Ontario Marine Transportation Study

Phase II Final Report
Market Issues, Competitiveness, Opportunities, and Recommendations

Prepared For
Ontario Ministry of Transportation
and
Ontario Marine Transportation Forum

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Executive Summary

A. Introduction

The Province of Ontario (including the Ministries of Transportation, Economic Development and Trade, and Natural Resources) and the Ontario Marine Transportation Forum (a collaboration of Ontario's marine transportation community including ports, carriers, the St Lawrence Seaway Management Corporation and other key service providers) are cosponsors of this Ontario Marine Transportation Study. A consortium of consulting firms, including MariNova Consulting Ltd, Research and Traffic Group, CPCS Transcom and Gardner Pinfold Consulting Economists, was selected in June 2008 to conduct the study.

The study findings will be used to facilitate discussions among the suppliers and users of marine transportation in Ontario concerning the Government of Ontario's policies and programs that are needed to:

1. ensure the best use is made by shippers of all available modes of transportation;
2. reduce congestion, improve transportation system efficiency and encourage mode integration;
3. promote transportation safety, environmental sustainability, and industry competitiveness; and
4. raise public awareness and understanding of the marine transportation industry so that the best use is made by shippers of all available modes of transportation, including the marine mode.

The primary objectives of this study were to: a) to produce an industry profile and economic impact assessment (Phase I); and b) – produce an objective assessment of marine industry challenges, opportunities and provide recommendations regarding its future sustainability (Phase II).

The present report represents Phase II of the Ontario Marine Transportation Study and deals with sections 2.3.2a, 2.3.2b, and 2.3.2c of the Request for Proposal. As such, the report is divided into five chapters:

- Chapter 1 – Introduction;
- Chapter 2 – Major Issues Assessment;
- Chapter 3 – Competitive Assessment;
- Chapter 4 – Opportunities Assessment; and
- Chapter 5 – Recommendations.

B. Major Issues Assessment

This section of the report looks at six major issues. The first deals with Infrastructure Issues, focusing on the infrastructure needs of key marine ports in Ontario and the St Lawrence Seaway. The second section, Policy Issues, includes Canadian Shipping Policy, the *Coasting Trade Act*, the 25percent duty issue, pilotage, manning, the US Harbor Maintenance Fee, various fees and tolls and customs issues.

The third section deals with Environmental Issues, including Aquatic Invasive Species (AIS) and water levels in the Great Lakes. The next section tackles Labour and Skills Shortages, while the fifth addresses Economic Issues. These include the cost structure of the marine industry, the costs of new versus older vessels, cargo handling, winter closures and pilotage. The final section examines Market Issues, including market share and trends, as well as modal and route competition.

B.1 Infrastructure Issues

The following ports are covered in this section:

- Oshawa
- Toronto
- Hamilton
- Port Colborne
- Port Stanley
- Nanticoke
- Windsor
- Sarnia
- Goderich
- Prescott
- Owen Sound
- Meldrum Bay
- Sault Ste Marie
- Thunder Bay

Infrastructure needs are characterized as either maintenance and renewal needs or expansion needs/plans, and are addressed separately in this report.

Infrastructure maintenance and renewal in the Ontario marine industry was deemed to be of "high" importance by all participating port sector and related industry stakeholders.

With only a few exceptions, the use of port assets in Ontario, including the St Lawrence Seaway, is under capacity. Preservation of port assets, and not capacity expansion, has been the key motivation for most port infrastructure improvement plans in the province.

There are nevertheless initiatives to improve the efficiency and use of port assets, including making better use of port land and improving road and rail access to port terminals (e.g. Port of Oshawa seeking a rail connection).

One of the key issues in many Ontario ports is competition with recreational and residential interests for waterfront use. In many cases, this inhibits port development for commercial purposes or even encroaches on port operations (The Port of Toronto is a case in point). Such land development constraints were noted as "high" by a number of interviewed port stakeholders.

The study reveals that there are a number of infrastructure needs and plans in the Ontario marine sector. Though these have been noted, no attempt has been made by the consultant to prioritize the projects, or to assess related market needs, the feasibility of investment plans, or the economic cost/benefit of the noted investment projects. Such analysis is beyond the scope of this study.

It is expected that private operators will make the necessary infrastructure investments in their facilities to ensure the ongoing sustainability or growth of their operations. There may nevertheless be opportunities to leverage private investment with public support in infrastructure, where investments would not be undertaken by the private sector on its own, where there is a market need and business case, and where this support would promote the development of marine transportation in Ontario.

There is also a need for investment in the maintenance and renewal of public ports and facilities in Ontario. However, these investments should be driven by the needs of the market and opportunities to ensure the competitiveness of the marine transportation industry in Ontario.

To this end, we offer some key questions that could help support decision-making with respect to public support for infrastructure investment. These questions are not intended to be comprehensive, but provide an initial basis to help guide decision-making with respect to public investment in marine infrastructure in Ontario.

Key Questions to Guide Public Investment in Public Facilities

Maintenance and Renewal	Expansion Plans
Will the investment address an existing or short-term safety risk?	Does the investment address a capacity constraint or limitation?
Does the investment address a capacity constraint or limitation?	Does the investment support a market need?
Does the investment support a market need? Will the investment promote sustained use of the facility? Does it make the facility more competitive? Will the related market need outlive the life of the investment?	Can the expansion initiative better/more effectively be undertaken by the private sector (in full or in part)?
Does the investment generate economic benefits in excess of costs, alternative land use over the long term?	Does the investment support the development of marine transportation in Ontario?

Key Questions to Guide Public Investment in Private Facilities

Maintenance and Renewal	Expansion Plans
If the private sector can not undertake the necessary maintenance and renewal investments itself, is there a business case to providing support? Will this promote long-term competitive operation of the facility by the private sector?	Is there a market need that the private sector can not address on its own? Is there a business case for public support?
	Does public support promote the development of the marine transportation sector in Ontario?

In assessing public investment options for the Ontario marine sector, these questions and others should be addressed in conjunction with a sound assessment of the market need for further marine sector infrastructure investments. This will ensure that public investments in infrastructure maximize the value of the marine transportation sector for Ontario and Canada as a whole.

B.2 Policy Issues

Canadian shipping policy creates a number of obstacles to the development of the marine industry in Canada. On the one hand, international shipping is largely unregulated, while domestic shipping is encumbered by a number of policies which, it could be argued, have stymied the development of the industry for at least a generation.

Canada's policy is increasingly divergent from the move to freer trade elsewhere, particularly in the EU, where, since 1993, there has been freedom to provide maritime cabotage services within a member state, with a vessel flying the flag of a member state, provided they comply with all the conditions for carrying out cabotage. The result has been a large increase in short sea shipping and better service standards, and the liberalization of cabotage also extends to the European Free Trade Association (EFTA) countries – Norway, Iceland, Switzerland and Lichtenstein. Canada's domestic overall shipping policy also discourages investment in short sea shipping, which has been the subject of much study and promotion, and an MOU with the US and Mexico.

Coasting Trade Act – The *Coasting Trade Act* came into force in 1992, and while it includes no declared policy objective, its clear intention and effect is to reserve the coasting trade of Canada to Canadian registered vessels, either built or duty-paid. Our point in raising the issue of cabotage is not to advocate opening up the Canadian market to a free-for-all of foreign competition, but to make access to foreign-built tonnage easier, whether used or new. In a nutshell, Canada's cabotage restrictions and duties on the purchase of non-Canadian vessels significantly increase marine industry start-up costs and risks.

In areas of the world with a thriving short sea sector, operators typically charter, rather than purchase, ships. This provides the ability to change ships to better respond to the market and to limit market entry risk given the implicit lower capital costs.[1] This would be difficult to do under Canada's duty and cabotage regime, as there are few such vessels sailing under Canadian flag. The *Act* does protect against "hit and run" and other opportunistic operators, (and this should continue to be of concern) but vessels brought into the country and upon which duty is paid, are virtually un-saleable on the international market once imported into Canada. It also makes it very difficult to "right-size" and upgrade a service once it is established.

The Duty Issue – One aspect of Canadian policy, which, contrary to popular belief, is not actually related to *shipping* policy *per se*, is the 25percent duty levied on foreign-built ships entering Canadian service. This policy is, in fact administered by Industry Canada and is intended to protect Canadian shipbuilding interests. *It is quite possibly the most important single issue impacting the Ontario marine transportation industry.*

In 2006, the Canadian Shipowners Association (CSA) began to campaign for the removal of duty on newly-built lakers, which, they contend, cannot be built in Canadian shipyards. The CSA has brought forward a compelling argument for removal of the duty, but it is limited to new vessels only and would not apply to ship repairs. The CSA estimates that over $1 billion in new vessel orders could be placed if the duty was removed. New ships would also have an immediate and positive environmental benefit, as new vessels produce up to 25percent fewer GHGs and have improved ballast systems.

Stakeholders consulted for the study mostly echoed the CSA's position, but did not place the "laker" qualifier on it. A number of shipowners indicated they would like to see the duty removed from all imported vessels to speed fleet renewal and to take advantages of new

[1] "Transhipment and Feedering Trades, Operators, Ships", Dynamar B.V., September 2007; this point is also discussed in "Eastern Canadian Hub and Spoke Study", Transport Canada, 2008.

opportunities. It was also recognized that a phase-in period is required for existing owners of duty-paid vessels.

Pilotage – All areas under consideration for this study fall under compulsory pilotage regulations either in the area covered by the Laurentian Pilotage Authority below Montreal or in the jurisdiction of the Great Lakes Pilotage Authority, west of Montreal.[2]

Numerous stakeholders have made representation regarding pilotage reform in both the St Lawrence and the Great Lakes.[3] Central to its position is that there have been vast improvements in technology and training in the past 30 years, and that pilotage authorities should consider that new communications and navigational equipment, including Differential Global Positioning System (DGPS) and electronic chart display has been installed on most domestic vessels. This has been complimented by Bridge Resource Management training, and the introduction of the International Management Safety Code under IMO for pollution prevention and safety.

Customs – There are two customs issues as they relate to Great Lakes shipping. One relates to the Canadian cost recovery fee, and the other relates to the US 24- hour notice that cargo owners are required to provide when shipping by the marine mode.

Any new marine service across the lakes has to pay the full cost of placing officers at the location (at $100 per hour per officer) as well as the total cost of new infrastructure.

B.3 Environmental Issues

Aquatic Invasive Species – Great Lakes/Seaway stakeholders have seen the issue of Aquatic Invasive Species (AIS) as being of paramount importance, as environmental interests have gone as far as demanding the closing of the Seaway to international shipping to prevent the introduction of additional AIS. The response of commercial shipping interests has been to focus on the management and inspection of ballast water to help insure that it does not contain AIS.

The marine industry is concerned that a hodgepodge of state regulations may evolve and impair the efficiency of their multi-jurisdictional operations. The timing for regulations coming into effect, combined with the need for either retrofitting existing vessels or building new tonnage is a major concern because of duty issues and shipbuilding capacity.

Water levels – The marine industry and hydro-electric industries prefer constant water levels, whereas environmental interests prefer more natural seasonally fluctuating water levels. Generally shipping has to adjust to changing water levels. The loss of even a few inches or centimetres in permissible draft results in very important reductions in cargo that a ship can carry – it may even equate to the profit margin for a particular shipment. Each one inch of vessel draft is equivalent to about 130 tonnes of cargo payload for a typical laker or ocean

[2] Laurentian Pilotage Authority Regulations (C.R.C., c. 1268) Section 4; Great Lakes Pilotage Authority Regulations (C.R.C., c.1266) Section 4.

[3] Canadian Shipowners Association, "Brief to the Consultation Consultant on the Pilotage Act Review", March 12, 2007.

going vessel, so this issue is very significant. From a public policy standpoint, water levels need to be addressed while still maintaining access for marine transportation.

B.4 Labour Issues and Skills Shortages

Across Canada, including in Ontario, the marine industry is facing acute difficulties in the attraction, recruitment, training, and retention of skilled workers – marine officers in particular.

The key problems with respect to the availability of qualified labour in the Ontario marine sector are driven by a number of issues, including an aging marine sector work force, inadequate recruitment of new staff, barriers to training and advancement. There has been funding for skills upgrading purposes, and it should be noted that the $8.5 million Marine Training Centre and Simulator at the Owen Sound campus of Georgian College received $3 million from the Ontario Ministry of Training, Colleges and Universities, $1.435 million from Transport Canada and $750,000 from MTO.

B.5 Economic Issues

The two basic elements of economics – "demand" and "supply" can *largely* be considered to be beyond the ability of the shipping industry to influence. Demand for Great Lakes shipping is a derived demand – it depends on the level of activity in those industries that use it:

- Many of the industries respond at a very early stage to the business cycle - steel production and cement are prime examples.
- Other commodities are influenced by other independent variables - for example salt shipments respond to severity of winter and grain shipments may be influenced by the levels of grain harvests half-way round the world.
- In the long-run, demand is determined by structural changes in the economy – for example globalization has led to the shifting of location of some industries such as steel production.

The greatest "supply" concern relates to the aging fleet of vessels, the need for fleet renewal and the imposition of the 25 percent duty imposed on imported vessels from the most important shipbuilding nations.

B.6 Market Issues

Modal market share is determined by shipper and/or receiver preferences based on transportation service criteria and price within a supply chain. The ability of modes to compete for business can be influenced by legislation and regulation that may affect service efficiency and/or government subsidies, fees or taxes that may influence service price.

C. Competitiveness Assessment

The chapter presents a summary of the overall strengths, weaknesses, opportunities, and threats which are affecting the Ontario marine transportation industry.

Strengths

- Stability of client base

- Low linehaul operating (tonne-km) costs
- Available capacity for traffic growth within Seaway and port infrastructure
- Low energy consumption and GHG emissions per tonne-km
- Ability to handle heavy and large dimension machinery and equipment

Weaknesses

- Government investment in and commitment to maintain essential infrastructure
- Load transfer and inventory costs
- Vessel fleet – age and vessel type
- Longer transit times and less frequent service than other modes
- Lack of direct access to other than shore-based clients
- Seasonality of service
- Government imposed fees and constraints
- Dimensional constraints of the Seaway system
- Low water levels

Opportunities

- Selective Attraction of Traffic from Competing Modes or Routes
- Pent up demand to rebuild Canada's merchant fleet

Threats

- Potential effects of industrial globalization and government policies
- Environmental issues (Aquatic Invasive Species, toxic emissions)
- Seasonal fluctuations in demand
- Labour force issues
- Competing land use priorities in and around ports

D. Opportunities

This chapter examines potential future opportunities for the Ontario marine transportation industry.

D.1 Best Practices

The Great Lakes and Baltic regions are very similar, in terms of geography and population, except the Baltic is surrounded by nine countries rather than two. The total population of the so-called Nordic countries (24 million), Baltic countries (8 million) and northwestern Russia (44 million) is a combined 76 million.[4] The climate and resource base are similar, and with the possible exception of the former Soviet republics, enjoy very high GDP per capita.

We examine several examples of successful shipping operations in the Baltic region, including perhaps the most unique "industrial shipping" application in the world.

[4] Finnlines Investor Presentation, September 2008.

D.2 Status of Initiatives

The concept of short sea shipping between the east coast and the Great Lakes has received much attention recently, and has been the subject of several studies, both public and private. It is being promoted by many stakeholders, including both the Canadian and US Seaway administrations, ports in the Great Lakes such as Hamilton and Cleveland, and potential new terminal operators such as Melford International Terminals.

D.3 Case Studies

In this section, we examine 10 different routings for potential new shipping services in Ontario. We have examined two services that utilizes the Seaway, and eight cross-lakes services. Previous work has suggested that requirements to keep supply chains open and cargo flowing, will render it difficult for short sea container services to operate into the Lakes from Halifax or Montreal. We have, however, examined the potential to move an industrial product from a point downstream from Montreal to Hamilton, as well as a pure ro-ro trailer (no passenger) service between the Lakehead and the Soo, and points in Lake Huron and Georgian Bay.

We also examined the potential for building new lakers in China. Arguments justifying the continued use of older tonnage range from the fact it is fully paid and depreciated, to the relatively benign (fresh) waters of the St Lawrence and Great Lakes system, which do not subject these vessels to the same kinds of operating conditions faced by salt water tonnage.

D.4 Environmental / Social Cost:Benefit

The marine mode offers low linehaul operating costs per tonne/km. This is particularly true in open waters, where the only infrastructure requirements are navigation aids. While vessel operating costs are low on a tonne-km basis, capital costs for vessels are high. Marine vessels require a much higher investment per tonne of capacity than trucks; and, while they have a longer life, the investment decision involves the risks of market forecasts of asset utilization over that longer life. Ocean vessels have some flexibility in markets/routes over their lifetime, whereas lakers are more dependent on the industries within the Great Lakes/Seaway system. Railway motive power and freight cars fall between the truck and marine modes in terms of magnitude of flexibility of routes/markets served over their useful lives. The higher duty imposed on imported vessels than on other modes exacerbates the capital magnitude/risk issue for marine.

While on a tonne-km basis the marine mode is more fuel efficient and produces less GHG than other modes, the potential for modal shift, from truck to marine, to significantly reduce road congestion and air pollution is somewhat limited by market realities and regulatory obstacles. Whereas the greatest potential for modal shift is with inter-city traffic, the greatest road congestion occurs with local intra-city traffic where distances are too short and handling costs too high for marine transportation to be viable, except perhaps in the case of high speed passenger-only ferries in the GTA region. With regard to air pollutants, new truck engine legislation will significantly reduce truck emissions so that by year 2010 the tonne-km cost of air pollutants from trucks may be lower than that of rail or marine, assuming the status quo remains with respect to the aging fleet of pre-1985-built vessels. There remains much uncertainty with respect to understanding and measuring these and other so-called external costs.

D.5 Promotion of Marine Mode

Both Canada and the US have taken inspiration from the European experience with short sea shipping. The EU Marco Polo programs are one way to promote the concept, as perhaps are the 19 short sea promotion centres scattered throughout the EU.

There are five types of programs in the Marco Polo Program:[5]

- modal shift actions;
- catalyst actions;
- common learning actions;
- motorways of the sea actions; and
- traffic avoidance actions.

Since 2006, Quebec has had a program in place to encourage modal integration. It has also established a Shortsea Shipping Roundtable to discuss maritime matters and to promote the use of the St Lawrence system. This follows the release of the *Quebec Marine Transportation Policy: Quebec at the Helm* in 2001.

E. Recommendations

There are obviously many issues impacting the marine industry in Ontario, as well as many different priorities that need to be addressed if it is to grow and prosper, and serve the needs of industry and communities in the Province. Below, are some key initiatives we believe should be undertaken.

E.1 Infrastructure

Government and industry should consider setting up and making available a fund for marine infrastructure development. This could potentially tie into the federal Public Private Partnerships Fund, which is part of the Building Canada Plan. Funds should be allocated on a call for proposal basis. The private sector should fund at least half of the cost themselves and provide a commitment to operating the facility for a fixed period (this is not intended to be a handout program). Funds should be awarded on the basis of demonstrated business case, and economic benefits resulting from project (metrics to be defined by program ahead of time).

E.2 Seaway

For any stakeholder contemplating investment in any assets with a life beyond 2018, particularly so for new lakers, it is necessary to know what the rules of the game will be beyond 2018, whether government will continue to be committed to maintaining Seaway infrastructure its current state of reliability, whether it will continue to cover any deficits and whether toll increases will be tied to the cost of living or less. Stakeholders should work within its existing Board of Directors, including carriers, shippers to obtain a commitment from the federal government to the Seaway past the present agreement.

[5] http://ec.europa.eu/transport/marcopolo/calls/docs/2008/call08_summary.pdf, last accessed 31 October 2008. CPCS has also provided extensive analysis of the Marco Polo program in the "Eastern Canada Hub-and-Spoke Study", Transport Canada, 2008.

E.3 Duty Issue

The most important policy issue is the imposition of a 25percent duty on foreign built vessels. This policy may support the shipbuilding industry, but it is an impediment to fleet renewal and impacts on the end users such as critical manufacturing capacity in the Province.

E.4 NAFTA cabotage

Work with US Counterparts to create a North America Cabotage regime. Many prospective Great Lakes trades may be more viable if additional flexibility to combine domestic and transborder trades is available. This is probably a longer term objective.

E.5 Regulatory Reform

There is little Ontario can do about some of the issues discussed above, but it should actively lobby federal government to address duty and other issues. This is the "elephant in the room", and until addressed, unlikely that other initiatives will get much traction.

E.6 Pilotage

Consider creating Marine NavCanada, a not-for-profit corporation, to take over the functions of pilotage and marine navigational services. Rationalization and modernization of services related to ship navigation, currently provided by government, needs to take place in order to create a lower-cost, more efficient regime. Such an initiative could include the federal government on the ground floor or at a later stage.

E.7 Human Resources/Training

Georgian College has a program to train marine personnel at its Owen Sound campus. If no local qualified labour available, these training programs/scholarships and certificate upgrades should be marketed to attract international marine HR, in collaboration with private marine groups that would commit to then hiring.

E.8 Opportunities

At the present time, there are too many barriers in the way of allowing cross-lakes or via Seaway short sea shipping to take place. These include:

- 25 percent duty;
- Coast Guard Hull Construction regulations should move to a high international standard;
- US HMF needs to be removed;
- inability to obtain pilotage exemption for a "ferry";
- the requirement to pay all customs infrastructure and personnel costs;
- for Seaway-based short sea shipping, a viable and cost effective winter alternative is required; and
- proponents of short sea shipping should work with large industrial shippers or trucking firms to develop supply chain solutions.

E.9 Promotion of Marine Transportation

An increase in the amount of cargo moved by water, whether in bulk, by container or by multimodal truck transport may have some potential to reduce traffic congestion, reduce road

maintenance costs and may have some potential to reduce pollution and GHG production. In this very capital intensive industry, there exist significant barriers both to entry and to continued operation posed by Canadian Government policy.

As pointed out in the Phase I Report, the marine industry impacts many sectors of the Ontario economy and higher costs are inevitably passed on to the users of the system, which is ultimately reflected in the competitiveness of the national economy.

E.10 Maintain Cost Competitive Marine Bulk Transportation System

Because of its importance to Ontario's industrial fabric and the competitiveness of its industrial base and other sectors of the economy, the government of Ontario should continue to advocate on behalf of its marine industry and their customers for continued access to marine transportation of bulk materials to base industries (steel, construction, agri-products, chemicals, energy), versus the alternative of a modal shift potentially from marine to already overburdened road infrastructure.

1.0 Introduction

1.1 Background

The Province of Ontario (including the Ministries of Transportation, Economic Development and Trade, and Natural Resources) and the Ontario Marine Transportation Forum (a collaboration of Ontario's marine transportation community including ports, carriers, the St Lawrence Seaway Management Corporation and other key service providers) are cosponsors of this Ontario Marine Transportation Study. A consortium of consulting firms, including MariNova Consulting Ltd, Research and Traffic Group, CPCS Transcom and Gardner Pinfold Consulting Economists, was selected in June 2008 to conduct the study.

The study findings will be used to facilitate discussions among the suppliers and users of marine transportation in Ontario concerning the Government of Ontario's policies and programs that are needed to:

1. ensure the best use is made by shippers of all available modes of transportation;
2. reduce congestion, improve transportation system efficiency and encourage mode integration;
3. promote transportation safety, environmental sustainability, and industry competitiveness; and
4. raise public awareness and understanding of the marine transportation industry so that the best use is made by shippers of all available modes of transportation, including the marine mode.

1.2 Objectives

The objectives of the study were two-fold:

1. to produce an up-to-date profile and economic impact assessment of Ontario's marine industry, and
2. to assess the challenges and opportunities facing the Ontario marine industry and to provide associated recommendations.

