vulnerable to land based quarries in Pennsylvania, Kentucky, Ohio, and Iowa. Market share in the construction sector has been lost to land based competitors in southwestern Ontario, Michigan and Ohio. Current weakening demand has resulted in land-based competitors and truckers idled by the recession penetrating markets normally supplied from marine ports.

Typical long haul aggregate trucks in Ontario (tandem tractor and quad dump semi-trailer) have an allowed Gross Vehicle Weight (GVW) of 58,500kg. This allows a practical load of 39 tonnes. Similar weights are allowed in Michigan but other US states are limited generally to a 40,000 lb GVW (18,144kg) although heavier weights may be allowed under special permits.

Using the Ontario weights and an established range of truck operating costs it can be calculated that each $1.00 increase in marine rates would expand the competitive radius of a land based quarry by 13 to 16 km.

Cleveland Ohio receives a high proportion of Canadian aggregate and the Ohio Geological Survey documents its aggregate quarries in detail. In addition to being a good indication of the competitive impact of ECA on a major aggregate port, it is representative of the situation at most Great Lakes aggregate ports. Perhaps Michigan and Ontario with higher

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[39] *Shipping in Canada 2005*, Statistics Canada.

[40] Windsor Port Authority data indicate that 2.3 million tonnes of aggregate from Canadian and U.S. sources came through the port in 2007.

axle load limits than other Great Lake states would have a more truck competitive environment. Thus, Ohio is considered a reasonable but conservative reference for aggregate impact analysis. Figure 6 illustrates the truck-competitive radius with marine shipments brought into Cleveland from northern Lake Huron. The green arc is the existing boundary within which trucks can bring aggregate to Cleveland for the same or lower cost than can marine.

As indicated in Figure 6, there is one crushed stone facility inside that arc and one close to the boundary. The post ECA rates for the average fleet composition, would expand the competitive radius (the blue ECA-Avg line) such that there are three crushed stone facilities inside the competitive radius. Similarly, the ECA-Hi rate adds one more crushed stone source and places an additional one on the boundary.

Aggregate sales outside of the Cleveland area would be trucked from the dock. The competitive radius increases by the distance of the truck movement from dock to destination. The next closest large populated area to Cleveland is Akron. The competitive impacts for an Akron final destination are illustrated in Figure 7. As indicated, there are four competitive crushed stone facilities at existing marine rates, three more are added with the ECA-Avg increased rate and another seven with the increase to ECA-Hi rates.

Thus, ECA induced rate increases would significantly increase the truck based competition for marine shipments of aggregate. The transportation price elasticity for aggregate would be higher than that for grain. Also, stone and gravel quarries exist in the vicinity of many ports that receive aggregate. Thus, one might expect that mode shift to truck transportation from local quarries could be double that of grain and apply to many more movements. In total, a 20% mode shift could be a reasonable expectation and specific shippers might experience much higher rates depending on local competitive circumstances. Furthermore, as discussed later in Chapter 9, a significant loss of market share could induce a downward spiral for the marine-serviced quarries of operations cost increases leading to further loss of market share. The long term impacts for mode shift from marine to truck transport from local quarries could escalate beyond the predicted 20% under such conditions.