1.3 Organization of this Report

The present report is Phase II of the Ontario Marine Transportation Study and deals with sections 2.3.2a, 2.3.2b, and 2.3.2c of the Request for Proposal. As such, the report is divided into four additional chapters:

- Chapter 2 – Major Issues Assessment;
- Chapter 3 – Competitive Assessment;
- Chapter 4 – Opportunities Assessment; and
- Chapter 5 – Recommendations.

Major Issues Assessment examines six major issues. The first deals with Infrastructure Issues, focusing on the infrastructure needs of key marine ports in Ontario and the St Lawrence Seaway. The second section, Policy Issues, includes Canadian Shipping Policy, the *Coasting Trade Act*, the 25percent duty issue (perhaps *the* most important issue facing the Ontario marine transportation industry), pilotage, manning, the US Harbor Maintenance Fee, various fees and tolls and customs issues. Environmental Issues, the third section, deals with Aquatic Invasive Species (AIS) and water levels in the Great Lakes. The fourth section tackles Labour and Skills Shortages, while the fifth section addresses Economic Issues. These include the cost structure of the marine industry, the costs of new versus older vessels, cargo handling, winter closures and pilotage. Market Issues, the final section, examines market share and trends, as well as modal and route competition.

Competitive Assessment includes a SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis. This sets the stage for the following chapters, Opportunities and Recommendations.

Opportunities Assessment examines potential future opportunities for the Ontario marine transportation industry. We first examine best practices and have chosen the Baltic region, which has a similar climate and population base to the Great Lakes Basin. However, in this context, it is noteworthy for its dynamism and success both globally as well as in the short sea sector. The region has benefited from EU cabotage reforms which ensure ready access to vessels and crew. This section also examines several companies active in the Baltic, and concludes that one approach is to build new short sea and other shipping services around the needs of one or two customers, what the Europeans term “industrial shipping”.

The report reviews several initiatives underway in Ontario and provides an update as to their progress. These include the Hamilton-Montreal feeder service project, the proposed Port Stanley-Cleveland ferry service, Thunder Bay’s “long sea” project, as well as ongoing efforts to start a Halifax-great Lakes feeder.

We also examine 10 potential cross-lakes routes and compare them to the cost of driving around the lakes on a point-point basis. We conclude that many obstacles need to be removed before these services are viable, but stripped of these obstacles, looking strictly at pure shipping operations (excluding duty), several services could be competitive providing they are well supported or built around the needs of a major shipper or trucker.

Finally, the report examines the potential benefit and costs of building a new fleet of lakers offshore (most likely in China) and compares the cost, with and without duty, of a “new laker” with older vessels. New environmental regulations make it imperative that fleet renewal begin *poste haste*.

Recommendations provides some key initiatives that should be taken for growth and renewal and the survival of marine transportation in Ontario.

2.0 Major Issues Assessment

2.1 Infrastructure Issues

The focus of this section is on the infrastructure needs of key ports in Ontario as well as the St Lawrence Seaway. Infrastructure needs are characterized as either *maintenance and renewal needs*, or *expansion needs/opportunities*. Accordingly, maintenance/renewal needs are addressed separately from expansion plans in this section.

For the purposes of assessing infrastructure needs to promote the development of the marine transportation industry in Ontario, "infrastructure" is defined as the physical, immovable structures that support the transportation of freight. Accordingly, for the purposes of this report, infrastructure includes seaways, channels, landside port infrastructure, including berths, piers and quays, and freight storage infrastructure, as well as rail and road infrastructure providing access to marine terminals and all infrastructure ancillary thereto.

Ships, barges, tugs, or other sea-going vessels are not considered infrastructure and thus are not addressed in this section. Operational or regulatory issues are also not covered in this section.

2.1.1 Methodology

The information in this section draws from a number of sources, including external and third party documents, the Phase I Report for this study, and interviews with relevant stakeholders. This infrastructure needs described in this section expand on those outlined in the Phase I Report. This section presents infrastructure needs as communicated to the consultant, and does not provide a detailed analysis of the urgency, market need, or feasibility of infrastructure maintenance/renewal and expansion plans.

Information has been presented as obtained, and has not been audited by the consultant for completeness or accuracy. It is recognized that this list of marine sector maintenance, renewal and expansion plans may be incomplete. In some cases, this is because infrastructure plans were deemed confidential and not provided to the consultant. In others, this is due to difficulties of obtaining input from specific stakeholders. In any case, the consultant welcomes additional input from the Steering Committee and other stakeholders on infrastructure needs, where not identified in this report.

2.1.2 Overview of Ontario marine sector infrastructure needs

Infrastructure maintenance and renewal in the Ontario marine industry was deemed to be of "high" importance by all participating ports sector and related industry stakeholders.

In some cases, port assets are over 100 years old and require significant attention in the short term (e.g. Port of Goderich) while in others only require routine maintenance (e.g. Port of Windsor). Transport Canada (TC) port assets planned for divestiture, including those at Port Stanley and Owen Sound, are maintained in response to urgent safety needs only.

With only a few exceptions, the use of port assets in Ontario, including the St Lawrence Seaway (Seaway), is under capacity. Preservation of port assets, and not capacity expansion, has been the key motivation for most port infrastructure maintenance and renewal activities in the province.

There are nevertheless initiatives to improve the efficiency and use of port assets, including making better use of port land and improving road and rail access to port terminals (e.g. Port of Oshawa seeking a rail connection).[6]

One of the key issues in many Ontario ports is competition with recreational and residential interests for waterfront use. In many cases, this inhibits port development for commercial purposes or even encroaches on port facilities (the Port of Toronto is a case in point). Such land development constraints were noted as high by a number of port stakeholders interviewed.

Nevertheless, a number of ports do have plans to capitalize on new traffic opportunities (e.g. developing capabilities to handle different types of traffic such as container feeder vessels or cross lake ferries (e.g. Port of Hamilton)), to attract ethanol plants (e.g. Oshawa), or otherwise to make commercial use of available lands (e.g. communities along the Welland Canal).

For the purposes of the discussion in this report, the maintenance and renewal of existing infrastructure is considered as distinct from expansion plans (future/new infrastructure).

It should be noted that most port facilities in Ontario are privately operated. Related maintenance/renewal and/or expansion plans are often confidential and were thus not provided to the consultant. We have noted related plans, where they were made available. Otherwise, much of the focus in this section is on the maintenance/renewal and expansion of assets owned and managed by "landlord" Port Authorities.

The following two sections provide an overview of the infrastructure needs of Ontario ports (Section 2.1.3) and the St Lawrence Seaway (Section 2.1.4), respectively. Section 2.1.5 provides some discussion around prioritization of infrastructure investments.

2.1.3 Port infrastructure needs and plans

The infrastructure needs and plans of the following ports are covered in this section:

- Prescott;
- Oshawa;
- Toronto;
- Hamilton;
- Port Colborne;
- Port Stanley;
- Nanticoke;
- Windsor;

[6] Road/rail access issues are the subject of an ongoing Transport Canada study, undertaken by Giffels and CPCS.

- Sarnia;
- Goderich;
- Owen Sound;
- Meldrum Bay;
- Sault Ste Marie; and
- Thunder Bay.

For each port, constraints and opportunities, infrastructure and renewal plans and expansion plans are noted.

The infrastructure needs and plans of the St Lawrence Seaway are covered in Section 2.1.4.

2.1.3.1. Prescott

Infrastructure Constraints and Opportunities

The port has" tired" infrastructure. It consists of timber docks built many years ago and not maintained by Ports Canada or Transport Canada. While appropriate for the time, the construction is not suitable for today's business where ships unload faster and commodity piles on-dock are bigger than the docks were designed for.

The port has excellent road and rail connections with eastern Ontario, Quebec and the United States via Highways 401 and 416 and the bridge to Ogdensburg, NY. Congestion is not an issue. Canadian National Railway provides service to the loading and unloading sheds at the grain elevator and is close to the other docks. Canadian Pacific Railway has access through interswitching at Brockville.

With the ethanol plant now in operation, there may be potential to handle distillers grain outbound over the port.

There is also potential for Prescott to become a stop on GLSL cruises because of its proximity to Ottawa, Morrisburg and Kingston. The Spirit of Nantucket stopped at Prescott in 2006 and 2007 (4 times).

Figure 3-1: Aerial View of the Port of Prescott

Infrastructure Maintenance and Renewal

The port indicated that maintenance and renewal of infrastructure is of "high" importance but did not provide specifics or related costs.

Dredging is not a major issue. It has been several years since dredging was done.

Expansion Plans

The port has approximately 20 hectares available for development in the port area and the township has approximately 80 hectares across County Road 2 from the port available for development.

The Port has applied for and received $11.5 million from both the provincial government and the Build Canada Fund to add 20,000 tonnes capacity[7] to the elevator (app $5 million) and for replacement of the "Harbourfront" salt dock (approx $34 million).

[7] The elevator needs additional capacity to handle the increasing volumes of grain to be stored. Part of this is inbound corn from the US for the ethanol plant, partly western grain bound for export, and partly corn and soybeans grown in Eastern Ontario that require storage at harvest time.

2.1.3.2. Oshawa

Infrastructure constraints and opportunities

All facilities at Oshawa are publicly owned. The Port of Oshawa is a receiving port (largely steel destined to Toronto and other nearby markets). No major infrastructure constraints at the Port of Oshawa were noted. Dredging, however, is required on a regular basis to remove silt across the port entrance. Current facilities can handle up to 500,000 tonnes per season, which is far in excess of current traffic that is generally below that volume. The port has good road access to nearby Highway 401, but does not at present have onside rail facilities A rail spur is seen as a necessary condition to attract an ethanol plant onto vacant land within the port (discussions are being held with the Canadian National (CN) Rail to extend a spur line to the East Dock).

Infrastructure maintenance and renewal

The Port of Oshawa rated infrastructure maintenance and renewal as being of "high" importance to its operations but did not comment on specifics. It did note that dredging was required every three years to remove silt across the entrance of the port, at an approximate cost of $600,000 each time.

Expansion Plans

The Port of Oshawa has a number of expansion plans, including those noted below (cost details were not provided):

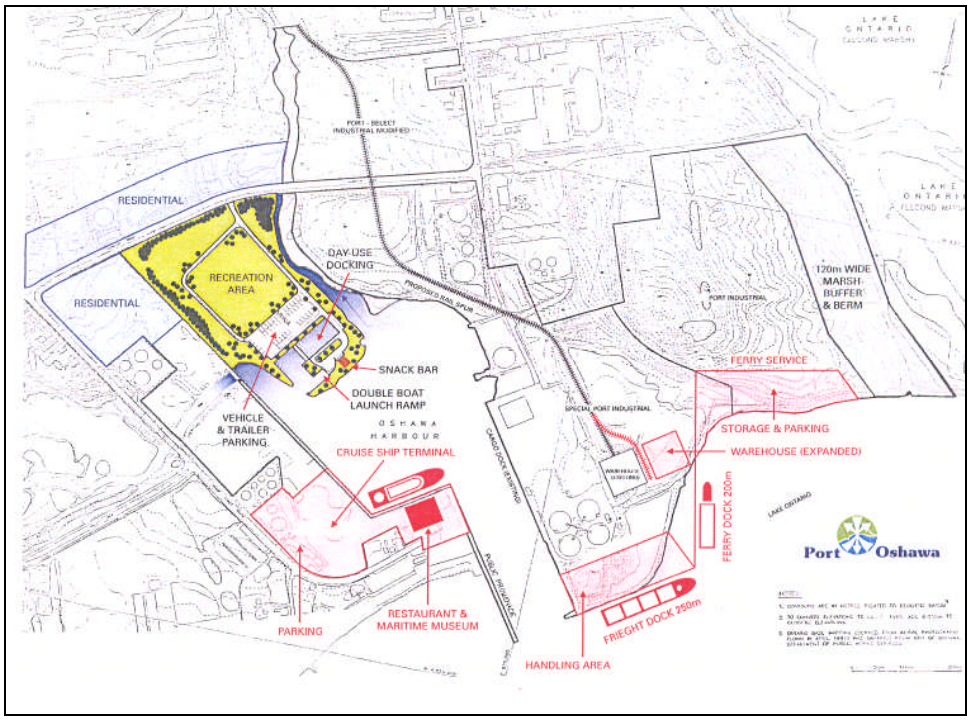
- As of August 2008, the port was anticipating an agreement with CN for the provision of a railway spur into the port area. This was seen as a necessary condition to attract an ethanol plant onto vacant land within the port, although there is opposition to these plans from the City of Oshawa.
- Plans to double warehouse space to 100,000 sq ft.
- The new dock is five to 10 years away as the port only has $1 million to invest, while it would require $6 million to complete.

Figure 1. Aerial View of the Port of Oshawa

In addition to the foregoing, the port has plans (see Figure 2 below) to expand its ability to handle freight, develop a recreation area including a marina, develop a cruise ship terminal and a ferry service facility, expand indoor storage and relocate the freight berth from the west dock to the south end of the east dock. These plans have been developed over a number of years and are expected to take place over an extended period. For instance, the cruise ship terminal is probably at least 10 years away from construction.

For the purposes of this report, further information on port maintenance/renewal as well as expansion plans for the Port of Oshawa was sought from the Harbour Commission, but no additional information has been provided.

Figure 2. Port of Oshawa Expansion Plans



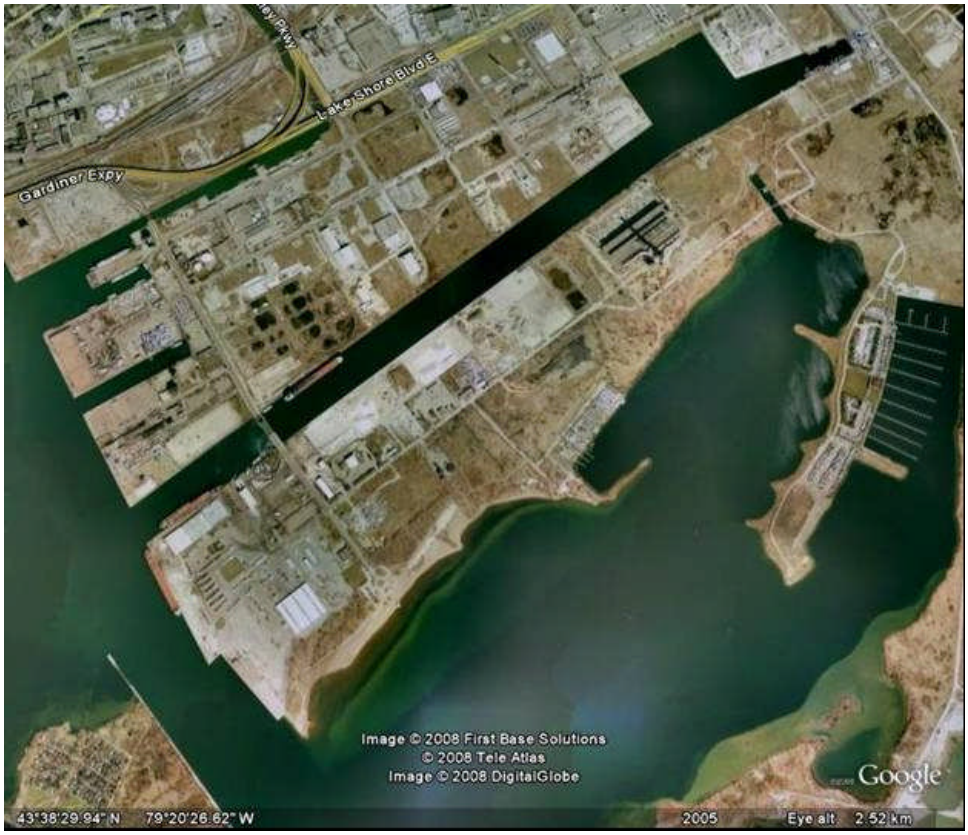
Source: Oshawa Port Commission

2.1.3.3. Toronto

Infrastructure Constraints and Opportunities

The Toronto Port Authority (TPA) owns and operates (or leases out) 50 acres of property within the inner harbour. No capacity issues were cited by the port, although there are road access congestion issues given the location of the port in relation to major roads in downtown Toronto. Road access via Cherry Street also creates issues as trucks pass through a residential area. The commercial marine facilities at the Port of Toronto have been shrinking for many years due to the redevelopment of the waterfront and industrial relocation. The port is expected to remain constrained as it is surrounded by City of Toronto land that will not be sold to the port. This year, the port was constrained in the handling of windmills by its limited open storage area. The Port of Toronto is served by both major railways (i.e. CN and the Canadian Pacific (CP) Railway) and has ready access to the major Ontario highway system. During a recent visit to the port by the consultant, it was noted that part of the rail system was not in use, with some being discontinued.

Figure 3. Aerial View of the Port of Toronto



Infrastructure Maintenance and Renewal

Infrastructure maintenance and renewal was deemed to be of "high" importance by the Port Authority. The TPA noted that it was "currently preparing a list of infrastructure projects" and that the projects it would be putting forward in the short-term are related to the dockwalls and the replacement of the Ship Channel Bridge (total estimated cost in the order of $50 million).[8]

It was indicated that these projects are critical to the Toronto Port Authority, in that the integrity of the dockwall must be maintained so that it does not infringe on the waterway and create a navigation issue. Also, dockwalls that are in disrepair cannot be used for berthing of ships. The Ship Channel Bridge is 70 years old and represents the only access to the main port operation of the Toronto Port Authority and other port users.

Expansion Plans

The TPA is considering the expansion of its outer harbor marina. Related cost estimates on this and other (not noted) expansion projects are in the area of $50 million.

[8] Email from Alan Paul, January 29th, 2009.

No other investments were cited by the port, although as the port redevelops over the next 10-15 years, the salt and aggregate companies are expected to relocate close to the cement companies, with road access by Leslie Street. No additional details were provided.

It is noted that the Port of Toronto is slowly changing from a traditional port to a residential and tourism waterfront. Related traffic is being picked up by the Port of Hamilton, which is very proactive in commercial marine development.

According to one industry stakeholder, "if marine transportation is not integrated into overall policy, municipalities will want to use unused port land for other purposes."

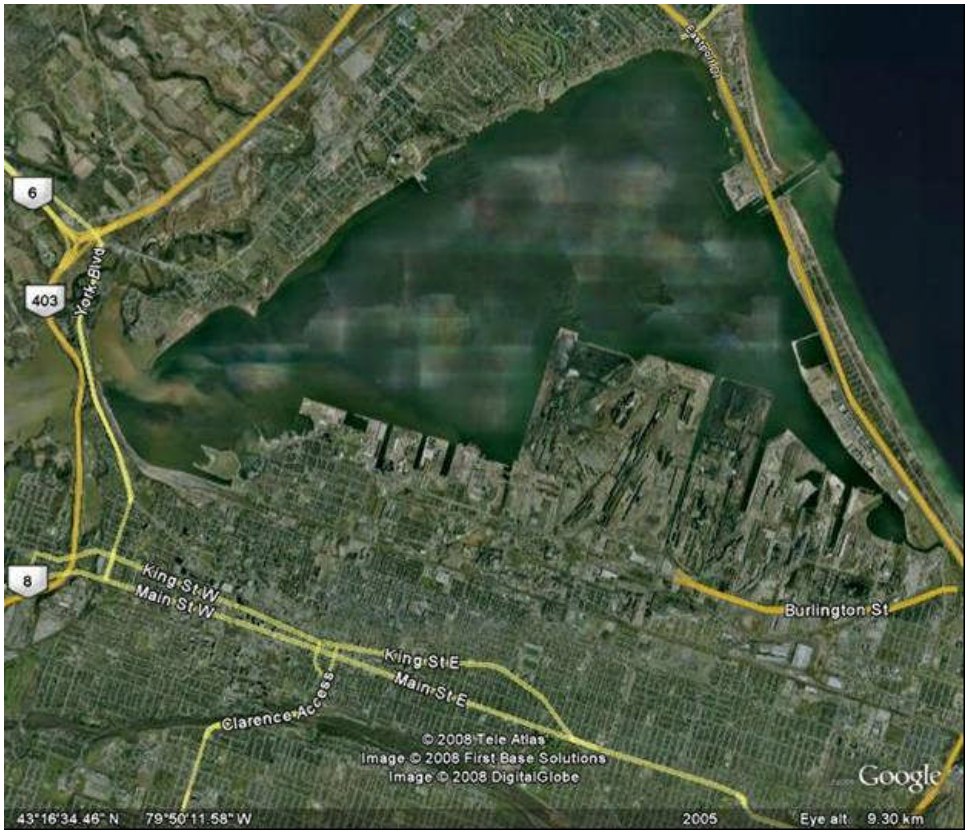
2.1.3.4. Hamilton

Infrastructure Constraints and Opportunities

Based on tonnage handled, Hamilton is the largest fully commercial port on the Canadian Great Lakes. The port is home to US Steel (formerly Stelco) Canada and Arcelor Mittal Dofasco, the two largest producers of steel in Canada. The port's most significant capacity is for ore handling, but it also has other dry and liquid bulk cargo docks as well as general cargo handling facilities. No capacity issues at the port were noted, although it was indicated that infrastructure was aging and would need upgrading or replacing over time. The port area is reached by local roads, and there is an extensive network of on-dock rail facilities serviced by the Southern Ontario Railway, which connects with both mainline service providers (CN and CP). The major facilities at the port, especially the steel mills, are set up to receive raw materials by water, and it is not known if there would be sufficient property to establish unit train unloading operations should the eventuality arise. The port has an access restriction for oversized rail shipments but is addressing the issue without the need for significant investment in infrastructure. Road access issues are being assessed in the context of an ongoing study, led by TC.[9] With a few exceptions, port facilities (docks) have a minimum of Seaway draft and can be dredged as needed.

[9] Study of Road Access to Intermodal Terminals and Distribution/Transload Centers, work undertaken by Giffels and CPCS. The Final Report is due in the first quarter of 2009.

Figure 4. Aerial View of the Port of Hamilton



Infrastructure Maintenance and Renewal

The Hamilton Port Authority (HPA) rated infrastructure maintenance and renewal as being of "high" importance to its operations as did ArcelorMittal Dofasco and US Steel, two of the major users of the port. Specific infrastructure maintenance and renewal plans were not provided, although it was indicated that infrastructure is aging and will need upgrading and replacement over time. The port will plan accordingly, on an as-needed basis, but funding will be needed to pay for this.

With a few exceptions, port facilities (docks) have a minimum of Seaway draft and can be dredged as needed. The channel is dredged every three to five years. Related costs were not provided.

There is also an ongoing environmental project to remediate the Randle Reef located within the harbour.

Expansion Plans

The Port has a land use plan developed in 2002, which includes improving road access to the port areas. Currently, the Port Authority has land for development at Piers 22 and 27 (sandy coloured areas on the map). Hamilton is trying to develop Pier 22 which has 103 acres, Seaway draft and is ready for development**.**

There are currently no dock facilities at Pier 27, which is a Confined Disposal Facility (CDF), but they are planned to be built along the west side as the CDF is filled and made available for property development. Fundraising is ongoing for the local one-third share of the construction cost.

Some of the waterfront has been converted to recreational and tourist uses, leaving the major components of the port intact.

The lift bridge over the Burlington Canal is owned by Public Works and Government Services and is on its divestiture list.

For the purposes of this report, further information on port maintenance/renewal as well as expansion plans for the Port of Hamilton were sought from port management, but no additional information was provided at the time of submission.

2.1.3.5. Port Colborne

Infrastructure Constraints and Opportunities

Commercial marine facilities (largely related to movement and storage of grain) at Port Colborne are well under capacity, and traffic is declining. The port is served by rail and road, although highway infrastructure is an issue with the City, which wants a limited access four-lane road extended to Port Colborne. Also of note, marine traffic on the Welland Canal can disrupt traffic in the city due to the need to close bridges to allow ships to transit the Canal. Draft along the Seaway wall is to maximum Seaway level, but draft in the City-owned harbour is listed at 6.7 metres in Greenwood's. In recent years, draft has been an issue due to lower water levels in Lake Erie. The canal wall is said to require some maintenance, and this is the responsibility of the Seaway.

The City is interested in developing the cruise business. In recent years several cruise ships have called, but there is no suitable area to tie up such a vessel. The City is also contemplating other transport sector development projects to spur regional economic development.

The Welland Canal is closed for three months each winter.

Figure 5. Aerial View of the Port Colborne

Infrastructure Maintenance and Renewal[10]

Port Colborne rated infrastructure maintenance and renewal as being of "high" importance to its operations. It was noted that the Welland Canal needs maintenance, although related work falls under the jurisdiction of the Seaway (related costs unknown). Private facilities along the canal may also require maintenance and renewal, although these were not communicated to the consultant.

Expansion Plans

Port Colborne has 800 acres of available land along or near the Welland Canal in the northern part of the City. There are discussions about developing a cruise berth in Port Colborne to promote regional tourism, although no formal plans have been developed. Dock space is available, although it would need rehabilitation to accommodate tourists (at present, cruise ships dock at the former coal dock).

Other expansion plans and initiatives are at very early conceptual stages, but include the following:

[10] Mr. Stephen Thompson of the Port Colborne Economic & Tourism Development Corporation provided additional information to inform this Working Paper in a phone interview on February 26th, 2009.

- Port Niagara project: municipalities along the Welland Canal are in the process of committing funding (approx. $100,000) to study port opportunities along the banks of Welland Canal. Opportunities likely to be explored include enhanced grain storage facilities, fuel docks, and facilities for transload activities as well as the potential to develop a regional container port.
- There are also plans to consider the sale (or lease) of land along the canal for industrial development and other related activities.
- There is an interest in the area for the establishment of the Port of Niagara to look after all the smaller ports (excluding Hamilton). There is some concern on the part of the Seaway about what this would mean for the use of the facilities.

These and other plans are largely long-term (five to 10 year) focused on economic development, rather than the enhancement of transport efficiency *per se.* Whether there is an economic basis for these plans is yet to be determined.

2.1.3.6. Port Stanley

Infrastructure Constraints and Opportunities

Port Stanley is a TC port slated for divestiture. The commercial port has been in decline for many years. This led to the abandonment of the London and Port Stanley (LPS) Railway, which once handled large volumes of coal shipped across Lake Erie from ports in Ohio.

Port Stanley has always been used for summer beach-front recreation, and in recent years there has been considerable residential development in the area.

Even when fully operational, the port had a draft limitation of 21 feet at the commercial docks, which meant that a large lake vessel could not come in fully loaded or take on a full load. From discussions with several interested parties, it now appears that the draft at Port Stanley is severely limited due to silting from Kettle Creek, such that one carrier that previously tied up at the port for the winter is now reported to be unable to enter the port in ballast.

Infrastructure Maintenance and Renewal

TC's investment is limited to expenditures related to urgent safety-type projects only. Any future maintenance/renewal projects required by the new entity would be negotiated with TC via a Contribution Agreement.

Expansion Plans

No expansions to the port's commercial facilities were noted.

Figure 6. Aerial View of the Port of Stanley

2.1.3.7. Nanticoke

Infrastructure Constraints and Opportunities

Ontario Power Generation (OPG) and US Steel are the two major operators at the Port of Nanticoke. OPG imports coal for its generating station and US Steel operates a steel mill at a nearby dock. Imperial Oil built a refinery in the same area and a pipeline extends from the refinery to the OPG port facility, which is used for receiving and shipping petroleum products via the OPG dock. No capacity issues were cited by US Steel or OPG.

The OPG port facilities operate for 10½ months each year, and it is logical that the steel company's facilities can operate on a similar basis, since neither facility relies on traffic through the St Lawrence Seaway.

OPG is currently studying options to shift from coal to biomass (wood pellets), which may have an impact on traffic and facilities.

The industrial facilities at Nanticoke are served by the Southern Ontario Railway, which connects with CN at Brantford. Highway connections are by the county road network. The nearest provincial road is Highway 6, which leads to Jarvis and Highway 3.

Figure 7. Aerial View of the Port of Nanticoke

Infrastructure Maintenance and Renewal

Maintenance and renewal plans are unknown for the Port of Nanticoke.

Expansion Plans

The OPG facilities are virtually unchanged since they were put into operation in 1972. OPG is currently looking at the feasibility of switching the Nanticoke Generating Station from coal to biomass (wood pellets). Should this be deemed feasible, and should plans move ahead, there may be an opportunity/need for the Port of Nanticoke to reconfigure its facilities to accommodate wood pellet traffic.

US Steel has ample land at Nanticoke. Coke ovens may be built at the mill if the cost of imported coke continues to rise. This would lead to additional traffic over the US Steel dock.

Seasonal closing is a significant impediment. US Steel currently uses a shortline railway to move product between Nanticoke and Hamilton. There may be potential for a shift to marine, but it would require investment in the Nanticoke port to handle outbound shipping.

The future use of the port facility by new companies locating in the Lake Erie Industrial Park may require modifications or additions to the steel company's dock and transfer facilities.

2.1.3.8. Windsor

Infrastructure Constraints and Opportunities

No major infrastructure constraints at the Port of Windsor were noted. All terminals are well below capacity. No major landside access issues were noted. On the water-side, channels and berthage have Seaway depth, though some terminals have had draft restrictions because of low water in recent years.

Figure 8. Aerial View of the Port of Windsor

Infrastructure Maintenance and Renewal

The Windsor Port Authority (WPA) rated infrastructure maintenance and renewal as being of "high" importance to its operations, but noted that it would be about 20 years before major infrastructure renewal works were necessary.

Until then, smaller maintenance projects include the following:

- Painting the bunkering / multipurpose dock operated by Sterling Fuels. The approximate cost was noted to be about $300,000 in the short term, plus about $10,000 annually over the next 10 to 12 years.
- Other regular and ongoing maintenance, budgeted at $50,000 per year over the next 10 years.

The above does not include the infrastructure maintenance and renewal plans of the private terminals operating in the Port of Windsor. This information was deemed confidential in nature and was not released to the consultant. Government support might nevertheless act as a catalyst for maintenance and renewal investments in private terminals, where economic benefits and market needs so justify.

The Port Authority underscored the importance of maintaining the Seaway to its operations.

Expansion Plans

The WPA has 50 acres of land available to develop. At present, however, there is excess capacity at all port terminals, suggesting little need to expand current facilities. There may nevertheless be opportunities for new industries to develop port land, where a business case exists.

Other expansion prospects (planned or otherwise) include the following:

- The Department of National Defence (DND) is contemplating the development of a new naval facility at the Port of Windsor (approximate cost: $8 million). Related to this development, the WPA is considering moving its office (currently in downtown Windsor) closer to the port site (approximate costs: $700,000). This is not expected to have an impact on commercial port traffic.
- The City and the Port Authority are looking at a jointly funded initiative to beautify the road access to the port. The approximate cost of this initiative is $500,000 over the next five years. Though this initiative would have a positive community relations impact, it would have no major impact on traffic or road access to the port (no major road access issues were noted).
- Sterling Fuels is contemplating building a new dock, adjacent to its existing bunkering/multipurpose dock, to which it could shift some of its inbound product (approximate costs: $10 million). Plans for this new dock could move forward as early as next year (funding is currently being sought).
- The WPA is also currently involved in a joint venture with Sterling Fuels to expand and double the liquid asphalt storage at Sterling Fuels.
- Extension of short line rail spur to serve other parts of the port (approximate cost: $2 million) to provide access to the port during the winter months when the Seaway is closed.

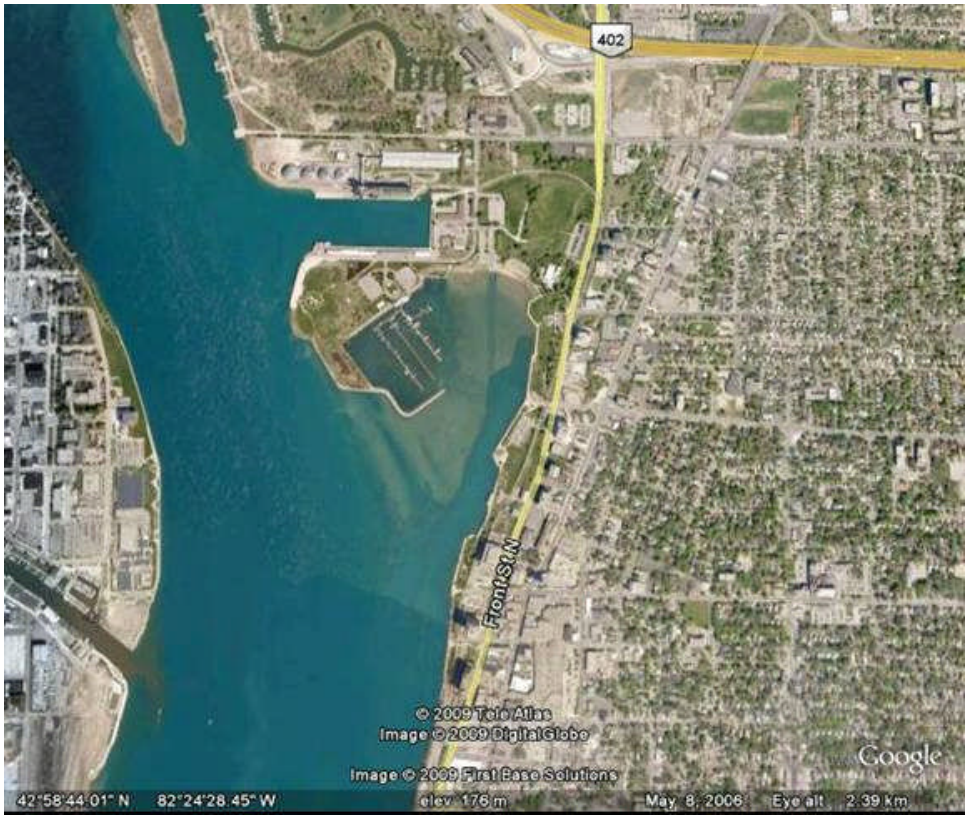
2.1.3.9. Sarnia

Infrastructure Constraints and Opportunities

The Port of Sarnia is a TC port that is not listed for devolution. While TC owns some shore property, most port facilities are private and located on private property. In addition to the Port of Sarnia, the strip downstream along the St Clair River is also home to other privately owned port facilities, mostly associated with the petrochemical industry.

The river channel is capable of handling 1,000-foot US lakers, but most of the listed docks at Sarnia have less than Seaway draft. This is probably due to the limited size and draft of the lakes' tanker fleet.

Figure 9. Aerial View of the Port of Sarnia



Infrastructure Maintenance and Renewal

TC investment is limited to expenditures related to maintaining safety standards of is shore property. Maintenance and renewal plans for the private facilities are not known.

Expansion Plans

No expansions to the ports facilities were noted.

2.1.3.10. Goderich

Infrastructure Constraints and Opportunities

There are three berths used for loading, one for salt, one for grain, and one used for both grain and calcium chloride. There are also two additional berths available for winter vessel storage. No major capacity issues were noted by the port. In addition, the port has good rail and truck access. There is no bunkering facility at the port; and any bunkering requirement would have to be met by trucking fuel directly to the vessel.

There are ongoing issues with the Town of Goderich regarding the land use in the port area. This is due to the close proximity of commercial port activity and recreational land use (marinas, park and beaches) in a space confined by local topography. Also, truck access to the elevators is not ideal, with trucks having to pass through the commercial town centre and a residential area to access the elevators on the south side of the port. There are also issues affecting adequate storage space availability at several destination ports.

The port also receives occasional inquiries regarding potential project cargo (e.g. wind power generation equipment), but it does not have the capacity to handle this traffic.

Infrastructure Maintenance and Renewal

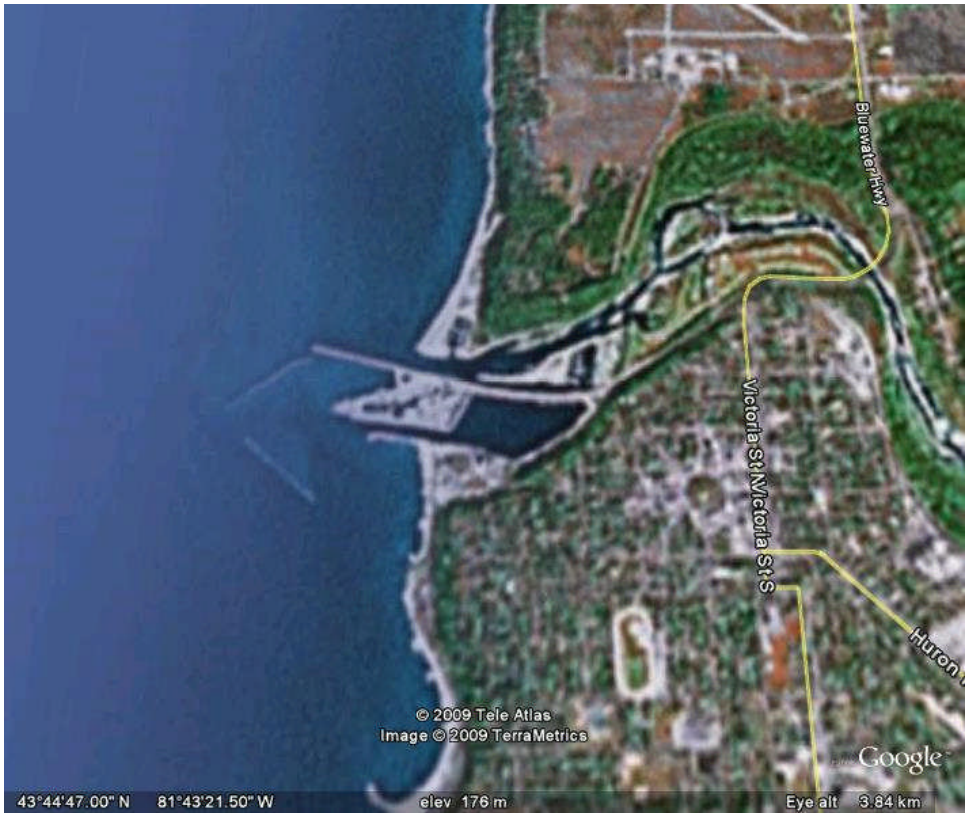
The Port of Goderich rated infrastructure maintenance and renewal as being of "high" importance to its operations and that of Sifto Salt.

The port was constructed with its first breakwater in early 1900's, with incremental development over time. Major maintenance is required. The port has a 15-year maintenance plan (2000-2014), which includes maintenance for the following (the estimated cost of maintenance over the life of the 15-year plan is included in brackets):

- North & South Breakwater ($9.2 million);
- South Pier Extension ($2.6 million);
- South Pier Repairs ($1.3 million);
- North Pier Repairs ($2.1 million);
- Maitland River Wall ($2 million); and
- North Harbour Road ($0.34 million).

The total estimated cost over the course of the 15-year plan is about $18 million, just less than half of which is budgeted for the period 2009-2014.

Figure 10. Aerial View of the Port of Goderich



Dredging has been required every 5-10 years. There may be a future dredging requirement beyond the breakwater to connect with deep water. It is unclear where the responsibility lies for this as the port property ends at the breakwater. Attempts to identify dredging responsibility beyond that point have been unsuccessful.

Expansion Plans

There is no potential property available for expansion without encroaching on that currently used for recreational purposes (marinas, parkland and beaches).

Any expansion would have to either take over recreational land, which the Town has resisted, or would require filling existing waterfrontage, which would be costly and likely raise environmental issues.

No long-term expansion plans related to the port were noted, however, the town has recently expressed a desire to develop new port lands, open the port to new users and attract short sea shipping.

2.1.3.11. Owen Sound

Infrastructure Constraints and Opportunities

The Port of Owen Sound is a TC port slated for divestiture. TC investment is limited to expenditures related to maintaining safety standards. The TC dock facilities are home to a grain elevator owned by Parrish and Heimbecker (Great Lakes Elevator Company), a road salt pad, and Miller Terminals, a cement facility. The grain elevator is a Canadian Grain Commission CGC licensed transfer elevator with a capacity of 106,420 tonnes. Water depth at the docks is in the range of 6.5 to 6.7 metres. According to the Railway Association of Canada Atlas, there is no rail service at Owen Sound.

Infrastructure Maintenance and Renewal

TC's investment is limited to expenditures related to urgent safety-type projects only. Any future maintenance/renewal projects required by the new entity would be negotiated with TC via a Contribution Agreement.

Expansion Plans

No expansions to the ports facilities were noted.

2.1.3.12. Meldrum Bay

Infrastructure Constraints and Issues

The quarry, which is reported to be the largest marine-based quarry in Canada, is located a long way from markets by road and does not have rail facilities.

The Lafarge port facilities have the capability of loading at the rate of 2,500 tonnes per hour using a belt conveyor slewing system. No unloading facilities appear to exist. Storage capacity at the port is reported to be 280,000 short tons, and the dock has a draft of 30 feet.[11]

Infrastructure Maintenance and Renewal

N/A

Expansion Plans

N/A

2.1.3.13. Sault Ste Marie

Infrastructure Constraints and Opportunities

Commercial port infrastructure at Sault Ste Marie is privately owned and operated by Essar Algoma Steel and Purvis Marine. Essar Algoma Steel has major capacity constraints due to limited docking space at present, which at times requires ships to go into a holding pattern or be anchored before unloading. In the interim, Essar Algoma Steel is establishing a temporary

[11] Data from Greenwood's 2006.

dock, but is looking to expand dock capacity significantly in coming years to accommodate expected increases in traffic related to steel operations.

Purvis, on the other hand, did not note any capacity constraints or issues related to the marine movement of freight, other than relating to seasonality. Essar would like to ship year round as it is impacted immensely during freeze-up with having to carry large inventories of raw materials that comes from the lower lakes.

Figure 11. Aerial View of the Port of Sault Ste Marie

Infrastructure Maintenance and Renewal

Both Essar Algoma Steel and Purvis Marine indicated that maintenance and renewal of infrastructure is of "high" importance but did not provide specifics or related costs. Dredging is necessary, though it is unclear at what frequency this is required. The major maintenance issue discussed is related to the maintenance of the canals and locks. The Welland Canal continues to improve its facilities as do the Soo Locks.

Expansion Plans[12]

The City of Sault Ste Marie, in conjunction with Essar Steel Algoma, is working towards development of a new Deep Sea Harbour and expansion of Essar Steel Algoma's port facility. This project will include three new docks – an import dock, an export dock and a public dock. The estimated cost of this project is $150-175 million. As part of this initiative, Essar Algoma Steel is making plans for Tenaris Algoma Tubes to import products.

Essar/Algoma has plenty of existing land to expand, but in order to create a new dock facility at Sawmill Bay, they have found the process for approvals has been too long.

2.1.3.14. Thunder Bay

Infrastructure Constraints and Opportunities

No capacity issues were cited by the Port of Thunder Bay. Traffic volumes through Thunder Bay are much lower than when grain went predominantly through the port rather than via West Coast ports or by rail directly to Eastern Canada. If anything, the port has an excess of available dockside infrastructure, although what is there now may not be what is needed in the future (see earlier notes about surplus elevators).

The port is accessed by a major 4-lane artery called the Harbour Expressway that connects with Highways 11 and 17 (Trans Canada). Both CN and CP railways have access to all major docks and elevators, either directly or through interswitching.

Infrastructure Maintenance and Renewal

The port's infrastructure is said to be well-maintained and operating below capacity, but road infrastructure improvements in the region are considered a high priority.

With respect to the Seaway, the channel and locks are well-maintained and adequate for current shipping needs.

Some dredging was carried out in 2007, and further dredging requirements are cyclical, and predominantly confined to river channels.

Expansion Plans

Thunder Bay Port Authority has over 300 acres of land, much of which is available for development. The phase-out by OPG of coal for power generation will be of high importance to the marine companies and the port.

The Port Authority recently signed an agreement to purchase 40 acres of waterfront property including the former Manitoba Pool 1 grain elevator, which is still operational and could be used for grain storage related to bio-fuels production.

[12] Additional information on port expansion plans was provided by Mr. Tom Dodds, of the Government of Canada.

The port authority has partnered with CN Rail to develop a western gateway for oil sands cargoes. The shipment of dimensional traffic to northern Alberta has been enhanced by recent changes to CN's route from Thunder Bay, which has enabled the port to obtain traffic that would have been formerly unloaded at a US Great Lakes port. CN acquired a short line railway between Boyle and Fort McMurray, Alberta, and has widened rock cuts and improved the line to allow large, heavy equipment and components to reach the oil sands by rail.

Figure 12. Aerial View of the Port of Thunder Bay

2.1.4 St Lawrence Seaway

2.1.4.1. Infrastructure constraints and opportunities

St Lawrence Seaway (Seaway) infrastructure is estimated to be operating at between 50 and 60 percent of its capacity. Although there are no infrastructure capacity constraints, *per se*, existing Seaway infrastructure is aging and requires extensive maintenance and renewal. The federal government has agreed that the asset renewal budget will be $270 million for the current five year tranche.

Although not within the scope of this report, there are capacity issues with regards to the domestic vessel fleet providing service in the Seaway. Current regulatory barriers, including the 25 percent duty on the import of ships, act as an impediment to fleet renewal and expansion. As a result, little additional capacity is being added to the marine transportation sector in Ontario.

The following sections provide an overview of key Seaway infrastructure needs.

2.1.4.2. Overview of Seaway infrastructure issues

Issues identified for the St Lawrence Seaway Management Corporation's (SLSMC) infrastructure can be separated into three basic issues:

- The first is the ongoing requirement to maintain in a reliable state, the locks and channels required for the efficient and timely movement of ships. This is an absolute necessity for the continuing operation of the parts of the system and for those trades that depend on the lock systems operated by the SLSMC.
- The second is extension of the season. This is not so important for the bulk trades that are currently the system's mainstay, but is seen as a necessity if the system is going to market itself for the movement of containers, as well as general and project cargoes.
- The third is technological improvements to the system. While not of critical importance for the day-to-day operation, they would help improve the competitiveness, efficiency and long-term viability of the system. It would also help market the system to potential users that may have otherwise been dissuaded because of required adaptations to vessels and the extra costs of fitting up for Seaway transits.

Each of these issues is addressed in more detail below.

2.1.4.3. Infrastructure maintenance

The challenge for the SLSMC and the Federal Government will be to maintain its aging infrastructure. The reality is that simply maintaining the Seaway infrastructure, to be as efficient and reliable as possible within its existing footprint and within the existing season, is a very expensive proposition.

Support for the level of maintenance expenditures projected by the SLSMC has been provided by a three-year Canada/US study that was completed in the fall of 2007. This major

review studied the maintenance requirements of the system for the next 50 years. The lead role on the engineering side was carried by the US Army Corps of Engineers, supported primarily by the two Seaway Corporations. The assumption for future investment in the Seaway is that it must all be done within the existing footprint of the locks because of the considerable opposition to any expansion of the Seaway.

According to the study, the priorities for asset renewal over the next 10 years include:

- bridges;
- lock walls in the Montreal/Lake Ontario section; and
- approach walls.

While the detailed Engineering Appendix to the study is not yet released, summary graphs in the Engineering chapter of the report provide an indication of the projected costs for the period 2010 to 2050 required to ensure that the system continues to provide the same degree of reliability as it has in the past. As there are no detailed cost numbers released yet, and as the cost categories and division between operations and maintenance are somewhat different from what is used by the SLSMC, exact comparisons are not yet possible. However it does appear that the required costs for the next five years appear to be in the same ball park as the level of asset renewal costs approved by Transport Canada, and expenditures at current levels are expected to be required right through to 2030.

For the Montreal/Lake Ontario region, the largest single maintenance component is the Alkaline-Aggregate Reaction (AAR) problem that exists at four of the five Canadian locks in the region. Beginning in 2013, this will require $20 million a year for vertical wall resurfacing. Another $1 million a year will be required to address other AAR issues. Seven stiff leg derricks will be replaced at a cost of $1 million each. The remainder of the structural maintenance costs is primarily for gates, valves, ship arrestors, ice management, concrete repair and electrical/mechanical repairs and upgrades.