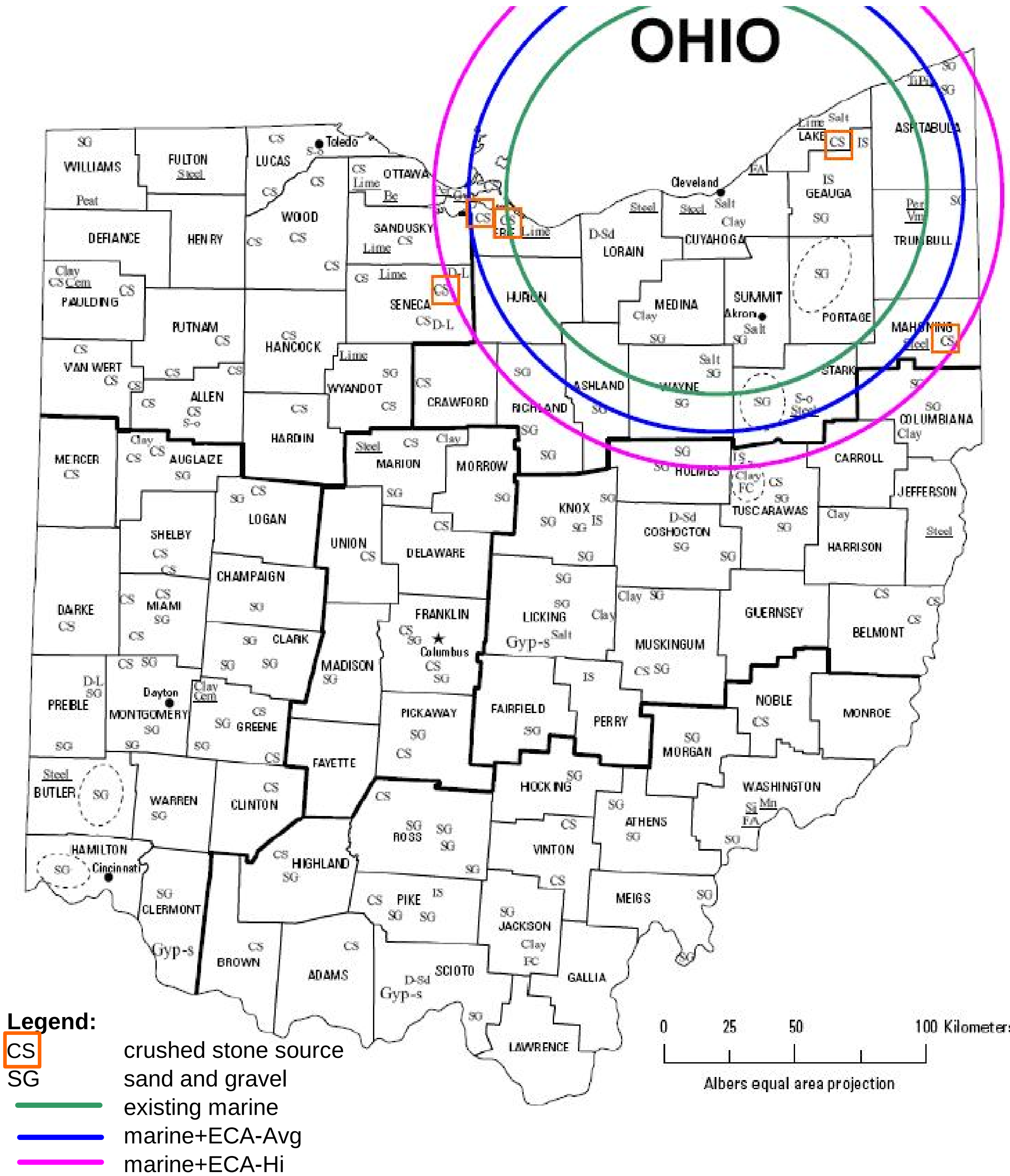


**Figure 6, Impact of ECA on Truck Competitive Crushed Stone Quarries for Cleveland**
Source of base map: Ohio Geological Survey/U.S. Geological Survey (2006)