In the Welland region, a total of $82.5 million is needed for replacement of five of the six timber tie-up walls from 2010 through 2019 ($8.25 million per year). A ramp-up of structural maintenance costs is foreseen from 2025 through 2044 for resurfacing of all lock walls at a cost of approximately $16 million per year. The lift bridges are expected to require approximately $0.5 million annually for maintenance and $3.8 million for rehabilitation. The bascule bridges are expected to require $1.4 million annually for maintenance and a total of $19.3 million is required for rehabilitations and replacements.

For the next five fiscal years, beginning in 2008-09, the annual expenditures of the SLSMC can be expected to increase by at least $20 million annually as the approved Asset Renewal Plan has increased from $170 to $270 million, an increase of $20 million a year, for the five-year period.

Sufficient funding to maintain the physical integrity of the Seaway infrastructure was a key part of the agreement that led to Seaway commercialization. From the perspective of the users of the system, this commitment to a consistent level of maintenance expenditures was one of the main benefits of commercialization, as under the previous regime expenditures on maintenance tended to fluctuate with the level of traffic and revenues. An indication of the interest of both the SLSMC and the government in the continued high level of maintenance

of the system is the formation of the Capital Committee, which is composed of two members from Transport Canada and two from the SLSMC. While the Asset Renewal Plan is managed by the SLSMC, it is overseen by the Capital Committee, which approves, within a predetermined envelope, asset renewal projects on an annual basis and meets, as required, to review and approve changes to the plan.

It must be borne in mind that the commercialization agreement is only a 20-year agreement that ends in 2018. There are no indications yet as to whether the parties to the agreement intend to extend it past 2018, but at the same time there are no indications that they will not renew, either, as the present arrangement is generally considered to have been a success. This agreement is of critical importance given studies showing a continuing large gap between the revenues that the system generates and the costs that are required to maintain and operate the system.

2.1.4.4. Season extension

Winter has proven to be a difficult opponent. Modern ships are able to operate in more difficult ice conditions than their predecessors, and various techniques, such as bubbler systems, ice breakers and scraping of lock walls, are used to keep locks open. Yet, with the exception of open waters on lakes and trials at the Sault Ste Marie locks, year-round navigation has not proven feasible – the limit for Seaway locks appears to be 9½ to 10 months.

The current season is about 9½ months. For the Montreal-Lake Ontario section the average number of days of operation has increased from 251 days in the 1963 to 1967 period to 280 days in the 2003 to 2007 period, an increase of 11.5 percent. In the Welland Canal the average season has increased from 260 days in the 1963 to 1967 period to 283 days in the 2003 to 2007 period, an increase of 9 percent.

Given the existing footprint of the locks and channels, it is felt that the maximum achievable season is 10 months. The achievement of a 10-month season faces some challenges. Once ice starts to form in the Welland Canal, there is nowhere for the ice to go as there is no easy way to flush it through the flight locks. The Montreal/Lake Ontario section has flushing weirs, but has problems with ice build-up on the lock walls, particularly as the walls have moved in a few inches because of Alkali Aggregate Reaction (AAR) expansion issues. This is a major problem when trying to move a ship with a beam of 78 feet through a lock that is only 80 feet wide (minus whatever it has lost because of AAR and ice build-up). There is a real possibility of ships getting stuck in locks. Thus the number of ships that can transit the system on a daily basis will be significantly less in the opening days of the season as well as at the closing, due to the time required to deal with build-ups of ice.

The length of the season is also limited by the amount of time required for major maintenance, which is virtually all done during the winter shutdown. Major maintenance could only be performed during the operating season if there were twin locks throughout the system. The work is currently performed over a 10-week period and could be squeezed into a shorter period, but this may increase costs as contractors may have to work around the clock.

A major issue with season extension is the need to accommodate other stakeholders in the system, for example:

- hydro generation requires the formation of a stable ice cover;
- Riparian interests are concerned that ice-breaking will cause erosion of shorelines and damage to installations such as docks and boat houses;
- aboriginal interests are concerned about interference with traditional ways of life;
- environmentalists are concerned about scouring of channel bottoms, destruction of fish habitat and disruption of mammal migration; and
- recreation users complain about disruption of winter activities such as snowmobiling and ice-fishing.

An important consideration is the extent to which there is a demand for an extended season. With the possible exception of grain, most bulk cargoes would just spread their demand over the longer season – there would not likely be an increase in total tonnage moved. Grain has different considerations, as shipping demand is often not known until well after the fall harvest, and could benefit in some years from an extended shipping season. Previous cost/benefit studies have found that season extension is not justified. The additional cost would not be offset by sufficient new tonnage.

The question of whether significantly increased tonnages of containers, general cargo and project cargo would move if the Seaway was open year round is moot – the reality is that year-round navigation is just not a possibility given the layout and footprint of the existing locks. The impact of marginal improvements in the length of the Seaway season would probably not have a major impact as it still leaves the shipper seeking alternative transportation or stockpiling cargo when the Seaway is closed.

2.1.4.5. New investment in capital improvements

While the focus is on maintaining the Seaway within its existing footprint, there does remain some scope to make investments in capital improvements that enhance the infrastructure and operations of the Seaway.

Two new technological initiatives that would enable the Seaway to handle ships more efficiently and quickly, with significant operational savings, are currently being evaluated. The first, self-spotting, uses a laser to indicate where the ship is in a lock. It would replace the function of spotter, currently carried out by lock-wall crew, and could possibly lead to savings in labour costs. The second, hands-free mooring, uses suction cups on the lock wall to position ships rather than using the present system of lines and winches. This technology would remove the requirement for Seaway-specific fittings (that cost $75,000 to $100,000) for salt water ships – an investment that occasional visitors to the Great Lakes are reluctant to make. As well, a lot of ship crews do not like going through the Seaway simply because of all the line handling required, and this initiative would help increase the potential fleet able to come into the system. The amount of line-handling involved in going through the Welland Canal also means that lake vessel crews are required to work overtime hours. This is a particular issue for lakers going into Hamilton Harbour – they are required to go to anchor for a four-hour rest period after transiting the Welland Canal before going into Hamilton.

These proposals were originally in the SLSMC's proposed Asset Renewal Plan (ARP) for 2008/09 to 2012/13 at a cost of $50 to $60 million, but have not yet been approved by the government for inclusion in the ARP. Within the current budget, there are no funds available for system improvements. Funding for the system improvements being tested remains the subject of negotiations and pending further study and evaluation.

2.1.5 Proposed infrastructure investment guidelines

The preceding sections outlined Ontario marine infrastructure maintenance and renewal as well as expansion plans, as identified in previous studies or as indicated by sector stakeholders. No attempt has been made by the consultant to prioritize projects, or to assess related market needs, the feasibility of investment plans, nor the economic cost/benefit of the noted investment projects. Such analysis is beyond the scope of this study.

Nevertheless, this section proposes some guidelines that could be used to assess investment needs, and to identify opportunities for public sector support in infrastructure to spur the development of the marine transportation sector in Ontario.

2.1.5.1. Guiding principles for public investment in marine infrastructure

> "Maintenance of the existing infrastructure is critical – renewal or new investment should be demand driven." – Gary LeRoux, Executive Director, ACPA

The above quote, provided during the course of this study, is a useful anchor for any public investment decision related to the maintenance, rehabilitation or expansion of marine infrastructure. Any public investment should be made with a view to respond to a market need. Otherwise, such investments become "make work" projects that do not otherwise generate sustained economic benefits, nor bolster the marine transportation industry. Although the conditions and terms for investment in marine infrastructure differ for private and public sector facilities (as is outlined in the following sections) market needs should be the key driver if there is to be a return (in one form or another) on the investment.

Investments in private marine facilities and infrastructure

Where port facilities are privately operated, it can be expected that the private sector operator will make the necessary infrastructure maintenance and renewal investments in their facilities to ensure the sustainability or growth of their operations. Similarly, expansion plans will be carried out in response to market needs, in line with the business case for these investments. Financial support from the public sector is not necessary, nor particularly justified, except where public support could promote new investments that the private sector would not make on its own (e.g. to promote a new business area like short sea shipping). Key principles for making public investment in private facilities might include the following:

- regional economic benefits to exceed public sector contribution to project costs;
- funding to be contingent on demonstrating that investment responds to a market needs, on a long term sustainable basis;
- funds to be awarded on the basis of a competitive call for proposals to promote transparency and to maximize the value of public contributions;

- public contributions to match or otherwise complement private sector investments to ensure private sector has financial incentive/risk to succeed;
- award of public funds to be based on clear metrics, in line with public policy objectives (i.e. modal shift, economic impacts, reduction of greenhouse gas emissions, etc., should those become public policy)

The approach recently used by TC to match private sector financing (via call for proposals) for the development of specialized docks, ramps, and fixed-crane infrastructure in British Columbia's Lower Mainland to promote short sea shipping may provide a useful reference. (The consultant is unclear, however, of the project proposal evaluation criteria in this instance).

Investments in public marine facilities and infrastructure

For public port facilities, there may be greater need for public sector financial support, particularly for the maintenance and renewal of aging facilities where assets are at risk of falling into a permanent state of disrepair.

Nevertheless, any maintenance or renewal of existing infrastructure should be market-driven (unless for the purpose of ensuring safety of the facility, as is the case with TC ports planned for divestiture). As such, it would be important to assess the long term market role and competitiveness of port facilities before assessing investment needs and opportunities. It may be that certain facilities requiring significant investment have a limited market function, or that these facilities lack a competitive advantage relative to other ports, and as a result risk losing significant traffic to these more competitive facilities. Certainly, it becomes difficult to justify significant investment in these facilities when other more competitive facilities require less investment over the long term (other than on grounds of regional economic development). It may also be that certain ports or port facilities would generate greater economic returns if converted to recreational, residential or other commercial use. Such assessments are not within the scope of this study, but should be considered when planning investments in port infrastructure in Ontario.

With regards to the expansion of public port facilities, it is suggested that public investments be limited to supporting the expansion needs of private facilities or to improving road/rail access to existing and future private and public port facilities.

For the purpose of this study, the focus should be on public infrastructure investments that can stimulate the development of marine transportation in Ontario. To this end, an understanding of market needs and the competitiveness of marine facilities is crucial.

2.1.5.2. Key questions to support analysis of public investment in marine infrastructure

Public infrastructure investment, in the marine sector or otherwise, is often at risk of becoming politicized. It is useful to have an objective framework with which to assess infrastructure investment options. To this end, we offer some key questions that could help support decision making with respect to public support for infrastructure investment. These questions are not intended to be comprehensive, but provide an initial basis to help guide decision making with respect to public investment in marine infrastructure in Ontario.

These questions have been split by public and private facilities, and by type of investment (maintenance and renewal as well as expansion plans).

Figure 13. Key Questions to Guide Public Investment in Public Facilities

Public Facilities	
Maintenance and Renewal	**Expansion Plans**
Will the investment address an existing or short term safety risk?	Does the investment address a capacity constraint or limitation?
Does the investment address a capacity constraint or limitation?	Does the investment support a market need?
Does the investment support a market need? Will the investment promote sustained use of the facility? Does it make the facility more competitive? Will the related market need outlive the life of the investment?	Can the expansion initiative better/more cheaply be undertaken by the private sector (in full or in part)?
Does the investment generate economic benefits in excess of costs, alternative land use over the long term?	Does the investment support the development of marine transportation in Ontario?

Figure 14. Key Questions to Guide Public Investment in Public Facilities

Private Facilities	
Maintenance and Renewal	**Expansion Plans**
If the private sector can not undertake the necessary maintenance and renewal investments itself, is there a business case to providing support? Will this promote long term competitive operation of the facility by the private sector?	Is there a market need that the private sector can not address on its own? Is there a business case for public support?
	Does public support promote the development of marine transportation in Ontario?

2.1.5.3. Conclusions

In conclusion, there are a number of infrastructure needs and plans in the Ontario marine transportation sector. These include maintenance and renewal needs, as well as expansion plans, at public as well as private facilities. These needs and plans have been outlined for select Ontario ports and the St Lawrence Seaway, as obtained by the consultant, without prioritization or analysis of market need, feasibility, or economic cost/benefit.

It is expected that the private operators of port facilities will make the necessary infrastructure investments in their facilities to ensure the sustainability or growth of their operations. There may nevertheless be opportunities to leverage private investment with public support in infrastructure, where investments would not be undertaken by the private sector on its own, where there is a market need and business case, and where this support would promote the development of marine transportation in Ontario.

There is also a need for investment in the maintenance and renewal of public ports and facilities in Ontario. However, these investments should be driven by the needs of the market and opportunities to ensure the competitiveness of the marine transportation industry in Ontario.

The consultant has proposed some initial questions that could help guide public infrastructure investments in the marine sector. This should be developed further, in conjunction with a sound assessment of the market need for further marine sector infrastructure investment.

2.2 Policy Issues

2.2.1 Canadian shipping policy

Canadian shipping policy creates a number of obstacles to the development of the marine industry in Canada. On the one hand, international shipping is largely unregulated, while domestic shipping is encumbered by a number of policies which, it could be argued, have stymied the development of the industry for at least a generation.

Most current observers are unaware that Canada once had one of the largest fleets in the world. At the end of the Second World War, Canada's international fleet was the fourth largest merchant fleet, at 150 vessels. By 1969, it had only four vessels and comprised a mere 70,000 grt. Since that time, as Hodgson and Brooks have pointed out, Canada has never chosen to describe a clear national shipping policy. Canada allows very open access to international markets, but has one of the most restrictive domestic markets in the world. And, as we describe below, shipping policy seems to have been muddied by industrial policy, or more specifically, shipbuilding policy.

Canada's shipping policy only came under its own jurisdiction with the *Canada Shipping Act* in 1936. At that time, a 25 percent tariff was imposed on all non-British ships, so as to aid the Canadian shipbuilding industry. This was somewhat ironic, as the British were still a major shipbuilding nation and Canadian yards were largely non-competitive. Canadian yards were also aided by Canadian vessel Construction Assistance which provided capital cost allowance. British registered and constructed ships still had access, however.

There have been several reports since the *Canada Shipping Act* was passed. The Spence Report of 1957, issued prior to the opening of the Seaway and the commencement of year-round shipping on the St Lawrence, recognized the tariff had negative consequences for shipowners and operators. At the time, a British ship was a Commonwealth ship and they had unrestricted access and about 10 percent market share of domestic movements. Spence argued that restricting the coasting trade to Canadian vessels would result in increased costs for the Great Lakes St Lawrence system, as commodities such as grain would be shipped directly overseas. He also argued the duty offered no protection from U.K. shipbuilders, and that a subsidy program for Canadian shipbuilding would be both more equitable by spreading the costs, and more effective public policy.

The Darling Report of 1970, which is considered to have laid down the modern-day foundation of Canadian shipping policy, suggested that shipping policy should drive shipbuilding policy, not the other way around. However, as Hodgson and Brooks point out,

the issue of protection was never questioned and in fact, argued that it should be extended to other maritime sectors, such as dredging, salvage, and activities associated with offshore oil and gas exploration and development.[13] The report did, however recognize the difficulty of Canadian flags competing internationally because of high construction and operating costs, and suggested flagging-out in winter.

In 1979, the British Commonwealth Merchant Shipping Agreement was abandoned. In 1982, Transport Canada published its *New Coasting Trade Policy – A Background Paper*. Its findings, which in effect argued for more protectionism, were largely incorporated into legislation 10 years later (see below).

Canada's policy is increasingly divergent from the move to freer trade elsewhere, particularly in the EU, where policy has evolved such that as of 2002, there is freedom to provide maritime cabotage services within all member states, with a vessel flying the flag of a member state, provided they comply with all the conditions for carrying out cabotage. The result has been a large increase in short sea shipping and better service standards, and the liberalization of cabotage also extends to the EFTA countries – Norway, Iceland, Switzerland and Lichtenstein.

In North America, discussion of shipping policy is dominated by the US Jones Act which restricts US cabotage trades to US built, US-owned and US-crewed vessels. There were attempts to include cabotage in both the Canada-US Free Trade Agreement as well as NAFTA, and while the US gained access to the Canadian market for US built ships, there was no reciprocal arrangement for Canada's shipbuilders or access to US shipping markets included in the agreement.

Canada's overall domestic shipping policy also discourages investment in short sea shipping, which has been the subject of much study and promotion, and an MOU with the US and Mexico.

2.2.2 *Coasting Trade Act*

The *Coasting Trade Act* came into force in 1992, and while it includes no declared policy objective, its clear intention and effect is to reserve the coasting trade of Canada to Canadian registered vessels, either built in Canada or duty-paid. Our point in raising the issue of cabotage is not to advocate opening up the Canadian market to a free-for-all of foreign competition, but to make access easier for foreign-built tonnage easier, whether used or new.

In a nutshell, Canada's cabotage restrictions and duties on the purchase of non-Canadian vessels significantly increase marine industry start-up costs and risks. The duty issue is exacerbated by Hull Construction Regulations unique to Canada, and which cost significant capital expenditures. These are, literally, sunk costs, which are not recoverable in the event the service is unsuccessful. As CPCS has described in a recent report for Transport Canada,

> In the eastern Canadian context, start-up risks for new feeder or regional short sea services are very high. Unquestionably, the greatest risk relates to the cost of acquiring suitable vessels (as noted, there few if any suitable vessels for new feeder services in the Canadian fleet). Related costs include not only the ship

[13] J.R.F. Hodgson and Mary R. Brooks, "Canada's Maritime Cabotage Policy", Dalhousie University, 2004, p. 41.

> purchase cost, but (for domestic service) the 25 percent duty on the purchase price (which will be incorporated into its debt servicing costs) and the cost of reconfiguring the vessel to meet Canadian regulations (which immediately become sunk costs). Duty and ship reconfiguration costs can not be reclaimed if the ship is later sold on the open market.[14]

For instance, in areas of the world with a thriving short sea sector, operators typically charter, rather than purchase, ships. This provides the ability to change ships to better respond to the market and to limit market entry risk given the implicit lower capital costs.[15] This would be difficult to do under Canada's duty and cabotage regime, as there are few such vessels sailing under Canadian flag. Canada is the only developed country that applies such punitive duties. It does protect against "hit and run" and other opportunistic operators, which is desirable, but vessels brought into the country and upon which duty is paid, are virtually un-saleable on the international market once imported into Canada. It also makes it very difficult to "right-size" and upgrade a service once it is established. Once a service is well established, it may make sense to build and introduce new tonnage, but the risk for start-ups is too great. In this context, it is interesting to note that Oceanex only purchased its first new vessel in 2005, after its predecessor companies operated three used vessels over more than 25 years.

Indeed, a policy statement of the European Bank for Reconstruction and Development states as much: "the risks in the shipping industry can be significantly reduced by purchasing second-hand ships". It also points out that shipping is a capital-intensive industry, and financing is based on a certain percentage of the market value of the ship, usually 70-80 percent. Duty cannot usually be financed, unless the vessel is entering a long-term contract.

Applications for a license to temporarily use a foreign flagged vessel in Canada are filed simultaneously with the Border Services Agency (CBSA) and the Canadian Transportation Agency (CTA). Following the receipt of an application, operators of Canadian registered ships are provided notice and afforded the opportunity to protest the application based on the fact that a suitable Canadian-flagged, duty-paid ship is available to perform the activity described in the application.

In 2005, Transport Canada commissioned a review of the *Act*, which was carried out by the Research and Traffic Group RTG).[16] The study suggests the *Act* is working as intended, which is to protect Canadian shipowners from foreign competition, except for issues relating to offshore oil and gas development and cruise operations in the St Lawrence/Great Lakes above Montreal. RTG found that more than 80 percent of the Canadian cargo fleet was over 25 years old in 2005, but that the 28 vessel tanker fleet was newer. The largest of these were tankers specifically built to serve the offshore oil industry in Newfoundland. Several of these vessels, which were all built overseas, are duty paid, while a number of foreign flag vessels pay duty on a voyage basis.

The RTG study also viewed the *Act* as a potential impediment to the development of new short sea shipping services. In this respect, there are a mere five Canadian-registered short

[14] CPCS Transcom, "Eastern Canadian Hub & Spoke Study", Transport Canada, December 2008.

[15] "Transhipment and Feedering Trades, Operators, Ships", Dynamar B.V., September 2007. This point is also discussed in "Eastern Canadian Hub and Spoke Study", Transport Canada, 2008.

[16] Research Study on the *Coasting Trade Act*", Research and Traffic Group, Transport Canada, 2005. (MariNova carried out a subsequent study examining the impact of the Act on the offshore oil and gas industry).

sea-type vessels. These include the three vessels currently in the Oceanex service between Newfoundland and the mainland, as well as the Great Lakes Feeder Line vessel, and another used to supply the northern coast of Labrador in the shipping season. The Relais Nordik vessel, which serves the lower north shore of the St Lawrence is a converted offshore supply vessel which carries passengers and freight, and is not really of the same genre. There are many more tugs and barges, which could be used in certain short sea applications.

RTG addressed some popular misconceptions regarding the *Act* and concluded that it "has no direct impact on Canadian shipbuilding, marine employment or safety".[17] Work permits are governed by immigration legislation and marine safety is administered by Transport Canada and the Canadian Coast Guard. The study recommended the *Act* be retained, as no compelling reason could be found to repeal it. It also recommended that special consideration be given to the case of offshore oil and gas developments and some of its unique special equipment needs.

It suggested that more cruise activity could take place in the St Lawrence and Great Lakes above Montreal if regulations were relaxed. On the east coast and below Montreal, vessels need to call at a foreign port such as St Pierre, if they sail from a Canadian port. Above Montreal, vessels need a coasting license, which tends to handicap Ontario ports and limit their participation in the growing cruise market. RTG recommended against adopting an open EU-like cabotage regime, but did recommend that a NAFTA regime be explored in the future. They were concerned that some reciprocity was needed with the US, so that access to US markets was open to Canadian fleets.

But, perhaps an unintended consequence of the *Act* is the present state of the Canadian flag fleet, as illustrated in the Table below. Arguments justifying the continued use of older tonnage range from the fact they are paid for, to the relatively benign (fresh) waters they sail in, which do not subject them to the same kinds of operating conditions faced by salt water tonnage. It is evident from the Table that the tanker fleet is much younger than the traditional laker bulk ships. These vessels have been imported by companies such as Algoma Tankers and Groupe Desgagnes to meet stringent new regulations imposed by the Canada Shipping Act of 1993, which said all Canadian-flag tankers were to be double-hulled by 2015, with the oldest to be phased out first over that period. Even with the addition of five new tankers delivered in 2004-2008, that fleet is still averages 23.8 years.

[17] RTG, *Ibid*., p. iv.

Table 1: Average Age of Canadian Domestic Shipping Fleet

Canadian Registered Vessels	Number of Vessels	Average Size (GRT)	Average Age
East Coast			
Special			
Tankers - (35000 GRT and over)	5	74460	8.0
Small Tanker (1000 - 34999 GRT) and Tank Barge	31	18161	24.0
Barge (East Coast, Great Lakes & St Lawrence)	17	8493	20.0
Ferry/passenger/yacht			
Ferries - East coast, St Lawrence, Great Lakes (roll-on/roll-off)	9	5565	31.0
Barge/cargo			
Barges - East coast, St Lawrence, Great Lakes (1000 GRT and over)	34	4518	43.0
Tank Barges - East coast, St Lawrence, Great Lakes	2	5088	24.5
Cargo vessels - East coast, St Lawrence, Great Lakes (1000 GRT and over)	79	15381	38.0
Pacific Coast			
Barge/cargo			
Cargo barges - Pacific (1000 GRT and over)	79	1769	31.0
Cargo vessels - Pacific (1000 GRT and over)	6	4044	35.0

Source: Brooks, Mary R. (2008), "East Coast Marine Developments: the Need for Changes," Presentation to the 2008 Canadian Transportation Research Forum Semi-Annual Conference, Calgary, October 2008; *Fairplay International* Ships Data Base.

2.2.3 The duty issue

One aspect of Canadian policy, which, contrary to popular belief, is not actually related to *shipping* policy *per se*, is the 25 percent duty levied on foreign-built ships entering Canadian service. This policy is, in fact administered by Industry Canada and is intended to protect Canadian shipbuilding interests.

As Brooks and Hodgson have pointed out, the duty is of no use to the shipbuilding industry; a subsidy would be a better support tool, and be in line with some practices elsewhere. As they wrote, "the use of duty payment as an assistance measure transfers the cost of that measure from the general taxpayer, where it belongs, to a discrete and comparatively small commercial sector, namely the users and operators of the ships".[18] Canada is also the only developed country with such tariff.

[18] J.R.F. Hodgson and Mary R, Brooks, "Canada's Maritime Cabotage Policy", Marine Affairs Program, Dalhousie University, 2004.

In 2006, the Canadian Shipowners Association (CSA) began to campaign for the removal of duty on newly-built lakers, which, they contend, cannot be built in Canadian shipyards. The CSA has brought forward a compelling argument for removal of the duty, but it is limited to new vessels only and would not apply to ship repairs. A new laker has not been built since the mid-1980s. One company estimated it would immediately order six new vessels if the duty was removed. The CSA estimates that over $1 billion in new vessel orders could be placed if the duty was removed. New ships would also have an immediate and positive environmental benefit, as new vessels produce up to 25percent fewer GHGs and have improved ballast systems.

The CSA has put forward an eloquent argument. In its brief to the Quebec/Ontario Continental Gateway Council in September 2008, it links the removal of duty to: 1) investment in short sea services and use of the underutilized Seaway system; 2) to building a more competitive industrial base in the Great Lakes region; 3) to the continued development and export of resource industries; 4) to address the shortage pf vessels to transport bulk commodities; to respond to emerging opportunities in the Arctic, and: 5) to employ the latest technology to improve the environmental performance of the marine mode and reduce its environmental footprint.[19] An unintended consequence of the present duty, if the fleet is not renewed could be increased unemployment, increased road congestion, pollution and infrastructure costs.

The CSA also pointed out that duty is not just a tax on Canadian shipowners but also the end users of marine transportation, Canadian industries and consumers. In their view, it creates a competitive disadvantage for companies such as steel and auto manufacturers, which are dependant on the marine mode. The CSA also contends that there does not exist a shipyard in Canada capable of building a new laker, as a RFP issued by one of its members demonstrated two years ago. It also committed to doing fleet repair and maintenance in Canadian facilities and to continue to employ Canadians in the domestic trades. The duty poses some balance sheet issues for vessel owners as well, as banks are unwilling to look at it as part of the purchase price. The CSA recommended the following plan for moving forward: 1) immediate elimination of the duty on new foreign-built ships; 2) maintenance of duty on used vessels for a period of 10 years, followed by its elimination; and 3) maintenance of the duty indefinitely on Canadian vessel repairs.

The duty issue was mentioned by many stakeholders consulted for this study, including shipowners, shippers and port interests. They mostly echoed the CSA's position, but did not place the "laker" qualifier on it. A number of shipowners indicated they would like to see the duty removed from all imported vessels to speed fleet renewal and to take advantages of new opportunities. In the words of one stakeholder, "it is not possible to increase the use of the system if the number of vessels is not increased. A policy change which increases the number of vessels in the system is good". It was also recognized that new short sea ventures are likely to start with second-hand tonnage, as purchasing a new vessel for an untried venture would be very risky. It was also recognized that a phase-in period is required for existing owners of duty-paid vessels. Indeed, this is a provision of the proposed free trade agreement with the European Free Trade Association (EFTA), which will see duty removal over a 15-year

[19] "Duty Removal is Essential for Fleet Renewal in order to Maintain Competitive Transportation Costs for Shippers and Consumers", address by Donald Morrison, to Continental Gateway Council, 30 September 2008.

period. One large manufacturer, which is very dependant upon efficient and cost-effective marine transportation, pointed out that the duty is passed on to users and ultimately reflects on overall cost competitiveness. A presentation on the CSA's web site suggests there is widespread support for removal, except at Industry Canada.[20]

According to Industry Canada, the duty is imposed to protect the Canadian shipbuilding industry. Given the fact that a new laker has not been built since the mid-1980s, and very few commercial vessels are now built in Canada, one has to question the overall effectiveness of the policy. Several shipbuilding companies have made yeoman efforts to build such vessels, but have ultimately not been able to compete with shipyards in China, Korea and elsewhere. In 2003, Canadian owners built 23 commercial vessels in foreign yards, but only two in Canada.

In 2001, when Brian Tobin was Industry Minister, he announced Canada would pursue an aggressive policy to support the industry.[21] Since 2002, the Structured Financing Facility Program of Industry Canada, has funded 33 projects, for a total of about $48 million. Another nine projects, for a total of $24.1 million are listed as "underway" in 2008, on the Industry Canada web site.[22] The largest of these projects was $7.479 million to Torch Offshore Inc. to convert a vessel for deep sea cable-laying. BC Ferries was also provided $4.2 million and $1.6 million to upgrade two of its vessels. Two additional projects ere listed as "projects underway" and included two other ferries, for $.9 million and 6.7 million respectively. During this same period, BC Ferries also ordered four new vessels from Germany.

In 2006, the ship building and repair industry in Canada employed 2,706 people in production jobs and another 474 in administration, compared with 3,976 and 684 a decade earlier. According to Statistics Canada, there were 95 shipbuilding and repair establishments in the country, but only 10 employed more than 100 people. In Ontario, there were 14 ship building and repair establishments, but all but two employed fewer than 100 people.[23]

Many arguments have been made over the years (particularly on the East coast) that had the shipbuilding industry been supported the same way that the aircraft, subway manufacturing and automotive industries had, it might have been able to compete with European and Far Eastern yards. The fact is, however, that this support was never forthcoming, and the European yards which have survived, have done so by specializing in certain types of vessels. The Finnish industry, for example, specializes in the cruise, ferry and ice-breaking vessels. The Germans have specialized in the cruise, ro-ro and small containership sectors. The US has a shipbuilding sector, but it is geared towards military requirements and *Jones Act* trades,

[20] "The Perils of Minority Government", David Angus, The Capital Hill Group, Presentation to International Joint Congress, February 12, 2008.

[21] "A New Policy Framework for the Canadian Shipbuilding and Industrial Marine Industry: Focusing on Opportunities", Government of Canada, 2001.

[22] The criteria for funding include: 1) the shipyard must be in Canada on a water way accessible to ocean-going traffic; 2) the vessel is not constructed mainly of wood or fibreglass and is not a wind powered craft; 3) the vessel is at least 25 metres in length; 4) the price paid for the shipyard work is at least $5 million; 5) the vessel is solely intended for commercial use and not any private use; 6) if it is a marine structure, it must be one used in the development or exploitation of offshore oil, gas and/or mineral resources; 7) the vessel or offshore marine structure will be constructed and delivered by March 31, 2011.

[23] Canadian Industry Statistics (CIS), Data Tables Shipbuilding and Repairing, (NAICS 336611).

which are protected. It is competitive in one commercial sector, however, offshore oil and gas support vessels and oil rigs, and offshore drilling platforms.

To support Canadian shipyards, the federal government could remove the duty on all commercial vessels, but keep it on government orders, such as navy ships, coast guard vessels, and RCMP patrol craft. One problem in the past has been the boom and bust cycle of government procurement. Rather than keep vessels in the pipeline, which the US seems to do, Canada orders 12 vessels to be delivered in 10 years and then upon completion of the contract, shipyards languish for years afterwards until the next large order. Likewise, several government-owned ferries need replacement, yet a large new ferry has not been built in Canada since 1989.

The issue is also important for the tanker trades, where new oil company regulations stipulate vessels need to be double-hulled. One domestic company even requires vessels chartered to be less than 15 years old. A recent CTA ruling required an oil company to break its own rules and use an older vessel, because it was available and Canadian.[24] Despite the presence of the duty, and on-the-record opposition to it, fleet renewal is taking place in this sector, because of industry requirements for more modern equipment.

The proponents of duty removal often point to a comparison with other modes, such as road, rail and air, which do not pay such onerous duties. Some transportation modes do pay some duty on their equipment, as follows:

Table 2: Canadian Duty Charged on Select Transportation Equipment

Item	HS Code	Duty	
		MFN	US & Mexico
Locomotives	8602.90.00	9.5%	Free
Containers	8609.00	Free	Free
Road tractors for semi-trailers	8701.20.00	6.1%	Free
Trailers and semi-trailers	8716.40.00	9.5%	Free
Aircraft	8802.40.00	Free	Free
Cruise ships, ferries, cargo ships, barges	8901.10.00	25%	Free
Fishing vessels under 30.5 m loa	8902.00.10	25%	Free
Fishing vessels over 30.5 m loa	8902.00.20	Free	Free
Drilling platforms	8905.20.10	20%	Free
Semi-submersible crane vessels, floating cranes, heavy lift crane vessels	8905.90.20	Free	Free

Source: CBSA Customs Tariff Schedules XVII, January 1, 2008.

It is beyond the scope of this report to examine Canada's manufacturing capacity in these sectors, but the country does have significant capacity in aircraft manufacturing (Bombardier and de Haviland) and locomotive manufacturing (GE). It has two tractor manufacturers, International (Navistar), in Chatham, ON and PACAR (Kenworth) in St Therese, QC. Manac

[24] Canadian Transportation Agency, Ruling 413-W-2008.

is the only company still building van-type trailers in Canada. To be fair, much of this domestic manufacturing capacity has been reduced since NAFTA.

However, for rail equipment and trucks there are viable NAFTA options, which are all duty free. There is import duty on tank trailers and rail tankers that are non-NAFTA. These rates range from 5 to 11percent but the reality is that for domestic markets zero rated NAFTA options exist for trucking and rail. These industries pay no duty while shipping is asked to pay 25 percent. For ships there is no NAFTA option because the US is a closed and fully protected market (i.e. the Jones Act) and Mexico does not build ships. It is cost prohibitive to build anything other than supply boats and perhaps tugs in the US, so for shipping there is no NAFTA solution.

The NAFTA situation is also distorted by the fact the Canadian vessels do not have access to the US market, but US-built vessels can be brought into Canada. However, the issue of equitable treatment between the modes cannot be adequately addressed as long as the market is distorted by the 25percent duty that is not charged on other modes.

Canada also has free trade agreements with Chile, Costa Rica and Israel, and a newly negotiated one with Colombia, which allow for importation of vessels duty free. NAFTA allows it as well, and a number of Canadian offshore supply vessels have been imported from the US. Other nations within the Commonwealth Caribbean countries, less developed countries and others (CIAT, CT, CRT) can export vessels to Canada duty free.

As pointed out in previous studies, the policy rationale for the duty is fundamentally flawed. It is more expensive than a subsidy to the shipbuilding industry and penalizes both the providers and consumers of domestic shipping. It can also be argued that it has done little to assist the Canadian shipbuilding industry, and has acted as a real disincentive to investing in vessels. Canadians also pay more for their vessels than do their counterparts in other countries, a factor which ultimately gets reflected in the overall competitiveness of Canadian industry. As Dr. Mary R. Brooks has written, Canada has viewed shipbuilding as part of its industrial base and not part of its support for maritime transport, or indeed, the customers of marine transportation services.[25]

There are two potential solutions to the duty issue. One would be that the government simply abolish the duty and look at the 1/120 rule for dealing with existing duty-paid ships. For any vessel that has been in Canada for less than 10 years the federal government could reimburse them at 1/120 of the value of the duty, per month for the outstanding balance of the 10 year period of the total duty paid. If a Canadian Owner had imported a ship five years ago and paid X amount of duty, the government would just reimburse the outstanding 60/120 X possibly in the form of non refundable tax credits. We believe that the number of vessels involved would be quite small, but this would need to be verified. As for modifications required for the Canadian market, which can add up to another 25percent of the cost of the vessel, if they could accept that a ship built to IACS standard is acceptable we would have made significant progress.

[25] Dr. Mary R. Brooks, "The Jones Act Under NAFTA and its Effects on the Canadian Shipbuilding Industry", Atlantic Institute for Market Studies", September 2006, p. 26.

Another example might be a remission of duty on vessels, assuming that duty remission is tied to a service offering on a particular route. Such remission could be linked to a willingness to remain on a route during off-peak periods so as to develop competitive alternatives to land-based transport modes, and to avoid opportunistic "hit and run" operators with no commitment to the long term. Such a remission or perhaps even refundable tax credit program could support right-sizing efforts by shipowners as they try to find the optimal size of asset to deploy on a particular route. A similar program could be a remission of the cost of reconfiguring ships to meet the Canadian standards.

Yet another possibility could be to develop a refundable tax credit program to offset the higher costs facing shipowners who, in the last 10 years, purchased a duty-paid ship, so as to offset the higher capital costs they face as a result of paying the duty. (The intention would be to equalize the competitive situation between those that did not wait to renew their fleet and those that did.) This would still not facilitate right-sizing in a duty-paid environment. To support this, a program where tax credits can be transferred so that vessel right-sizing can occur would make sense as an interim measure. As no duty would be paid on new-builds and so they could be sold after delivery of a new, larger or smaller vessel, this provision would only be necessary in a transition period. As the transition period passes, right-sizing would be possible with new-builds or charter vessels.

2.2.4 Pilotage

All areas under consideration for this study fall under compulsory pilotage regulations either in the area covered by the Laurentian Pilotage Authority below Montreal or in the jurisdiction of the Great Lakes Pilotage Authority, West of Montreal.[26]

Under the Laurentian Pilotage Authority Regulations, all Canadian-flagged vessels of over 70m and 2400 GRT or any Foreign Flagged vessel of over 35m in length must carry a pilot for transits of Zone 1 (Montreal to Quebec) and all Canadian vessels of over 80m and 3300 GRT or Foreign vessels of over 35m must carry pilot for transits of Zone 21 (Quebec to Escoumins) At certain periods during the winter months due to the presence of ice and reduced visibility this requirement is increased to the carriage of two pilots per vessel for every transit of the zones. Additional fees are incurred for the use of pilot boats to allow pilots to board and leave vessels at the various pilot stations along the St Lawrence River.

For the purposes of this paper this means that all but the very smallest Canadian commercial vessel must carry and pay for at least one pilot for every transit of the waters included in the Laurentian Pilotage Authority's jurisdiction.

The Great Lakes Pilotage Authority has taken a position that is substantially more beneficial to Canadian vessel operators. Although the entire Great Lakes and Seaway system from St Lambert Lock at Montreal to the Lakehead at Thunder Bay is listed as a compulsory pilotage zone, Canadian flagged and certified vessels may be exempted from the requirement to carry pilots if: they trade primarily in the Great Lakes system and they are crewed by

[26] Laurentian Pilotage Authority Regulations (C.R.C., c. 1268) Section 4; Great Lakes Pilotage Authority Regulations (C.R.C., c.1266) Section 4.

Canadian certificated officers who have completed at least 10 transits of the zone in question within the past three years.

This means that for the most part and only subject to the limitation of availability of appropriately qualified crews, that Canadian flagged vessels are exempt from the requirement to use pilots within the Great Lakes system (this provision also applies to US flagged and crewed vessels.). A second potential exemption exists for vessels operating a scheduled ferry service.

From an economic perspective, the ability to exempt from the requirement to carry a pilot within the Great Lakes and St Lawrence Seaway carries a significant benefit which may counterbalance at least to some degree the cost differential associated with carrying a Canadian or American crew.

For traffic below Montreal, a number of Canadian companies have made proposals to the LPA including the implementation of formal bridge resource management procedures, the installation of ECDIS (Electronic Chart Display and Information) and other precision navigation equipment aboard Canadian vessels and other significant initiatives in order to attain dispensation similar to that allowed by the GLPA. The LPA has resisted these initiatives and has maintained the status quo.

The cost implications of this policy are significant. For example a transit by a small feeder of approximately 3500 tdw from les Escoumins to the entrance to the Seaway at St Lambert might expect to incur a pilotage charge of $4400 per direction. From the perspective of a potential feeder operation, from any port outside of the St Lawrence this translates into an incremental cost of $22 per container or $1.25 per tonne with costs being doubled in the winter season. This of course assumes that the vessel is operating with a full load, partial loads would draw a higher incremental rate For larger vessels, this cost increment is considerably greater with a typical “laker” or lakes style bulk carrier incurring a pilotage charge of $17,000 per transit or $34,000 per round trip. This translates into a premium on shipping rates of approximately $1.00 per tonne for a typical laker. With both road and rail infrastructure being very well developed in this area and feeding into the area of Southern Ontario any increase in cost is likely to have a negative effect on the ability of marine transport to compete with either of the land based alternatives.

The Canadian Shipowners’ Association has also made representation regarding pilotage reform in both the St Lawrence and the Great Lakes.[27] Central to its position is that there have been vast improvements in technology and training in the past 30 years, and that pilotage authorities should consider that new communications and navigational equipment, including Differential Global Positioning System (DGPS) and electronic chart display has been installed on most domestic vessels. This has been complimented by training in Bridge Resource Management, and the introduction of the International Management Safety Code under IMO for pollution prevention and safety.

[27] “Consultation Document: Proposed Amendments to the Pilotage Act,” Canadian Shipowner’s Association, Comments – Background Paper”, 2007

The CSA makes the point that pilotage exemptions are applied inconsistently across the country. They have been granted for tug-and-barge operators on the west coast, offshore supply boats n the east coast, and for domestic and US vessels in the Great Lakes. They argue for an extension of this exemption into the Laurentian Pilotage Authority region below Montreal. The CSA has raised other issues with respect to governance, fees, etc.

2.2.5 Manning

The nature of trade in the Great Lakes and St Lawrence system limits the potential for operation with reduced crew numbers. Trades in the system tend to involve either significant periods of operation in confined waters and/or very short transit times.

In confined waters, whether the assignment is handled by a senior deck officer or by a pilot, the presence of a senior deck officer on the bridge is a requirement and for safety considerations the engine room must be manned at all times.

In the short haul trans lake trades, supervision by a senior deck officer is required to assure that the load/discharge process is undertaken safely and efficiently. A senior officer is also required on the bridge for departure and arrival to and from port, followed by a very short transit time during which the opportunity for adequate rest periods is limited. Increased numbers of licensed crew may be required in such trades to assure adequate supervision of cargo operations while complying with both safe practice and legislation governing hours of work.

2.2.6 US harbor maintenance fee (HMF)

The Harbor Maintenance Fee (HMF*)* was originally created by the *Water Resources Development Act of 1986* (USC. 4461 et seq) as the Harbor Maintenance Tax and was implemented by the *Customs Regulations* (19 CFR 24.24). The fee was originally set at .04 percent of the value of the cargo on ships calling at ports. In 1991 it was increased to .125 percent of value.

The HMF was controversial from the beginning. In 1998, the US Supreme Court ruled that this was an unconstitutional tax on exports. The name was changed from the Harbor Maintenance Tax to the Harbor Maintenance Fee at the time. Since then, its application on imports has been challenged by Thompson Multimedia, however in September of 2002; the Court of International Trade dismissed the application.

Currently, the assessment on imports is at a rate of 0.125 percent of cargo value against cargo imported through ports where federal funds have been used for harbour construction, maintenance or operation. Traffic to most ports from Canada is subject to this fee. The Harbor Maintenance Fee is payable by the cargo owner or his agent and not generally included in ocean rates.

Since April 1, 1987, the Saint Lawrence Seaway Development Corporation has received appropriations from the *Harbor Maintenance Trust Fund*. These are used to fund the operations of the Corporation.

The HMF creates a major cost and administrative burden in the marine mode that is not present in other modes and can be a major trade irritant or a deterrent to moving to the marine mode. As an example, an auto transporter hauling nine automobiles from St Thomas (ON) to Columbus (OH) would incur costs of about $500 on the Detroit/ Windsor truck ferry but would not face a similar fee on the Ambassador Bridge.

The HMF may ultimately be removed from transborder trades as a result of American initiatives related to shortsea shipping. In December 2007, President Bush signed the *Energy Independence and Security Act* (EISA), directing the Secretary of Transportation to establish a program aimed at expanding the use of America's Marine Highways as an extension of the surface transportation system to mitigate landside congestion.

The EISA has a continental component, called the Trilateral Working Group, as the US Maritime Administration (Marad) continues to work with Transport Canada and the Secretary of Communications and Transportation for Mexico to develop marine highways. As one of the first steps in developing the program, Marad in partnership with public and private entities, was tasked to identify potential incentives and seek solutions to impediments as a means of encouraging utilization of the Marine Highway and incorporate it, including ferries, in multi-state, state and regional transportation planning. The Secretary will "designate short sea transportation projects ... to mitigate landside congestion."[28] The focus is on "(1) documented vessels; (2) shipper utilization; (3) port and landside infrastructure; and (4) marine transportation strategies by State and local governments." A promotion program is envisaged including elements focusing on cargoes and shippers, research, vessel design and so on. Most important from a Canadian perspective was the program included not only US domestic marine cabotage but that it also extended the definition of short sea trade to container and ro-ro trade between Canada and the US on the Great Lakes St Lawrence Seaway System.

The EISA has led to new congressional initiatives. In January 2009, Congressional representatives McHugh (NY-23) and Cummings (MD-7) respectively introduced H.R. 528 (January 14th) and H.R. 638 (January 22nd) to amend the Internal Revenue Code of 1986 to exempt users of America's Marine Highways from the Harbor Maintenance Fee.

2.2.7 Fees and tolls

2.2.7.1. Seaway

There are no charges for passage through the two locks operated by the US Saint Lawrence Seaway Development Corporation or for the locks at Sault Ste Marie operated by the US Army Corps of Engineers or for services provided by the US Coast Guard.

Part 3 of the *Canada Marine Act* (Sections 77 to 102) give wide power to the Minister of Transport with respect to the infrastructure, property and operation of the Seaway. Section 92 provides for the charging of fees (including tolls) for the use of property and for the passage of vessels through the locks. Section 93 provides for relief against unjust discrimination and undue and unreasonable preference in toll setting. It also permits the differentiation among

[28] Public Law 110-140, 121 STAT. 1760, Chapter 556.

users or classes of users on the basis of volume or value of goods or any other "*generally commercially accepted*" basis. This latter provision would appear to allow the Seaway to price according to the needs of the market, subject to appeal by an aggrieved party.

Seaway tolls were modified in 2008 based on stakeholder input. These changes were driven by the system users with a view to attract new business. The following changes were approved and implemented:

- A three year toll freeze
- A change of classification of domestic cargo to increase/promote short sea shipping
- An incentive for new business, providing a 20 percent toll reduction
- Variable lockage fees on the Welland to assist the smaller vessel operators, which reduced lockage fees up to 65 percent in some situations. This is also intended to promote short sea shipping
- Incentives for existing shippers for incremental increase of traffic

As a result of these changes, the Seaway states that 1.8 million tonnes and $3.3 million in incremental revenue were generated.

2.2.7.2. Coast Guard charges

Traditionally, the Canadian Coast Guard (CCG) provided icebreaking and other services without direct charge to the marine community. Then in the late 1990s after extensive study and consultation, charges were implemented for navigational services, icebreaking and dredging. The charges were imposed to recover part of the costs of providing the services and it was hoped to provide some discipline on the level of service being demanded. Fee implementation was as follows:

- June 1996 Marine Navigation Services Fee;
- December 1997 Dredging in the St Lawrence Ship Channel; and
- December 1998 Icebreaking.