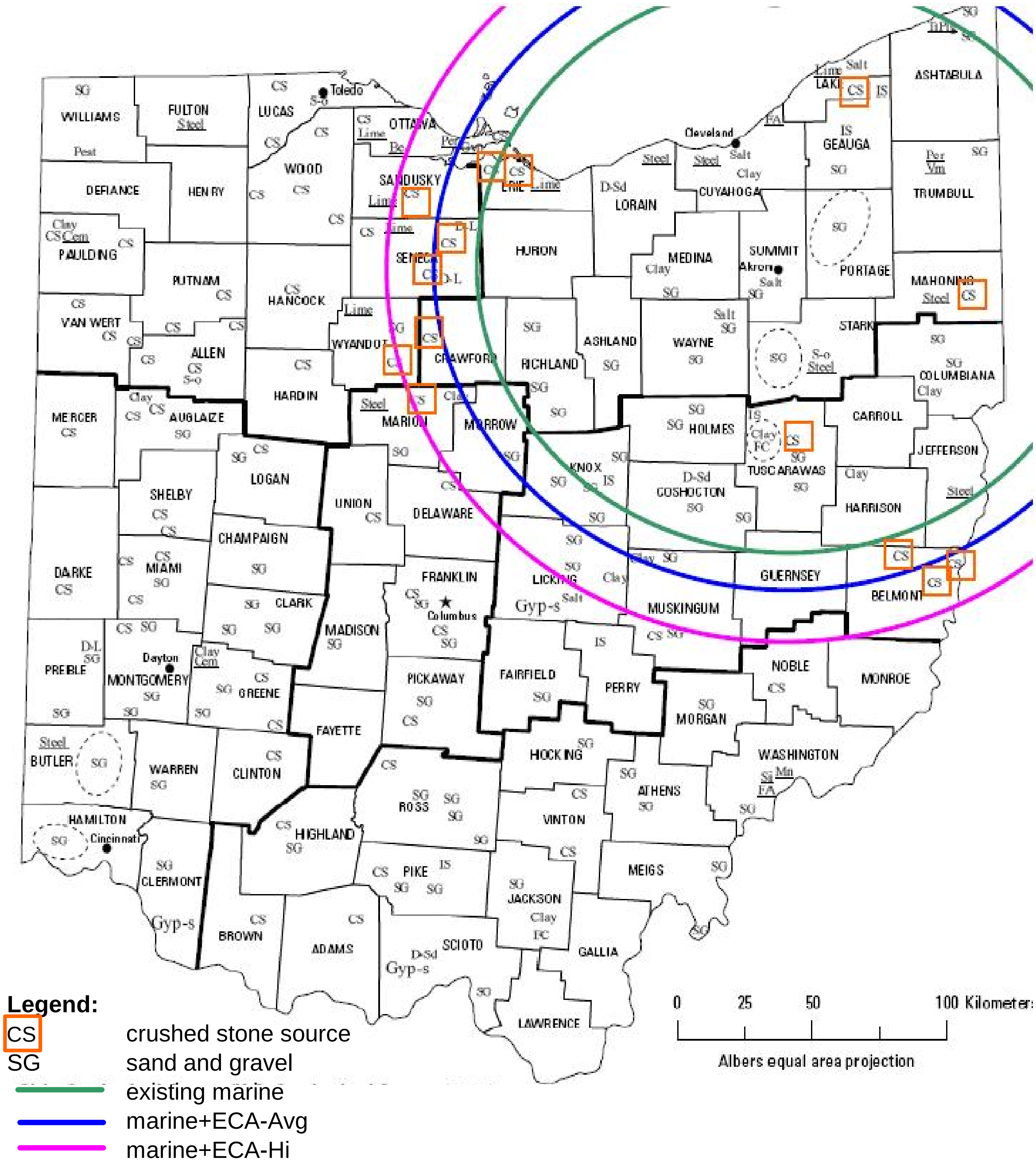


**Figure 7, Impact of ECA on Truck Competitive Crushed Stone Quarries for Akron**
Source of base map: Ohio Geological Survey/U.S. Geological Survey (2006)

# 8 Petroleum Assessment

## *8.1 Canadian Petroleum Movements*

Petroleum movements in the GLSLS largely involve product distribution. As previously indicated in Table 5, the CSA members carried 5.8 million tonnes of tanker products in 2008. Rail is the main competitor with marine. In 2006, rail moved 4.0 million tonnes of liquid petroleum products within Ontario, Quebec and Atlantic Canada.[41] Over 90% of the rail shipments of petroleum products originated in Quebec with 47% of that staying in Quebec, 42% going to Ontario and the remaining 11% going to the Maritimes.[42]

While not all movements involve competitive destinations many do. We were told that the Ultramar refinery in Levis leases a fleet of rail cars and has a long term contract with CN to ship petroleum products. Ultramar has the flexibility to shift to rail very quickly. It responded to a Coast Guard decision to not dredge the river access to Chatham, NB in 2001 by shifting its Quebec City to Chatham movements from marine to rail within one month. Rail has a share of the present market from Quebec City to Montreal, and to Maitland, ON. It is seen as a potential competitor to other destinations in Quebec and Ontario.