On October 1, 1998, fee levels were frozen and have not changed since then. The CCG is now reviewing the level of fees and even their continued existence. A large number of users and user groups (over 600) from coast to coast have asked that these charges be reduced and phased out over a period of 10 years. While the freeze ended on October 1, 2001, the review continues and the fees appear not to have changed. Great Lakes shipping interests, led by the Chamber of Maritime Commerce, are trying to tie fee reductions to participation in a green ships initiative for ships that meet certain environmental criteria.

Marine Navigation Services Fee

A CCG *Marine Navigation Services Fee* was implemented in 1996. The current fees reflect the nature of the vessel and cargo, distance travelled and tonnage with the actual rates varying by the registration of the vessel and the maritime zone being transited. The fee is not charged to vessels passing through Canadian waters en route to or from the United States.

Icebreaking

The Canadian Coast Guard *Fee Schedule* indicates that (effective December 21, 1998) vessels travelling in the St Lawrence, the Seaway and the Great Lakes *ice zones* during the *ice season* must pay the fee for ice breaking whether the service is needed or not.

The fee for transiting is $3,100 for each zone. *Ice season* dates are December 21-April 15 for all ports along the St Lawrence River as far as the St Lambert lock of the Seaway and Canadian Great Lakes ports except for ports in Lake Ontario and along the MLO section of the Seaway. For the latter, the *ice season* is defined as December 21-24 and April 1-15.

The fee applies to any vessel calling at a Canadian port. If an ocean-going ship comes into the system and transits directly to a US port, there is no fee. If a vessel transits between a US port and a Canadian port the fee is charged. Accordingly, a laker movement of grain from

Duluth to Baie Comeau would be charged. A return movement of iron ore would also be charged. Certain categories of shipment or vessel are entitled to reduced fees. Also, the fee is chargeable a maximum of eight (8) times per ice season or three (3) times in 30 days to the same vessel.

The United States Coast Guard provides ice breaking services in US waters but does not charge for this service.

Maintenance Dredging Services Tonnage Fees

A CCG *St Lawrence Ship Channel Maintenance Dredging Services Tonnage Fee* was implemented in 1997. The present fee is 3.45 cents per transit based on the Gross (Registered) Tonnage of the vessel for each transit. This fee is only charged to commercial vessels that transit the St Lawrence Ship Channel and call at a Canadian port for loading or unloading. Ships transiting the Seaway that call at Montreal but do not travel further down the St Lawrence are not assessed this fee. For example a ship loading at Duluth and proceeding directly overseas would not pay the charge, if the ship unloaded in Quebec City it would pay the charge and if it unloaded in Montreal Harbour would not pay the charge.

The intent of the Dredging fee is that it would recover all of the costs of dredging the channel. By way of comparison the level of cost recovery is about 20 percent for the Marine Navigation Services Fee and only about 10 percent for the Icebreaking fee.

2.2.8 Customs

There are two customs issues as they relate to Great Lakes shipping. One relates to the Canadian cost recovery fee, and the other relates to the US 24-hour notice, whereby cargo owners are required to provide US authorities with 24-hour notice for the arrival of marine cargo in US ports.

Any new marine service across the lakes has to pay the full cost of placing officers at the location (at $100 per hour per officer) as well as the total cost of new infrastructure.

It has been argued that the policy (which comes from Treasury Board[29]) is anti-competitive, and only applies to new operations, whereas existing ones do not pay for it other than through their taxes. It also affects the potential expansion of existing services, such as the Detroit-Windsor Truck ferry. That operation is thus limited to five days per week, 10 hours per day, and capacity sits idle the rest of the time.

As noted in the Phase I Report, the ill-fated Toronto-Rochester ferry cited the cost of debts incurred by a delayed start-up, as well as costs for pilotage and customs services, and delays in terminal construction at Toronto for its ultimate failure.

2.3 Environment Issues

This section addresses two major environmental issues affecting the Ontario marine industry, Aquatic Invasive Species (AIS) and lake water levels. Both issues have brought the whole future of water transportation in the Great Lakes into focus. They both impact on the public perception of marine transportation and the use of the Lakes. The section also discusses environmental regulations affecting the Ontario marine industry.

2.3.1 Aquatic Invasive Species and the Great Lakes/Seaway

During the past two centuries, AIS have significantly changed the Great Lakes ecosystem. In turn, the changes have had broad economic and social effects on people that rely on the system for food, water, and recreation. An "aquatic invasive species" is a plant or animal that is non-native (or alien) to an ecosystem, and whose introduction is likely to cause economic, human health, or environmental damage in that ecosystem. Once established, it is extremely difficult to control their spread. One of the main avenues for the introduction of AIS has been in the ballast water carried by foreign ships entering the Great Lakes.

More than 180 Aquatic Invasive Species are estimated to be present in the Great Lakes, including animals, plants, viruses and bacteria. These species have had significant impacts on the Great Lakes food web by competing with native species for food and habitat. Invasive animals have also been responsible for increased degradation of coastal wetlands; further degrading conditions are resulting in loss of plant cover and diversity.

Non-native molluscs have also caused turmoil in the food chain. In 1988, zebra mussels were inadvertently introduced to Lake St Clair, and quickly spread throughout the Great Lakes and into many inland lakes, rivers, and canals. Since then, they have caused severe problems at power plants and municipal water supplies, clogging intake screens, pipes, and cooling systems. They have also nearly eliminated the native clam population in the ecosystem.

Great Lakes/Seaway stakeholders have seen this issue of paramount importance, as environmental interests have gone as far as demanding the closing of the Seaway to international shipping to prevent the introduction of additional AIS. The response of commercial shipping interests has been to focus on the management and inspection of ballast water to insure that it does not contain invasive species.

[29] Section 60, *Customs and Revenue Agency Act,* and Sections 6 and 167, *Customs Act.*

The two Seaway Corporations marked a significant achievement in 2008 with the establishment of uniform ballast water management standards for all vessels. In March 2008, the US Saint Lawrence Seaway Development Corporation issued regulations that followed Transport Canada's lead in requiring saltwater flushing for all vessels fully loaded with cargo entering the Seaway from outside the 200-mile "Exclusive Economic Zone". The combined efforts of Canadian and US inspectors ensures that no vessel is granted admission to Seaway waters without first complying with ballast water management practices that are among the most stringent in the world today.

Commercial shipping interests also got a strong boost from a recently released study by the National Academy of Sciences. The study, *Great Lakes Shipping, Trade, and Aquatic Invasive Species*, concluded that closing the St Lawrence Seaway to ocean-going vessels is not the answer to ending the further introduction of AIS, such as zebra and quagga mussels, into the Great Lakes as non-ship-related vectors would continue to allow AIS into the Great Lakes. The committee's evaluation of the effects of closing the seaway to international shipping led it to conclude that this action would be not only high risk but also an impractical and unsatisfactory compromise that would likely reduce economic competition, raise consumer prices, and increase greenhouse gas emissions.

A 13-member committee of US and Canadian scientists, engineers and academics conducted the study, which began in 2004. The group recommended nine actions to enhance global trade in the region and end ship-borne introductions of AIS into the Great Lakes. One of these would require all vessels entering the Great Lakes to take protective measures similar to those currently required for transoceanic vessels. This action was cited by the report as an example of the type of effective ballast-water management practice that is required.

Of concern is not only the introduction of new species into the lakes from overseas, but also the moving of species from one area in the Great Lakes to another. Domestic shipowners in both Canada and the US try to deal with this by adhering to a Code of Best Management Practices that states that ships not take ballast where there is an active outbreak of alien species. Unfortunately, there is no real time system that shipping interests can access to determine this information.

Of greatest concern to commercial shipping interests is the unilateral imposition of much tougher restrictions by individual states bordering the Great Lakes. For example the Wisconsin Department of Natural Resources recently released a proposed set of ballast water discharge rules for ocean-going vessels that is far stricter than anything that has been adopted by any other Great Lakes state except New York. Wisconsin's decision to take a tough stand is so critical because most all the ballast water discharged in the Great Lakes by overseas vessels happens in Wisconsin and Minnesota waters at the twin ports of Duluth-Superior. Wisconsin's proposed rules, which do not start until 2012, require overseas ships to install water treatment systems that are 100 times more stringent than what neighbouring Minnesota has proposed. Minnesota's rules also will not commence for existing ships until 2016.

These join Michigan regulation which has long been a concern to shipowners. The US Court of Appeals for the Sixth Circuit recently issued a decision upholding the permit requirement of the Michigan Ballast Water Statute, thereby dismissing the complaint that had been filed by various industry representatives. Because none of the plaintiffs indicated that their vessels

would discharge ballast water into Michigan waters, the court ruled that they would not be affected by the permit's provisions and therefore did not have the right to challenge the statute. The court also disagreed with the plaintiffs' contention that the Michigan statute is pre-empted by federal law and barred by the US Constitution. As a result of this ruling, each ship that intends to discharge ballast water during port operations in Michigan must first treat its ballast water with an approved system.

The US Environmental Protection Agency has a system of permits requiring ships to have a Vessel General Permit imposing environmental requirements that include ballast. States are free to impose additional requirements beyond the federal ones and apparently individual states are acting because many different interest groups including commercial and sport fishing, recreational, and well as individual land owners and businesses, believe that the federal government requirement that overseas ships flush their ballast tanks with salt water in mid-ocean before they arrive in the lakes is insufficient.

Many interests have been pushing for a uniform system with more stringent federal requirements. Recently appointed administrator Lisa Jackson has been quoted as saying that she will consider tougher new rules.

2.3.2 Water levels and the Great Lakes

Water travels some 3,600 kilometres from the western end of Lake Superior to the Gulf of St Lawrence. The Great Lakes and St Lawrence River form a chain of lakes with each one draining into the next. Lake Superior, the largest of the five Great Lakes, drains into Lake Huron by way of the St Marys River. Lake Michigan also drains into Lake Huron through the Straits of Mackinac. The straits are so wide and deep that the water levels in lakes Michigan and Huron are the same. From Lake Huron, water flows into Lake Erie via the St Clair River, Lake St Clair and the Detroit River. The water then flows into Lake Ontario through the Niagara River and the Welland Canal. Lake Ontario, in turn, empties into the St Lawrence River. From there, the water flows into the Gulf of St Lawrence and the Atlantic Ocean.

There is more to the Great Lakes than just the lakes. They are part of a complex system of lakes, rivers and streams which drains large tracts of the province of Ontario as well as eight American states. In total, the Great Lakes basin, on both sides of the border, measures 774 000 square kilometres.

Water levels in the Great Lakes rise and fall all the time. They have been doing so since the glaciers retreated about 10 000 years ago. Most changes in water levels are natural, but some are the result of human activities. Long-term changes in water levels are usually the result of heavier or lighter than normal levels of precipitation. For example, the low water levels in the Great Lakes during the 1960s, which left many docks a good walk from the water, followed a number of years of below-normal snow and rain fall.

In contrast, heavy rains and snow in the early 1970s and mid-1980s raised the water levels in the Great Lakes to heights which were above average.

Currently, Lake Superior is nine centimetres higher than it was a year ago. Lakes Michigan-Huron and St Clair are 25 and nine centimetres, respectively, above what they were at this

time last year. Lake Erie is the same as last year's level, while Lake Ontario is four centimetres above last year's level. Over the next several months, Lakes Superior and Michigan-Huron are predicted to remain at or above their levels of a year ago. Lakes St Clair, Erie, and Ontario, however, are projected to be at or below last year's levels for the next few months

Generally shipping has to adjust to changing water levels. The loss of even a few inches in permissible draft results in very important reductions in cargo that a ship can carry – it may even equate to the profit margin for a particular shipment. Each one inch of vessel draft is equivalent to about 130 tonnes of cargo payload for a typical laker or ocean going vessel, so this issue is very significant.

There is the possibility of controlling water levels since the flow of water through the Great Lakes is controlled at two points: from Lake Superior to Lake Huron at Sault Ste Marie, and from Lake Ontario through the St Lawrence River at Cornwall. This is done according to rules set out by the International Joint Commission (IJC). The rules were established by the Canadian and American governments and work toward the fair, equitable and environmentally sound management of the Great Lakes and other boundary waters.

Of concern to Great Lakes shipping interests is the regulation of the level of Lake Ontario. The International Joint Commission has been reviewing water levels and flow regulation for the Lake Ontario-St Lawrence River system. Studies had been ongoing for several years. After considering public comment on a draft proposal released in March, 2008, Commissioners have concluded that regulation should be based on a revised set of goals and criteria aimed at more natural flows while respecting other interests. It has a proposed one-year process to resolve outstanding issues and obtain the concurrence of the federal governments.

The shipping industry questions the validity of the economic analysis used to inform the decision being made. The concern is that a focus on habitat and wildlife conservation turns a blind eye to other, potentially more damaging impacts on the large scale such as the economic damage to shipping and the possible shift to more environmentally damaging modes. The shipping industry is asking for a flexible and responsive plan to provide certainty about water levels required to support commercial navigation and to allow deviations in case of unforeseen difficulties with the weather. As well industry is seeking guarantees that safe and acceptable conditions for navigation will be maintained in accordance with the priorities of the Boundary Waters Treaty.

Of concern in the longer term are the possible effects of climate change. The earth's natural climate system is never stable. It has changed in the past and it appears to be changing again. This time it seems to be getting warmer. Although opinions vary on the effect a change in climate may have on the Great Lakes, computer models suggest that supplies of water to the lakes may drop dramatically. The mean levels of water in lakes Michigan and Huron may drop by 100 centimetres, while those in Lake St Clair may fall by 90 centimetres, in Lake Erie by 80 centimetres and in lakes Ontario and Superior by 40 centimetres over the next 20 to 40 years. Obviously this would have potentially devastating effects on Great Lakes shipping.

2.3.3 Discharges into the water

In the recent past the most serious concern confronting vessel operators in the Great Lakes concerned discharge of oil, oily residue or cargo residue into the water. This remains a primary concern, however in recent years there have been other significant concerns raised about the introduction to or transfer within the system of AIS. This has led to the introduction of ballast water treatment protocols and regulations which require the treatment of ballast water in an attempt to render it biologically inert prior to being discharged into the system. This is of greatest concern for vessels entering the system either fully loaded or in ballast from outside of North America, however there is also a concern for the transfer of species from lake to lake for vessels trading exclusively inside the system as well.

As well as ballast water, some 27 other sources of water discharge from ships have been identified. These discharges come from such varied sources as deck runoff and hold washings to galley grey water and engine room wash water. The Environmental Protection Agency in the United States was required by court action in 2007 to regulate these under its Vessel General Permit system and in Canada operators are required to adhere to the Voluntary Ballast Water Management Practices protocol as introduced in 2001. The lack of a coherent federal policy in the US in years past has also led to the introduction of legislation affecting ballast water and other discharges by the states bordering on the Great Lakes.

It is expected that water treatment requirements for overboard discharges will become ever more stringent over the next few years. These may include treatment facilities to render discharge water inert or a requirement to retain water that is currently discharged on board for treatment ashore or for discharge outside of the Great Lakes system. For Great Lakes vessel operators this will represent a further requirement for capital investment to retrofit older vessels to comply with new regulations. Some of these are expected to be so technically difficult as to make them impractical or uneconomic and once again emphasizes the need to invest in purpose built tonnage that can meet all of the regulatory requirements for continued trade in the Seaway and Great Lakes system. A failure to do so will result in a continuing decrease in the number of vessels trading in the Lakes system.

2.3.4 Environmental legislation

There are two areas of environmental legislation that affect shipowners with existing tonnage. These apply to Air Pollution and Water Pollution, particularly as it relates to invasive marine organisms, but also to discharge of cooling water, domestic grey water, hold washings and sweepings, and deck run off.

Both Canada and the United States are signatories to MARPOL, the International Convention for Prevention of Pollution from Ships which was initially enacted in 1973, and focused primarily on oil pollution. It has undergone successive amendments over the years to address other ship generated pollution including: bilge and tank washings, noxious liquids, cargo, sewage, garbage and air pollution (Annexes I through VI). Both Canada and the US have enacted federal legislation to meet the requirements of the Convention.

The Great Lakes system is bounded by eight states and the province of Ontario. In Canada the division between federal and provincial jurisdiction with regard to shipping is clearly spelled out under Sections 91 and 92 of the BNA Act, and in the case of marine transport

falls clearly under the mandate of the federal government. In the US jurisdiction is not as clearly defined, and individual states have the ability to legislate independently of the federal government.

Annex VI of Marpol sets limits for NOx, SOx, and particulate emissions from ships' exhaust, as well as release of gases and petroleum vapours from other ship board activities. Annex VI also limits the amount of sulphur acceptable in marine fuels. Most engine manufacturers have made significant efforts to allow owners to comply with the newer MARPOL NOx provisions. There is some question as to whether older engines will be able to comply with the new limits imposed, and shipowners may be faced with significant capital expenditure requirements to do so.

The restrictions on sulphur content in residual fuels and the limits on SOx emissions will have a significant operating cost implication as a large number vessels in the Great Lakes operate on intermediate fuel (IFO), which is significantly less expensive than distillate. As requirements become more restrictive, owners of older tonnage may be faced with the prospect of retro-fitting exhaust gas scrubbers to remove sulphur compounds, or alternatively, operating on low sulphur fuels. This situation is exacerbated by the ongoing shortage of distillate fuel in North America.

A further degree of uncertainty has been added by the application made to the International Maritime Organization (IMO) by the governments of Canada and the United States on 27 March 2009 to declare an Emission Control Area (ECA) within 200 miles of the coast of North America. The EPA Administrator signed the following proposed rule on June 26, 2009, which is being submitted for publication in the Federal Register. In summary,

> EPA is proposing emission standards for new marine diesel engines with per cylinder displacement at or above 30 liters (called Category 3 marine diesel engines) installed on U.S. vessels, under section 213 of the Clean Air Act (CAA or "the Act"). The proposed engine standards are equivalent to the nitrogen oxides (NOX) limits recently adopted in the amendments to Annex VI to the International Convention for the Prevention of Pollution from Ships (MARPOL Annex VI) and are based on the position advanced by the United States Government as part of those international negotiations. The near-term standards for newly-built engines would apply beginning in 2011. Long-term standards would begin in 2016 and are based on the application of high-efficiency after treatment technology. We are also proposing a change to our diesel fuel program that would forbid the production and sale of marine fuel oil above 1,000 ppm sulphur for use in the waters within the proposed U.S. ECA and internal U.S. waters and allow for the production and sale of 1,000 ppm sulphur fuel for use in Category 3 marine vessels.[30]

The regulations would apply to both coastal and inland waters, and would have a significant impact on the Ontario marine industry. Some operators have proposed innovative fuelling solutions for their vessels which would make them fully compliant with all current and future Annex VI provisions, however the expense involved in so outfitting vessels would likely preclude retrofits and underlines the necessity for investment in new tonnage.

[30] http://www.epa.gov/otaq/regs/nonroad/marine/ci/c3marine-nprm.pdf

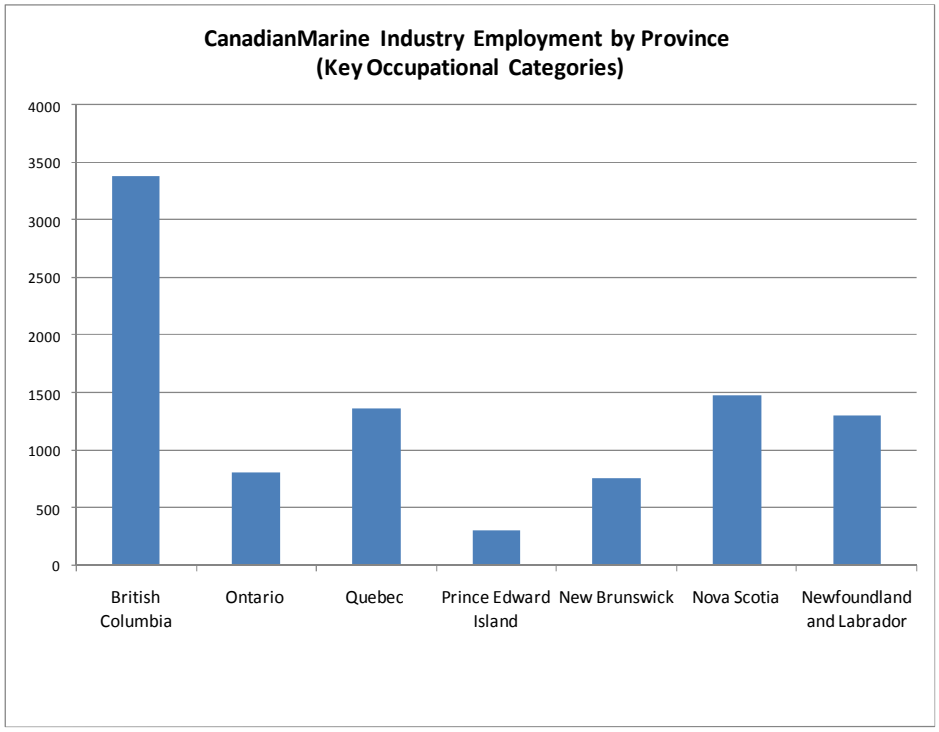
2.4 Labour and Skills Shortages

2.4.1 Overview and profile of labour in the Ontario marine industry

Of the over 90,000 jobs generated by the marine industry in Canada in 2003, and as the Phase I Report describes, over 19,000 jobs were generated in Ontario, second to British Columbia which generated over 34,000 jobs. This is followed closely by Quebec, which generate over 18,000[31].

The actual number of jobs in the marine industry (as opposed to generated by the marine industry), is considerably lower than this. According to Statistics Canada's 2006 census data, Ontario's marine industry directly employed 800 full and part time individuals in key marine sector occupational categories[32]. This is significantly less than British Columbia (3400 jobs), Nova Scotia (1500 jobs), Newfoundland and Labrador (1300 jobs), and Quebec (1400 jobs).

Figure 15. Distribution of Marine Sector Jobs by Province (2006)



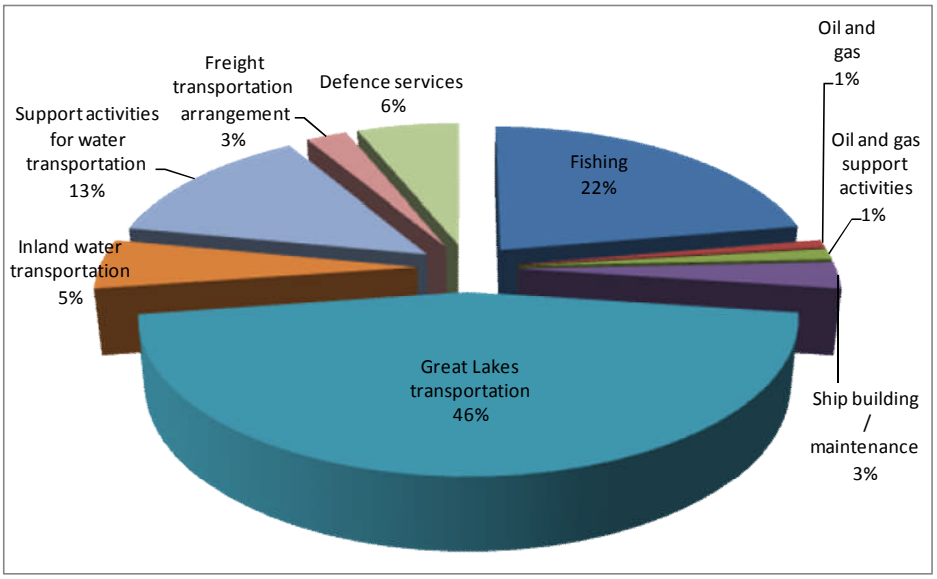
Source: Statistics Canada 2006 Census, generated by CPCS from NAICS database

The great majority of Ontario marine sector jobs are in marine freight transportation. The distribution of jobs in the Ontario marine sector across different industries is depicted below.

[31] LECG, Marine Industry Benefits Study, Executive Summary, December 2004; See also MariNova Consulting Ltd., Phase I Ontario Marine Industry Report, p. 105.

[32] Deck officers, deck crew, engineer officers, ship master and officers, other professional engineers, engine room crew.

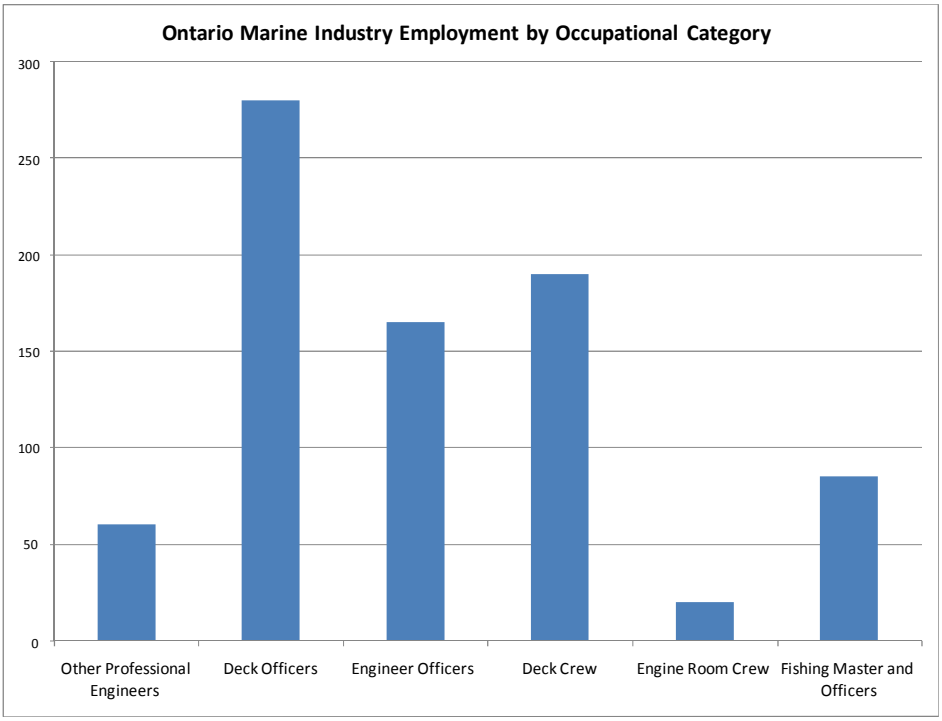
Figure 16. Distribution of Ontario Marine Sector Jobs by Industry (2006)



Source: Statistics Canada 2006 Census, generated by CPCS from NAICS database

The major employment categories in the Ontario marine sector are Deck Officers, followed by Dock Crew and Engineering Officers, as depicted in the figure below.

Figure 17. Distribution of Ontario Marine Sector Jobs/Occupational Category (2006)



Source: Statistics Canada 2006 Census, generated by CPCS from NOCS database

2.4.2 Skills shortage in the Ontario marine sector

Across Canada, including in Ontario, the marine industry is facing acute difficulties in the attraction, recruitment, training, and retention of skilled workers – marine officers in particular.

The need for Engineering Officers was identified as the number one priority across the industry, followed closely by Deck Officers, and their respective Crews. Without these essential personnel in place, the marine industry in Ontario and other parts of Canada is threatened.

Findings in a recent study by CPCS[33] have underscored the gravity of this issue for the marine sector and likened it to a "burning platform" situation, whereby maintaining the present course of action or inaction is even more problematic with every passing day.

The key problems with respect to the availability of qualified labour in the Ontario marine sector are driven by a number of issues, including an aging marine sector work force, inadequate recruitment of new staff, barriers to training and advancement. Each of these issues is discussed briefly below.

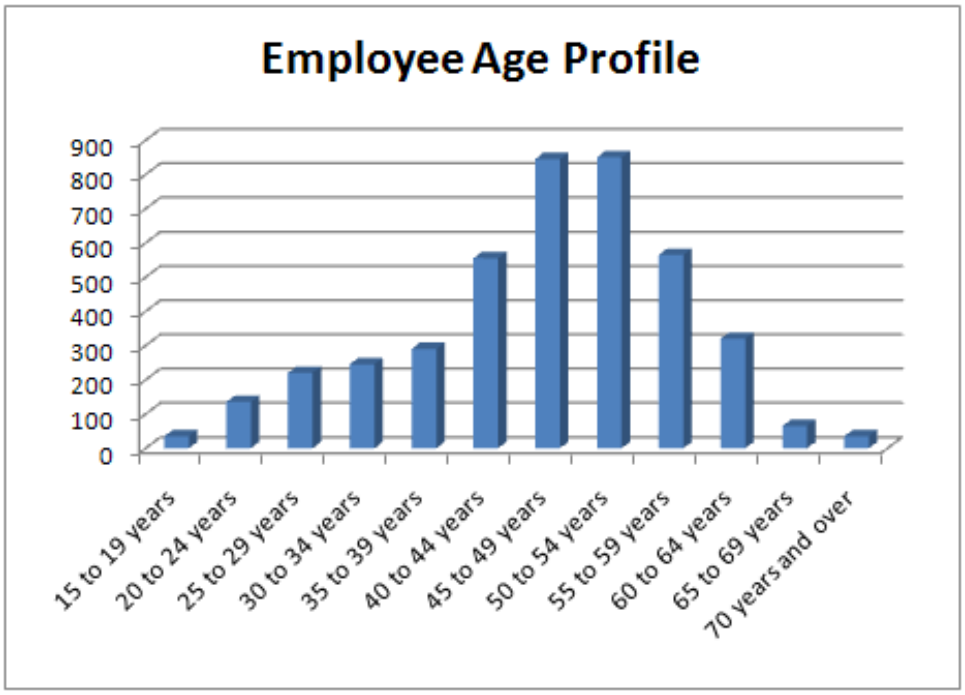
2.4.2.1. Aging workforce

The average age of workers in the marine sector in Ontario is increasing. A 2002 study revealed that between 58 and 98 percent of licensed Marine Officers in Canada are over 45 years of age, and approximately 20 percent are over 54 years of age[34]. The situation is similar in Ontario. This situation has been getting worse since then, and is expected to continue as the existing work force continues to age. In this respect, the following figure, of the employee age profile for Engineering Officers and Deck Officers, is telling.

[33] CPCS, "Marine Transportation, Ports and Ocean Technology Situational Analysis , Final Report prepared for HRSDC, May 30, 2008.

[34] *Executive Summary of Sectoral Profile- "Let's Not Miss the Boat,"* "Comité sectoriel de la main-d'œuvre de l'industrie maritime" of Quebec, *2002.*

Figure 18. Employee Age Profile across Canada for Engineering & Deck Officers (2006)



Source: Statistics Canada 2006 Census, generated by CPCS from NOCS database

2.4.2.2. Inadequate recruitment

Recruitment of workers in the Ontario marine sector is not keeping step with the aging demographic profile of this labour force in the marine sector (for marine officers in particular).

Recent studies[35] have indicated that the following Engineering Officer Certificates have been difficult to recruit:

- First Class Marine Engineer;
- Second Class Marine Engineer;
- Third Class Marine Engineer; and
- Fourth Class Marine Engineer (entry-level).

The reasons for the difficulty in recruiting marine officers include the following:

- barriers to training and advancement of lower level officers (discussed in following sub-section);
- poor public perception of employment in the marine sector. this limits the interest of potential candidates to apply and train for careers in this sector; and

[35] Summarized in "Marine Transportation, Ports and Ocean Technology Situational Analysis , Final Report prepared by CPCS for HRSDC, May 30, 2008.

- general lack of awareness among high-school students about careers in the marine sector.

In addition, it was recently found that a majority of officers graduating from Georgian College's Post Secondary Programs were recruited en masse by Ontario Hydro, which limits the pool of available candidates for other marine sector employers in Ontario.

Other marine positions that have been identified as difficult to recruit include:

- Marine Crane Operator (offshore);
- Marine Electrical Technician;
- Marine Electronics Technician;
- Instrumentation Technician;
- Marine Superintendent/Operations Manager; and
- Safety Managers.

Otherwise, Deck Crew and Engine Crew, unlicensed marine personnel, were not indicated by employers as difficult to recruit.

2.4.2.3. Barriers to training and advancement

Of the six institutions that provide marine sector training in Canada, only one is located in Ontario: Georgian College Great Lakes International Marine Training Centre[36]. This makes training less accessible as most in Ontario would have to travel to take courses at Georgian College, or elsewhere in Canada, as appropriate.

Fundamental to the training issue are the high costs associated with certification requirements and upgrading of existing personnel. It must be remembered that the requirement for completion of training and sea service to advance to Senior Marine Certificates is a minimum twelve years.

The Niagara College Report, *Making Waves: A Profile of Career Opportunities in Niagara's Marine Sector*, cited a number of other potential barriers to training and advancement for careers in the marine sector. These include, in order of priority:

- lack of time to do the courses with limited "off-time";
- travel costs/time to training location too high;
- course fees too expensive;
- lack of flexible course scheduling;
- lack of specific training programs; and
- lack of financial incentive to upgrade skills.

Funding is a key issue which is a major barrier to marine sector training. Funding for training (tuition costs) varies across regions and is often inadequate or inconsistent. It should be noted that the $8.5 million Marine Training Centre and Simulator at the Owen Sound campus of

[36] The others are the Marine Institute of Memorial University Programs (Newfoundland), British Columbia Institute of Technology (BCIT), Institut Maritime du Québec, the Canadian Coast Guard College, in Sydney, NS and the Nautical Institute in Port Hawkesbury, NS.

Georgian College received $3 million from the Ontario Ministry of Training, Colleges and Universities, $1.435 million from Transport Canada and $750,000 from MTO.

Focus and support for marine sector training has been on new entrants to the industry, rather than upgrading qualifications for current mariners. This has limited accessibility of advanced training for the existing work force.

2.4.3 Summary and implications of skills shortage for Ontario marine industry

The skills shortage in the Ontario marine sector is getting worse as time progresses. For key positions and occupational groupings, such as that of Deck Officers, Engineering Officers, Deck Crew, and Engineering Crew, in particular, shortages are going to impact severely on the quality and level of service of the Ontario marine industry, to the point where this threatens the long term viability of the sector. A severe crisis in operations has been forestalled through the use of overtime strategies and other short-term human resource practices. However, employee burnout has already begun to occur, and the application of more robust, long-term human resource practices is urgently required.

While this section has dealt with the ship-board trades, labour shortages are also looming in other sectors which support the marine industry in Ontario, namely Seaway and port workers, marine service and repair companies and sectors dependent upon marine transportation from within shipper groups.

2.5 Economic Issues

The two basic elements of economics – 'demand' and 'supply' can *largely* be considered to be beyond the ability of the shipping industry to influence. Demand for Great Lakes shipping is a derived demand[37] - it depends on the level of activity in those industries that use it:

- many of the industries respond at a very early stage to the business cycle – steel production and cement are prime examples;
- other commodities are influenced by other independent variables – for example salt shipments respond to severity of winter and grain shipments may be influenced by the levels of grain harvests half-way round the world; and

[37] There are many examples in the shipping industry where demand has been created by innovative entrepreneurs. The cruise industry did not exist prior to 1970 and is now a major component of the travel industry. It was a response to the demise of transatlantic passenger shipping and the emergence of Likewise, Scandinavians incorporated a "cruise" element into their basic ferry services and vastly increased the numbers of people travelling (as well as their revenue) in the Baltic region just for the experience. Perhaps the best example of this phenomenon is the invention of the simple shipping container, and the explosion of containerized shipping since the mid-1960s, which has been cited as one of the enablers of globalization. The point here is that new services can *create* their own demand. See Marc Levinson, *The Box: How the Shipping Container Made the World Smaller and the World Economy Bigger*, (Princeton: Princeton University Press, 2006); Also, Frank Broeze, "The Globalization of the Oceans: Containerization From the 1950s to the present", *Research in Maritime History*, no. 23. Indeed, the container industry is replete with examples of ports and transhipment hubs which did not exist a decade ago, and which now handle millions of containers annually. Some examples include Freeport, Bahamas; Gioia Tauro, Italy, Tanjung Palapas, Malaysia, and Salalah, Aden. Melford, Nova Scotia could emerge in the next decade.

- in the long-run, demand is determined by structural changes in the economy – for example globalization has led to the shifting of location of some industries such as steel production.

The supply side of the economic equation is the one that the shipping industry has much more hope of influencing. The supply equation contains many variables, chief of which are the cost and service characteristics of shipping. In fact most variables can ultimately be reduced to the common denominator of cost. The challenge for domestic marine transportation, if it is to generate additional business, is to lower its cost structure to become more competitive with other modes and to overcome hurdles such as the 25 percent duty that ultimately add to the costs faced by shippers. As the European Union's Marco Polo and Motorways of the Sea programs demonstrate, as well, it is possible to encourage modal shift through public policy and incentives.[38]

2.5.1 Economics of ship size

As is evident from the development of the world fleet of ships, bigger is better, assuming ports are capable of handling the volumes they load and discharge. Better because the larger the ship, the lower the cost on the basis of cost per tonne carried. Virtually all cost factors, on a per tonne of cargo basis, drop as ship size increases – labour, fuel, construction cost, etc. Ship size becomes constrained by harbour, channel or lock dimensions, by particular requirements of a shipper or by the trade-off between the size of cargo versus frequency of service. Nowhere is this more evident than in the Great Lakes/Seaway system. When it opened to ocean shipping in 1959 it could accommodate most of the world fleet, now it is able to only accommodate a small proportion.

It appears that for the foreseeable future the footprint of Seaway locks and channels can be taken as a given. Opposition from environmental interests and the prohibitive costs of rebuilding the locks to larger dimensions are likely to keep them at their present configuration. The Seaway locks of the Welland Canal and the Montreal/Lake Ontario section were built to accommodate ships with maximum measurements of 225.5 metres long, 23.16 metres in beam. Original lakers had capacity of 26,500 tonnes. The Seaway can now accommodate vessels of 225m' length overall (loa) and beam of 23.77m. A new generation laker will be able to carry 32,000 tonnes of cargo. The locks between Montreal and Lake Ontario that were opened to traffic in 1959 were built to the same dimensions of the locks of the Welland Canal locks that were completed in 1932. The locks at Sault Ste Marie on the other hand, have been built to accommodate ships carrying over 50,000 metric tonnes of cargo and led to a US fleet of '1000 foot' lakers.

The economics of building ships is the converse of building locks. For ships the cheapest dimension to increase is the depth of the ship, followed by the breadth and then by the length – for locks the cheapest dimension to increase, when they are being built, is the length, followed by the breadth and finally by the depth. The only change to the Seaway locks, if the footprint is assumed to be a given, is likely to do is very marginal increases in draft as their

[38] For a full discussion of this program, see CPCS, "Eastern Canada Hub-and-Spoke Container Transhipment Study", Transport Canada, December 2008.

footprint appears to be a given. This would allow ships to increase their payload with virtually no increase in cost.

Shipowners operating through Seaway locks, seeking to minimize costs, have reached the maximum economies available through ship size. This has resulted in very specialized long thin ships that are restricted to 'inland waters' – hence increasing the risk of investing in new lakers. Curiously no Canadian shipowner has ever opted to build a ship larger than the Seaway-max vessel that will fit through the Seaway locks. It is believed that all of the major Canadian fleets have evaluated, at some time, the economics of adding a ship of at least 850 feet, if not 1000 feet, for trades in the Upper Great Lakes. Some of the reasons the concept was not adopted include:

- The preponderance of trades on the Great lakes above the Welland Canal that are suitable for a 1000 foot ship is domestic US trades.
- Many of the Canadian domestic trades above the Welland are commodities such as salt and stone that are loaded and unloaded at harbours that could not accommodate a 1000 foot ship and serve shippers that do not require deliveries of 50,000 tonnes at one time. Thus there does not appear to be sufficient domestic (protected trades) to provide a core business.
- It is not possible to use low cost overseas shipbuilders.
- Canadian shipowners prefer to have their assets much more flexible rather than being tied to the upper lakes trades.

Shipowners have been taking steps in conjunction with Seaway Corporations and Coast Guards to maximize the drafts they have available as there is a strong incentive to optimize the carrying capacity of existing ships. However there appears to be little scope for domestic carriers to lower their costs through increasing the size of their ships. Exploitation of niche markets will in fact lead to higher cost ship operation as new trades would not likely support a full seaway –max vessel.

2.5.2 Economics of travel time

The reality of marine transportation is that ships are much slower than other modes of transport hence are at a considerable disadvantage when it comes to moving high value commodities that are sensitive to time of delivery or that have high carrying costs.

This is an economic reality that marine transportation must face. Great Lakes ships with a very high block coefficient must contend with a sharply increasing fuel consumption curve if speed is increased over current speeds. As well speed in confined channels is limited by opposition from riparian interests that are concerned by shore line erosion.

2.5.3 Minimizing transfer costs: Self-unloaders versus bulkers

Within the last 30 years there have been dramatic changes in the composition of the domestic laker fleet. The fleet of bulkers, vessels that relied on shore-based unloading equipment, was the dominant vessel in the Great Lakes fleet. In the present day fleet self-unloaders are now dominant notwithstanding the reality that self-unloaders carry a significant weight penalty

that results in a reduction in payload on every voyage. Construction costs of a self-unloader are much higher, and extra crew members and extra maintenance are also required. On a line-haul basis the cost per tonne of cargo carried would be 10 to 20 percent higher for a self-unloader than for a bulker.

However the preponderance of self-unloaders in preference to bulkers in Great Lakes trades is the result of several factors:

- Many Great Lakes trades are short distance trades where the time in port is a much more important consideration than it is for long distance ocean trades. Hence there is a much greater incentive to speed up port turnaround time. The limited success of self-unloaders in cross-ocean trades (as opposed to coastal) is a result of much longer trades where the higher ship costs are not offset by lower port costs.
- Many Great Lakes trades involve long-term relationships between shippers and carriers. A calculation of the total costs of the movement has led to shippers, such as steel mills, abandoning shore-based unloading equipment and relying on ship-based equipment.
- Self-unloading ships are much more flexible for the movement of commodities such as salt or aggregates where the receiver requires only a relatively small amount.
- The decline of the long distance two-way trade of iron ore and grain. These were the longest trades in the system where the advantages of self-unloaders would be minimal.

Thus the Great Lakes system has evolved to a system where total logistics costs are being minimized for the major bulk trades as the lowest combination of line-haul and unloading-port cost has been achieved. However this has the effect of increasing the barriers to entry as new self-unloading vessels are much more expensive than bulkers and it has left most Great Lakes ports without the infrastructure necessary to support the development of new niche markets that would not utilize self-unloading ships.

2.5.4 Costs of new ships versus rehabilitation

To this point shipowners have opted to renovate or rebuild existing tonnage rather than replace it with new ships. Lakers because they operate in fresh water have a much longer life than salt-water ships, being able to operate 60 years or more, replacing steel as necessary as it becomes damaging from manoeuvring in the close quarters of locks and their approaches.

However there is an economic cost to renovating rather than replacing – that is the foregone opportunities of replacing older ships with new more fuel-efficient, less polluting ships.

For the present, the calculation of replacing or rehabilitating is distorted by the 25 percent duty on new foreign-built ships. As well shipowners must assess the risk of investing in an asset that is locked into a system where business appears to be stagnant. (This issue is also dealt with in Chapter 4.0–Opportunities).

2.5.5 Economics of environmental compliance

As discussed elsewhere, new legislation has been introduced in New York state that will require all vessels transiting its waters (including the MLO section of the Seaway) to have ballast water technology installed by 2012. These systems, none of which will currently meet New York's onerous standards, will impose a significant cost on the operators of existing Lakes vessels.

Likewise, the ECA emissions legislation planned for 2012-15, will require vessels to burn marine diesel oil (MDO), which costs about double what the currently prevalent intermediate fuel (IFO) costs. Some older vessels still operate with steam engines and these would are not capable of burning MDO. ECA legislation will also restrict NOx (nitrogen oxide), GHG and other emissions, which can be reduced with new engine technology, but scrubbers may also need to be installed on older vessels.

It is costly to retrofit existing older tonnage, and probably desirable, from many points of view, to replace older vessels with cleaner, more environmentally friendly and fuel efficient new ones, but the 25 percent duty imposed on foreign-built vessels makes it especially onerous, and is a major disincentive.

2.5.6 Economic costs of winter seaway closure

For vessels operating through the Seaway system, the shutting down of shipping operations for two or three months is a very critical feature of their business model that ultimately leads to a higher cost system. These shipowners have to spread fixed costs over a shorter period, while shippers have to carry higher inventories or make alternative transportation arrangements. Using different transportation channels during the Seaway navigation season and during the winter can be expensive. Railway rates and service levels can be less favourable for shippers who are only looking for winter service. Duplicate facilities for loading and unloading may be required as well. For the small shipper facing potentially high inventory costs, the limits on the navigation season may be sufficient to seek other, permanent transportation channels.

The end result of seasonality has been the development of a system that is specialized in the transportation of huge volumes of a handful of bulk commodities. The question of whether significantly increased tonnages of containers, general cargo and project cargo would move through the Seaway if it were open year round is presently the topic of much discussion, but the reality is that year-round navigation is just not a possibility given the layout and footprint of the existing locks. The impact of marginal improvements in the length of the Seaway season would probably not have a major impact as it still leaves the shipper seeking alternative transportation, or stockpiling cargo when the Seaway is closed.

2.5.7 Economic costs of marine traffic control and user fees

Shipowners continue to outfit their large commercial vessels with the latest in radar, electronic charts, GPS and modern communications equipment to ensure that the navigational officers on the ship know exactly where they are in the ship channel. Ships are now required to have transponders and traffic controllers are able to pinpoint their location in the Seaway.

At the same time ocean-going vessels are required to put pilots on board throughout the Great Lakes/Seaway system and lakers are required to put pilots on board on the St Lawrence below Montreal. However air traffic control over craft moving at much greater speed does not require having a controller on board the aircraft.

Shipowners are also required to pay a marine services fee for services that may not be required by the largest ships.

There is an argument that government regulation has not kept pace with technological improvements. From an economic perspective shipowners have a great interest in safety in order to protect their investment and to minimize insurance costs. Rational decision making would see shipowners taking pilots on board voluntarily if it was warranted to manage bridge resources or rest periods for deck personnel.

Any regulatory requirement by government does have an immediate effect on the cost structure of marine transportation – whether through user fees or through investments that must be made to meet regulations. The threats of new regulatory requirements appear to be mainly in the field of environmental concerns – ballast water requirements and reduction of fuel emissions are the most current.

Given the fixed size of ships, the main course open for the reduction of costs and for the greatest threat to increase costs appears to be at the hand of the government regulator.

2.6 Market Issues

2.6.1 Market share and trends

Modal market share is determined by shipper and/or receiver preferences based on transportation service criteria and price within a supply chain. The ability of modes to compete for business can be influenced by legislation and regulation that may affect service efficiency and/or government subsidies, fees or taxes that may influence service price.

While there are many examples in the study area where the marine mode has direct access to potential cargo at point of shipment and/or direct access to the receiver at destination in most cases the marine mode is dependent on land based transportation modes to effect a through movement of traffic from origin to destination. This introduces a measure of modal competitive vulnerability in that once freight is loaded on a railcar or truck it may prove economically attractive to continue the movement on land. This is particularly true within the St Lawrence River Valley and the Great Lakes Basin where land based transportation is almost always an option.

In addition, the value of the commodity being moved may present a significant factor in modal choice. Marine transportation is usually more time consuming than land based modes and consequently introduces a longer period of inventory carrying cost. This is much less significant a factor for low value, bulk commodities but can influence modal choice for higher valued manufactured and consumer goods.

Following is a commentary on market share for the main commodities moving in marine service to, from, and within Ontario.