## *8.2 Cost Impact for Petroleum Products*

While the modal costs of transporting petroleum products can be estimated, liability cost allocation can vary significantly across shippers and modes. The rail industry has recognized that its rates for dangerous goods (DG) products have not covered the litigation costs associated with the probability of release and has been increasing its rates for DG shipments. Thus there might be opportunity for marine to recapture some of the market share lost to rail in the past. Again, the main cost of ECA will be the opportunity cost of not recapturing market share rather than losing additional market share. Without any other reference we would estimate that this opportunity cost would be in the order of the 11.3% lost market gain for competitive markets, where the 11.3% is based on our review of TEMS elasticity for petroleum products in Section 4.1.

We were unable to schedule an interview with a petroleum shipper to discuss mode shift aspects. As noted in the previous subsection, rail's main market is from Quebec to other Quebec and Ontario destinations and that is where the biggest opportunity cost would be; although the size of the rail-competitive market will be reduced when Ultramar's planned pipeline between Quebec City to Montreal is completed. There might be offsetting growth in the petroleum market from rationalization of the North American refinery market. Additional cross border marine movement could result if refiners rationalize the North American distribution system. However, this potential trade could be disadvantaged by the probable rate increases. Again, the loss would be an opportunity cost to marine and petroleum industries rather than a mode shift.

We briefly looked at Ontario's Sarnia refinery shipments to Thunder Bay and Sault Ste. Marie as a possible mode shift (marine to rail) candidates. The sole-company rail routes

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[41] Statistics Canada, Transportation Division, *Rail in Canada 2006*, Catalogue no. 52-216-X.
[42] Ibid.

to Thunder Bay are extremely circuitous relative to marine and the more direct route from Edmonton to Thunder Bay is also much longer than marine's Sarnia to Thunder Bay trade. The more direct rail route from Sarnia to both destinations is via Michigan, but requires three rail carriers to Thunder Bay and two to Sault Ste. Marie. We believe there is little likelihood that rail would compete with marine for these trades.

# 9 Global Competitiveness Impacts

Global competitiveness issues could arise for some industries that are dependant on marine's low cost structure. As well as mode shift impacts on the carriers, the industries being served would suffer. As discussed in Section 7.2, Meldrum Bay, ON, Calcite, MI and other aggregate producers that are located on the GLSLS system but not near high population areas would suffer from ECA induced rate increases. The loss of output would be displaced by quarries located closer to the populated areas and using trucks for shipment. Since the economics of these quarries are tied to high volume production, and significant loss of market share could induce a downward spiral of operations cost increases and further loss of market share. The long term impacts for mode shift from marine to truck transport from local quarries could escalate beyond the predicted 20% under such conditions.

The shift of grain traffic away from Thunder Bay could have competitiveness consequences. Any diversion to rail (or to Churchill or the west coast) would further imperil already underutilized grain company assets at Thunder Bay. Also, if large quantities were diverted, the ability of the lake carrier industry to handle large volumes of grain (say in a bumper year) could be jeopardized and constrain the market opportunities of the grain industry.

## *9.1 The Canadian Steel Mills*

The other industry that is a significant user of marine transport is the steel industry, with plants located in the GLSLS system on both sides of the border.

### *9.1.1 Background*

The Canadian lake vessel operators, represented by the Canadian Shipowners' Association, serve four major steel mills located in Ontario – two in Hamilton, one in Nanticoke and one in Sault Ste Marie. In recent years these mills have all become part of global steel conglomerates.

**U. S. Steel** Canada Inc with mills in Hamilton and Nanticoke was formerly known as Stelco – dates from 1910 when several existing smaller steelworks combined and were incorporated as the Steel Company of Canada. In 2004, Stelco had been having financial difficulties and was under court ordered protection from its creditors. Stelco exited bankruptcy (CCAA) protection on March 31 2006. It divested itself of several non-core operations, including Stelwire, Norambar (formerly Stelco McMaster Works) and Welland Pipe. The CCAA exit saw the remaining operations restructured into 9 separate operating businesses, held by the corporate entity of Stelco. In August 27th, 2007, US Steel purchased Stelco for $1.9 billion--$1.1 billion in cash, and assuming $800 million in debt. The deal closed effective October 31, 2007. The company was renamed US Steel Canada Inc.

On March 3rd, 2009, US Steel announced that further consolidating was necessary to maximize efficiency while meeting customer demands. In this regard, the company announced a "temporary idling" of the finishing and coking operations at Hamilton and the steelmaking and finishing operations at Lake Erie Works (Nanticoke). Approximately 1,500 employees are affected.

United States Steel Corporation is headquartered in Pittsburgh, Pa., with major production operations in the United States, Canada and Europe. The additional 4.9 million net tons of raw steelmaking capability at the U. S. Steel Canada facilities raised U. S. Steel's total capability to 31.7 million net tons, the fifth highest total among steelmakers worldwide. (The company is the world's tenth largest steel producer ranked by sales.) U. S. Steel's integrated steel facilities include Gary Works, which is made up of Gary Works in Gary, Ind., East Chicago Tin in East Chicago, Ind., and the Midwest Plant in Portage, Ind.; Great Lakes Works in Ecorse and River Rouge, Mich.; Mon Valley Works, which includes the Edgar Thomson Plant and the Irvin Plant near Pittsburgh, Pa., and the Fairless Plant near Philadelphia, Pa.; Granite City Works in Granite City, Ill.; Fairfield Works in Fairfield, Ala.; Lake Erie Works in Nanticoke, Ontario, and Hamilton Works in Hamilton, Ontario, both of which make up U. S. Steel Canada; U. S. Steel Košice in the Slovak Republic; and U. S. Steel Serbia in the Republic of Serbia. U. S. Steel is also involved in several steel finishing joint ventures in the United States, Brazil, Canada and Mexico. It is still the largest domestically owned integrated steel producer in the United States, although it produces only slightly more steel than it did in 1902.

Hamilton, Ontario, Canada, has been the home of **ArcelorMittal Dofasco** since 1912, when C.W. Sherman founded the Dominion Steel Casting Company to manufacture castings for Canadian railways. Later named Dominion Foundries and Steel, the company merged with its subsidiary, Hamilton Steel Wheel Company in 1917. The name was officially changed to Dofasco Inc. in 1980.

In 2006, Dofasco was purchased by Europe-based steelmaker Arcelor which is the largest steel company in the world, with 326,000 employees in more than 60 countries. The company is headquartered in Luxembourg. It holds sizeable captive supplies of raw materials and operates extensive distribution networks.

ArcelorMittal key financials for 2007 show revenues of US$105.2 billion, with a crude steel production of 116 million tonnes - around 10% of world steel output. In December, 2008, ArcelorMittal announced several plant closings, including the former Bethlehem Steel plant in Lackawanna, NY and LTV Steel in Hennepin, IL. On July 31$^{st}$ this year an ArcelorMittal Dofasco spokesperson said that employees can expect short pay but no layoffs at least until November after their corporate parent reported a massive loss for the second quarter.

Established in 1901, **Essar Steel Algoma Inc.** is an integrated steel producer based in Sault Ste. Marie. Formerly operating as Algoma Steel, it was acquired in June 2007 by Essar Steel Holdings Ltd (a wholly owned subsidiary of Essar Global Ltd) for $1.63 billion (U.S.) Essar Steel Algoma's current production capacity is 2.4 million tonnes per annum (MTPA). Over the next three to five years Essar plans capital expenditure initiatives aimed at increasing overall output to in excess of four million tons per annum.

Essar Steel is a global producer of steel with a footprint covering India, Canada, USA, and Asia. Essar Steel has a current capacity of 9 million tonnes per annum (MTPA). It has aggressive expansion plans in India as well as Asia and the Americas, to ultimately raise capacity to 20 to 25 MTPA.

As well as the purchase of Algoma in 2006 Essar also bought Minnesota Steel for an undisclosed amount. As part of that deal Essar will invest US$ 1.65 billion to build a steel plant in northern Minnesota. After the acquisition of these firms, Essar Steel became India's fourth largest steel manufacturer.

**Globalization of Steel Markets**

Steel markets—whether in Canada, North America, or elsewhere around the world—are increasingly shaped by the forces of globalization beyond their borders. Although relatively heavy and costly to transport, steel and steel products often travel across oceans to find a customer. Over one-third of global steel production is traded internationally, and in Canada, over half of the steel consumed domestically is imported. On balance, Canada is a net importer of steel.

However, the global steel industry continues to be plagued by structural overcapacity. Many countries, including those experiencing high growth rates, produce far more steel than they consume. The problem is often rooted not with individual companies, but rather with governments striving to develop a steel industry to serve both internal needs and also export to open markets elsewhere. Subsidies and other trade distortions can undermine the ability of Canadian firms to compete. As the most significant regional importer of steel, the NAFTA bloc (Canada, the United States, and Mexico) is particularly vulnerable to trade-related market distortions. Markets in North America are the most open in the world, with many international companies marketing steel into the region.

**Current Market Situation**

NAFTA steel demand and domestic shipments have fallen by 48 per cent and 40 per cent respectively since peak levels in mid-2008 – for example automobile production in 2009 is expected to be half that of recent years. However while steel production has declined steeply in North America, South America, Europe and Japan the level of production in China has increased in recent months and is expected to increase 10 per cent over 2008 levels..

Non-NAFTA import market share has increased over the last two quarters at the same time as NAFTA steel producers have more than adequate capacity to meet home demand in 2009.

### *9.1.2 Raw Material Shipments*

The southern Ontario steel mills receive iron ore from the Quebec north shore and from the Messabi Range in Minnesota. Ore movements from Quebec are considered by the marine industry to be an important source of back haul for export grain moving from the Lakehead to the Lower St. Lawrence. Coal is shipped primarily from Appalachia via rail to Lake Erie ports and then by marine carriers. A smaller quantity of coal is received from western Canada via rail to Thunder Bay and then via marine service.

ArcelorMittal in Hamilton in a typical year receives 4 million tonnes of ore and 2 million tonnes of coal. Volumes this year are expected to be lower. U.S. Steel Canada was unable to agree to an interview within the timeframe allocated for this project.

Iron Ore
Marine transportation costs are a significant but not a majority component of the delivered cost of iron ore. While in the past, ore was received by rail from Ontario mines that are now closed, there is no practical modal option other than marine service from existing sources. The corporate groups of both southern Ontario steel companies have interests in mines located in Quebec and Minnesota.

Transportation costs while an important factor in determining ore sourcing are often subordinate to considerations of ore quality, mine ownership, long term contracts, and overall corporate benefit. With respect to the latter point, the Ontario mills may at times source from a higher transportation cost origin in order to satisfy an overall corporate contract commitment.

Coal
The marine component of transportation costs to destination for coal is relatively small compared with the rail transportation cost component for delivery to either Lake Erie ports or Thunder Bay for transfer to marine. Consequently marine transportation is a minor component of the delivered cost of coal to southern Ontario steel mills.

In the event of a significant rise in marine transportation costs for coal the southern Ontario mills have the theoretical option of an all rail movement. However, neither company currently has the facility to receive the commodity by rail. Any decision to do so would involve significant investment and a long term commitment.

#### 9.1.3 Shipping Rate Impacts

While the input cost of raw material transportation is not insignificant it has little bearing on the end-product price of the steel that is established in a global market. It is however one factor, among many, in establishing the profitability of a particular steel mill. Both ArcelorMittal and U.S. Steel Canada have mills located in the U. S. on the Great Lakes above the Welland Canal that already benefit from service by larger (1000 ft) lower cost vessels than those that serve Hamilton. Steel mills represent a significant investment and any decision to shift production and/or close mills permanently would be considered only after thorough examination and influenced by many factors including input transportation costs. Marine rate increases of 10% or more were considered to be enough to stimulate a shift of production to other mills, if the capacity to accommodate the shift existed.

Steel is imported into the North American market periodically, often by U.S. and Canadian steel producers. Usually this is to meet peak demands that cannot be satisfied by local production. With current depressed world prices one industry contact observed that offshore producers would not find the North American market attractive today.

# 10 Conclusions

## *10.1 Rate Increases*

The marine industry is expected to move to 100% MDO in order to meet the 1% sulphur emissions requirement of 2012, and a premium distilled product will be required in 2015 to meet the 0.1% sulphur emissions requirement. Average rate increases of 11% and 14% are anticipated under the ECA regulations of 2012 and 2015 respectively. Individual vessels could require rate increases of 20% in 2012 and the fleet-average increase could also approach 20% under a scenario of significant increased ballast movements or lower vessel utilization, from either mode shift or market loss by shippers.

## *10.2 Mode Shift*

The increase in marine rates will affect some specific markets. The most vulnerable commodity movement is aggregate/stone where marine rate increases may result in both metallurgical and construction industries sourcing product from land based quarries instead of from sources served by marine transportation. A mode shift to truck in the order of 20% could result. The aggregate market for the Canadian GLSLS fleet has averaged 9 million tonnes per year over the last decade.

Any potential loss of aggregate traffic will put pressure on rates charged for salt on those movements where aggregate has traditionally provided backhaul. Increased marine rates for salt may affect the relative competitiveness of salt producers in specific markets but should not affect the current total volume of salt movement nor the marine modal share.

The ECA induced rate increases for grain will give rail a short term cost advantage, which would lead to some modal shift to rail delivery to Quebec City and Montreal and alternate export routings via rail deliveries to the port of Churchill (serving Western Europe, North Africa and the east coast of South America) and the West Coast (serving some eastern markets such as Mexico). The current rail car fleet is sized to carry grain in peak seasons to the terminal elevators at Vancouver, Prince Rupert, Thunder Bay and Churchill. While Churchill could be serviced as a substitute for Thunder Bay with the existing fleet, Churchill has a lower storage capacity. Any long term shift of grain to rail for direct service to lower river ports would require additional rail cars. To invest in a larger fleet of covered hoppers, the railways would probably want a long-term contract from the CWB (and the private grain companies if the movement involves non-Board grains). These factors could mitigate the likelihood of mode shifts in excess of 12%. Montreal and Quebec City received 1.4 million tonnes of wheat by domestic marine in 2006.[43] An estimated 12% or more could be diverted to rail-direct and rail-Churchill routings.

For petroleum products, the main cost of ECA will be the opportunity cost of not recapturing market share from rail rather than losing additional market share. This opportunity cost would be in the order of the 11.3% lost market gain for rail-competitive markets, primarily those sourced in Quebec.

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[43] *Shipping in Canada 2006*, Statistics Canada.

### 10.3 Global Competitiveness

Meldrum Bay, ON, Calcite MI and other aggregate producers that are located on the GLSLS system but not near high population areas would suffer from ECA induced rate increases. Similarly, the shift of grain traffic away from Thunder Bay could have competitiveness consequences. Any diversion to rail would further imperil already underutilized grain company assets at Thunder Bay. Also, if large quantities were diverted to rail, the ability of the lake carrier industry to handle large volumes of grain (say in a bumper year) could be jeopardized and constrain the market opportunities of the grain industry.

Increased rates for iron ore and coal will not be welcomed by the steel industry but are unlikely to have any short term effect on steel production at existing mills. However, if there is to be a longer-term rationalization of steel production within the global corporations increased delivered cost of raw materials would be one factor among many influencing decisions. A rate increase of 10% or more is considered to be an influencing factor.

Sourcing of raw materials, which is also driven by numerous factors, is likely to be minimally impacted. Southern Ontario steel mills have the theoretical option of an all-rail movement for coal. However, the relatively small contribution of marine transportation costs to the delivered price of coal and the significant investment required by the steel mills to enable rail receiving make it unlikely that a modal shift would occur.