2.6.1.1. Iron ore

Currently iron ore moves exclusively via the marine mode to steel mills in Ontario. This was not always the case as the former Dofasco mill in Hamilton used to receive iron ore by rail from mines in north-eastern Ontario[39] and the former Algoma mill at Sault Ste Marie received ore by rail from a mine at Wawa. While rail transportation costs may have been a factor in shifting iron ore sourcing to the Quebec north shore and the US Mesabi Range, ore quality, its cost and environmental issues regarding the sintering process at Wawa were primary motivators. Regardless, the shift in sourcing to locations from which rail or truck transportation are uncompetitive has assured the marine mode a 100 percent share of this commodity.

The inability of the marine mode to supply this commodity during the closed winter navigation season is addressed by the mills building inventory starting in the late summer.

2.6.1.2. Coal

Both metallurgical and thermal coal move exclusively by the marine mode to Ontario's steel mills and to coal fired generating stations in southern Ontario. However, the use of thermal coal is scheduled to be phased out as a matter of provincial government policy. Coal is sourced from Appalachia, western Canada, and the Powder River Basin and in all cases moves to a Great Lakes port by rail for transhipment.

At times in the past, railways have expressed interest in moving Appalachian coal direct to Hamilton, by-passing the Lake Erie ports where it is transhipped to lake vessels. However, it is believed that any apparent transportation and inventory cost reduction would not support the necessary investment in rail receiving facilities at the Hamilton mills by either the railway or the steel company. Earlier consulting assignments touching on this particular issue identified that exploration of a direct rail-to-mill option foundered on this point.

Similar to the situation with iron ore the mills build inventory to cover the closed winter navigation season.

2.6.1.3. Steel

Most steel is shipped from Ontario mills by truck. There is, however, a regular movement by rail from Sault Ste Marie to Hamilton for eventual truck delivery. There are also some shipments by rail to western Canada.

The marine mode shares very little of the steel transportation market. In the past steel slab has been imported from offshore by vessel. With the global restructuring of the steel industry this appears to have ceased and in the past year some steel was exported offshore from

[39] In addition, iron ore once moved directly to Hamilton by rail from Marmora, Ontario and from Wyman, Quebec.

Hamilton. In addition, some steel slab was shipped by barge from Hamilton to US Great Lake ports. There are also movements of steel by barge from Sault Ste Marie to the Detroit area.

2.6.1.4. Grain

Grain markets have shifted away from Thunder Bay and the GLSL route since the heady days of the mid 1970s. Not one single factor caused this shift but the shift of Canada's major export markets from Europe to Asia and the cost of transporting grain east were the prime factors. It should be noted that international grain markets are highly competitive and are often influenced by producing country's financial assistance.

Historically, the western railway network was built to bring grain to Thunder Bay. Prairie branch lines sloped that way and the statutory rail rate structure initially only applied to the lakehead and later to Armstrong. The statutory rates were extended to the west coast in the 1920s and later to Churchill when the railway line was completed there. Another important factor is that until western grain rate reform in 1984, statutory rail rates could not apply to shipments of more than one carload; that is, lower rates for multiple cars or trainloads was not permitted. East of Thunder Bay, multiple carload and trainload rates had been permitted since the rail reforms of 1967.

Commencing in the late 1950s, new markets for Canadian grain developed, particularly in the Soviet Union and these shipments mostly moved via the GLSL. This was in addition to traditional markets in the UK and western Europe. With the creation of the EEC, now the EU, much of the traditional western European markets were lost as was the UK market with the UK's accession to EU membership. Not only were the markets lost in Europe but western Europe became a significant competitor in traditional Canadian export markets as a result of increased grain production and the EU's highly subsidized grain production resulting from the Common Agricultural policy (CAP).[40]

[40] The subject of explaining grain subsidies and efforts to have them reduced or removed could become a career for someone.

Table 3: Estimated cost of moving wheat from a mid-prairie point* to export position

Crop Year	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08p
			$/tonne			
Primary Elevator Costs						
Elevation (1)	11.63	11.90	11.90	12.20	12.51	12.94
Removal of dockage	3.83	4.40	4.40	4.50	4.62	4.85
Shrinkage	0.25	-	-	-	-	-
Carrying charges (2)	3.53	1.96	1.86	2.30	2.09	2.40
Railway Freight						
Via Thunder Bay	33.43	33.26	34.02	34.36	38.05	41.53
Via Vancouver	33.77	34.45	34.71	35.06	38.09	41.98
Marketing (3)	-0.08	2.77	0.83	3.15	4.94	7.99
Terminal Elevator Costs						
Storage (4)	1.67	1.02	1.48	1.30	1.28	1.35
Fobbing charges:						
- via St. Lawrence ports (5)	8.73	9.03	9.26	9.54	9.78	9.81
- via Pacific seaboard (5)	8.90	9.20	9.36	9.82	10.06	10.46
Lake Transportation (6)	18.93	18.92	19.28	19.91	21.85	24.09
Transfer Elevator Costs						
Storage	3.47	1.73	3.62	3.41	3.45	3.11
Fobbing charges (7)	2.31	2.32	2.32	2.31	2.32	2.41
Total						
- via St. Lawrence ports	87.70	87.31	88.97	92.98	100.89	110.48
- via Pacific seaboard	63.50	65.70	64.54	68.33	73.59	81.97

p Preliminary

* Mid-Prairie point being Brass, Saskatchewan

(1) Filed tariff for receiving, elevating and loading.

(2) Carrying charges on wheat stored in country elevators.

(3) Includes interest, bank and other charges and Canadian Wheat Board administrative costs, interest and depreciation on CWB hopper cars; drying, additional freight, and demurrage/despatch.

(4) Storage charges on wheat stored in terminal elevators.

(5) Thunder Bay and Pacific fobbing charge, which includes elevation, outward weighing and inspection, terminal elevator receipt cancellation, lake shippers' charges, superintendence and forwarding brokerage charges.

(6) Includes elevation, outward weighing and inspection, terminal elevator receipt cancellation, B.C. Shippers' charges, superintendence, wharfage and forwarding brokerage charges.

(7) Includes lake freight, lake brokerage, cargo rates, insurance, St. Lawrence Seaway and Welland Canal tolls and inward elevation into transfer elevator.

Source: Canadian Grain Exports Crop Year 2007-2008, Canadian Grain Commission

The cost structure of moving grain through the GLSL has been well documented over the years, at least since 1987.[41] What that study (and later studies) showed is that the combined effect of a number of small charges for the eastbound movement through Thunder Bay can influence the routing selection of export grain as some markets can be served either via the West Coast or Via the eastern system. To illustrate this point, the Canadian Grain Commission annually publishes a comparison of the cost of the eastern routing vs the western routing using Brass, Saskatchewan as an example mid-prairie point. The data (see Table 3 above) show that the break point is somewhere east of Brass, probably in Manitoba. Since Saskatchewan is the major grain producing province, this means that for most grain exports,

[41] *See: Great Lakes/St Lawrence Seaway System: Review of Grain Transportation Cost Structure*, The Trade and Transportation Group and Wintemute, Randle & Kilimnik, for Ontario Ministry of Transportation and Communications, Goods Distribution Office and Dominion Marine Association, May 1987.

the cost to export position is less via the West Coast than via the GLSL. With significantly increased grain storage and handling being built on the west coast to accommodate the market shift, significantly more grain is now exported via Vancouver and Prince Rupert than via the eastern system. This is unlikely to change in the foreseeable future.

In addition to the major shifts in markets, the grain handling system on the prairies has seen major restructuring of the number and size of elevators. Most of the small old elevators have closed and dismantled and have been replaced by fewer but larger facilities referred to as "High Throughput Elevators".[42] These large terminals draw grain from larger areas by truck. Whereas grain was formerly delivered to the local country elevator by the farmer in his own farm truck, grain is now routinely delivered longer distances in larger, often commercially operated, trucks. In addition, these terminals can clean grain to export standards and can load multiple rail carloads and often trainloads. This means that once grain is loaded onto rail, it is easy to haul it all the way to export position in the St Lawrence without transfer at Thunder Bay. There is no longer a need to unload at Thunder Bay, clean and tranship either by marine or rail. Table 4 illustrates the effect of the changes in the grain handling system on the prairies as there were only 18.5 percent of the number of primary elevators in the prairie provinces in 2007-08 as there were 20 years previously, but capacity remained at 67.1 percent of that in 1987-1988.

Table 4: Primary Elevator Numbers and Capacities (capacity in thousand tonnes)

	Manitoba		Saskatchewan		Alberta		Total	
Aug. 1	***Number***	***Capacity***	***Number***	***Capacity***	***Number***	***Capacity***	***Number***	***Capacity***
1987	288	1,106	925	3,741	545	2,700	1,758	7,547
1997	212	1,017	637	3,737	298	1,806	1,147	6,560
2007	75	937	169	3,746	81	1,381	325	5,064

Note: Primary elevators in British Columbia are excluded for the totals in the table. On August 1, 2008, there were six primary elevators capacity of 56,350 tonnes in British Columbia.

Source: Canadian Grain Commission, Grain Elevators in Canada, Crop Year 2007-2008

Furthermore, rail competition east of the lakehead has been further heightened since the railways went from 45 tonne boxcars to 65 tonne hopper cars to 90 tonne hopper cars and now 100 tonne hopper cars while the laker industry has only been able to squeeze relatively small increases into vessel capacity due to the fixed size of the Seaway locks.

In addition to the foregoing, more and more grain is being processed on the prairies and there is increasing production of non-traditional crops such as peas, beans and lentils which move in smaller lots and lend themselves to rail transport.

All of the foregoing and perhaps other factors such as the CWB's increasing use of the Port of Churchill for export have impacted on the movement of grain through the GLSL.

[42] The number of primary elevators in the prairies has fallen fairly continuously from over 5,000 in the 1960s to little more than 300 today.

2.6.1.5. Limestone/cement

Limestone is the primary raw material in cement production. To be competitive cement manufacturing plants locate at the limestone source or at a location where the limestone can be delivered relatively cheaply by the marine mode. There are many cement plants located around the Great Lakes Basin, several of them in Ontario and those not located at a deposit receive limestone via marine service.

Cement is also moved throughout the system via the marine mode in bulk quantities but this commodity is also transported in bulk by rail and truck and final delivery is almost always by a land-based mode. Modal selection is based on factors of cost and service needs. Typically, cement is positioned by marine service to be close to inland markets. However, there are some relatively long land-based movements. The nickel mines in Sudbury, for example, at one time received cement by rail from southern Ontario and likely still do so.

Cement production is typically year round, with perhaps a one-month plant closure in the winter for maintenance. However, most product demand occurs outside the winter months necessitating an inventory build up in the late winter and spring. Cement plants receiving limestone by marine service are normally supplied from locations within a particular Great Lake so supply can continue during the winter. However, some cement plant locations lack adequate storage capacity for their winter production resulting in the need for shipment to alternate facilities. If winter navigation to such destinations is not possible then shipments move by rail or truck pending the opening of Seaway navigation.

2.6.1.6. Salt

Salt mines located at Goderich and in the Windsor area produce salt for winter road maintenance and for industrial and consumer markets. [43] Salt for road maintenance provides the greatest tonnage and is shipped primarily by marine service to ports on the Great Lakes and St Lawrence River for distribution by truck to provincial and state highway authorities and municipalities. Local clients, within about 160 km of the mines are supplied directly by truck. Rail service is also used to inland points and to clients with a preference for rail delivery. It is believed that much of the product shipped by rail is for industrial use, rather than road maintenance.

Also, in the case of Goderich, the salt mine is the primary user of the railway branch line between that town and Stratford. Shifting its existing rail use to marine or truck transportation would likely precipitate line abandonment by the shortline railway operator and thus preclude the rail option for the future – an outcome that the salt producer would likely wish to avoid.

As most of the demand for road maintenance occurs during the closed navigation season, inventories are built at destination ports in the summer and fall. It is reported that, on occasion, due to lack of available vessels in the fall, product has to be shipped, at higher cost, by rail or truck during the winter. In addition, in the case of unusually severe winter weather, demand may exceed local inventory supply resulting in replenishment by rail or truck.

[43] Salt moves both ways across the lakes between Canada and the US. Discussion on salt from Goderich and Windsor also applies to shipments from US origins and from Canada to the US.

2.6.1.7. Aggregate

Aggregate for road building and other construction is normally sourced reasonably close to the area of demand and typically moves by truck. However, in some locations, notably south-western Ontario there are no local deposits. Consequently, aggregate is moved by vessels of all sizes from northern Ontario to south-western Ontario ports as a more economical option than trucking supplies from quarries located east of London ON. Also, Canadian aggregate moves across the lakes to the US by water and from US origins to Ontario. Again, such long-haul movements are only economic via the marine mode.

2.6.1.8. Raw sugar

The Redpath sugar refinery located on the Toronto waterfront receives all its raw sugar from offshore by vessel. The plant was built in 1959, coinciding with the opening of the St Lawrence Seaway. Throughout the open season of navigation it is supplied direct by foreign seaway sized vessels. However, in the fall, shipment from overseas is received via larger vessels and the raw sugar is transhipped in the St Lawrence River to domestic lake vessels that then provide storage for winter inventory at the Toronto plant. This avoids the cost of being supplied by land-based transportation during the winter months from St Lawrence River or east coast ports. Transhipment into lakers can also occur during the rest of the year.

Outbound product is shipped exclusively by truck.

2.6.1.9. Project cargo

Inbound project cargo for power generation, industrial plants, oil sands development, etc. is handled periodically throughout the system. There are also locally generated shipments of unusual size, such as pressure vessels produced in Cambridge, which utilize marine services. Marine services offer significant advantage for handling dimensional loads that require special arrangement and permits to move by either highway or rail.[44] Determination of routing for such shipments involves many factors and is often planned far in advance of the material being built.

The constraints posed for any necessary onward land-based transportation often influences port selection. In the case of shipments destined to western Canada by road, Duluth and Superior have the advantage of providing access to the multi-lane Interstate Highway System whereas Thunder Bay offers access only to a two-lane highway.

Thunder Bay *does* have direct rail connections by both CP and CN to western Canada. CN has improved its line from Thunder Bay by strengthening bridges and widening rock cuts in order to move large pieces of equipment through the port to western Canada. With its purchase of the short line railway from Edmonton to Fort McMurray, project cargo can now be moved directly from Thunder Bay to the oilsands over 1,500 miles of CN line. The port is also on the CP mainline which, together with CN, provides Thunder Bay with excellent rail

[44] Rail's disadvantage is often related to the incidence of bridges and other clearance problems. Similarly, highway routings can involve special handling and routing to avoid low overpasses, overhead wires and other dimensional limitations.

connections to western Canada and makes it a competitive Canadian routing for project cargo.

Furthermore shipments arriving in vessels that are too large to navigate the Seaway must tranship such cargo at St Lawrence River ports, primarily the ports at Quebec City or Montreal. If the final destination in western Canada is to be reached by rail then transfer to railcars may occur at that point rather than incur an additional transfer at a Lake Superior port. For shipments of this type, the security and timely arrival of the cargo may outweigh cost considerations.

2.6.2 Trends affecting Ontario marine activity

There are several economic and industrial trends that will affect the demand for marine transportation in the immediate and longer-term future. An immediate impact will be felt at the opening of navigation as a consequence of the negative effect of the economic recession on the demand for goods and materials in the Great Lakes basin. The demand for marine transportation is dependent entirely on the demand for the material it carries.

Furthermore, it would be unrealistic to anticipate that economic recovery will necessarily result in a return to former levels of demand. Recessions often force a restructuring of economic activity that can have a downstream effect on freight transportation needs. As an example, the recession of the early 1980's was an impetus for cost cutting and improved productivity in the automotive industry. One of the key outcomes was a shift away from maintaining several days parts inventory at automotive assembly plants and the move towards "just in time" supply chain management. This had a profound effect on freight transportation demand – leading to smaller, more frequent, tightly scheduled shipments. In the short term this resulted in some modal shift from rail to truck, an increase in less than truckload shipments and, eventually in the longer term, to the growth of third party logistics services tailored to the needs of the automotive industry.

2.6.2.1. Recession related trends

Major impact will occur in the steel industry as demand within the automotive industry declines and as private sector construction projects are deferred or abandoned. Steel shipments from producers reportedly started to decline in November.[45] Iron ore shipments throughout the Great Lakes – St Lawrence Seaway plunged 42 percent in December from the previous year[46] and it is already anticipated that the demand for iron ore and coal will drop from traditional levels at the opening of navigation in March as the mills cut back production to match steel demand. Anticipation that the demand for iron and coal would drop with the opening of navigation has already been realized with the March 3, 2009 announcement of the temporary closure of the US Steel Canada mills at Hamilton and Nanticoke. Raw material receipts at both mills will be reduced to the relatively small quantity of coal required at Nanticoke to sustain the coking operation that will continue to produce coke, presumably for US mills.

[45] http://www.steelguru.com/search_in_news_container/sg_news_search_result.html#79433.

[46] Journal of Commerce Online January 16, 2009 – Lakes ore trade crumbles http://www.joc.com:80/articles/news.asp?section=logis&sid=47594.

Similar effects can be anticipated in the demand for the transport of cement and aggregate. It is too early to forecast the offsetting effect that may result from federal and provincial stimulus packages. Certainly public sector infrastructure projects will create demand for structural steel, cement, and aggregate. Some projects, such as the renovation, of Union Station in Toronto have already started. However that project and other, so-called, shovel ready projects such as municipal road reconstruction may have been going to proceed eventually anyway. The stimulus package may advance the timing of such work but may have no long-term impact on transportation demand over the coming years.

Again, with respect to the automotive industry it is too early to assess the effect of any stimulus package in improving the demand for, and the assembly of, vehicles. In the longer term it is clear that the automotive industry is going to restructure with uncertain outcomes on steel demand.

The potential for the US stimulus package to restrict public sector spending on construction material to domestic sources is troubling and may have negative consequences for both the Ontario steel and cement industries. While there have been assurances that the US legislation mandates that "Buy America" provisions should not be implemented in contravention of international treaties it remains to be seen how the sourcing of material by state and municipal governments may be biased towards local sourcing of construction material.

The recession-induced decline in world trade will have other negative effects for the marine industry at least in the short term. New services that have been proposed for the cross-border movement of trucks or semi-trailers as well as marine container movement from the east coast have at least in part been predicated on existing routings becoming congested and less attractive. In the case of cross-border ferry services, delays at land crossings have been cited as one of several reasons for pursuing a marine option. With Canada/US trade in decline border congestion becomes less of an issue.

With respect to container imports from the Far East, it has been anticipated that marine traffic might seek to avoid west coast port congestion by arriving at the east coast via the Suez Canal, thus providing increased opportunity for marine feeder services into the Great Lakes. With declining imports it seems less likely that shipments from the Far East will be induced to follow this longer routing via the east coast.

2.6.3 Other trends

2.6.3.1. Steel demand and production

The recent acquisition of all three Ontario steel interests by foreign, global companies has already resulted in some shifts in raw material sourcing and product distribution. Individual changes may have either positive or negative effects on the marine industry in general and on specific carriers in particular. Perhaps, more important, in the globalization of the steel industry, is the removal of decision making from the local mills and potential vulnerability to rationalization within their respective global corporations.

The Ontario mills are relatively small by world standards and in some cases the facilities are quite old and potentially more vulnerable to closure than newer mills. A steel industry

analyst, quoted in the Globe and Mail forecast that the relatively new US Steel Canada mill at Nanticoke is likely to reopen once steel demand improves, but the much older mill at Hamilton is likely to remain closed until demand returns to 2008 levels.[47]

Steel demand in specific sectors is vulnerable to decline. In the case of the automotive industry, regardless of the outcome of potential government support of the "Big Three", future production is likely to consist of smaller, more fuel efficient vehicles. Smaller vehicles require less steel and more fuel-efficient vehicles tend to employ lighter weight materials, plastic and aluminum, in preference to steel. Other steel users such as major appliance manufacturers have shifted production from Canada and the US to lower production cost countries such as Mexico and China. There is no indication of a reversal of this trend.

Taken together the short and long-term trends for steel and the consequent demand for iron ore and coal marine transportation are not encouraging. A decline in the short term is already underway. Eventual economic recovery can be expected to result in rising demand but it is uncertain if that demand will return to former levels. In the longer term it is possible that demand may trend steadily downward.

2.6.3.2. Construction material demand

Construction materials demand, experiencing a potential downturn during the recession, may be expected to continue to fluctuate based on economic activity in the region. While housing starts, for example, are currently trending downward, provincial estimates of population growth within southern Ontario over the next two decades, if realized, should ensure continued demand for cement, aggregates and asphalt.

2.6.3.3. Electrical power generation

The Ontario decision to cease coal fired power generation appears now to be firmly set for implementation by 2014. The resulting loss of marine coal transportation demand may be partially offset by a demand for movement of wind powered generating equipment. However, this is a one-time demand for moving equipment from offshore to the point of installation and employs entirely different vessels from those moving coal. Furthermore, wind powered generating equipment now purchased overseas may eventually be built in North America, making it less likely that marine transportation would be employed.

Also, Ontario Power Generation is currently experimenting with mixing biomass (pelletized grain screenings) with coal in fuelling its Nanicoke facility. The Atikokan station has been experimenting with using wood pellets as fuel.[48] It is too early to assess the longer-term potential of these fuels in power generation and more particularly any potential transportation demand. It is possible that bulk movement of biomass material might present a future marine transportation demand.

[47] Michael Willemse, "US Steel to shutter Ontario operations" Globe and Mail, March 4, 2009, p. B-1.

[48] http://www.opg.com/power/fossil/biomass.asp?printMe.x=55&printMe.y=14.

2.6.3.4. Global warming

The pace of global warming is uncertain but its trend may have some effect on marine transportation demand and operations. If the consequence of global warming is reduced precipitation then it will have an adverse effect on water levels and a negative effect on vessel operations. Measures taken to counter global warming may have a potential positive impact for the marine mode. For example, aggressive future government action to reduce greenhouse gas emissions could make marine transportation a more attractive option.

Warmer winters may result in lower demand for salt by municipalities and highway authorities. Much of the salt now shipped by marine services from Goderich and Windsor is used for snow and ice melting throughout the Great Lakes Basin and St Lawrence River Valley.

2.6.3.5. Logistics practices

The "just in time" revolution dating from the early 1980's shows no sign of reversal. The practice of moving both primary and secondary manufactured goods as well as consumer goods to point of sale in frequent, time sensitive shipments, primarily by truck or intermodal rail service, without significant inventory in the supply chain, shows no evidence of reverting to former methods. This will continue to militate against modal shift from either truck or rail to the marine mode. Transportation remains a relatively small cost component of the delivered price of all but very low value commodities. The spike in fuel prices during 2008 almost doubled the cost of truck transportation but there has been no apparent published, or even anecdotal, evidence that this led to any appreciable shift to more fuel-efficient modes.

2.6.4 Modal competition

2.6.4.1. The Mississippi River system

The Mississippi is a high-volume waterway that cuts through the middle of the United States from the Northern Tier States to the Gulf of Mexico. When combined with tributaries such as the Ohio, the catchment area is immense.[49] In some ways, the Mississippi is two systems; the northern reaches are characterized by locks and dams and winter conditions while the lower reaches constitute an open unrestricted access waterway. By comparison with the Great Lakes and the St Lawrence System, draft is shallow, often nine feet, and transport is by tug and barge combinations. The lower part of the river can accommodate much larger tow combinations than can the upper reaches.

The locks and dams in the upper section and levees in the lower section are maintained by the Army Corps of Engineers. As such, the upper part of the River is subsidized to the extent that the only payments made for use are on the upper section where a fuel tax applies to recoups some of the capital cost associated with the lock and dam system. Accordingly, the Mississippi System is subsidized by the US taxpayer. While the Seaway recovers all its operating costs and a portion of fixed costs through tolls, it receives federal funds for maintenance and repair.

[49] The catchment area for the Mississippi River and tributaries limits the geographic catchment area for the GLSL. For example, the Ohio River (at Pittsburgh, PA) comes within 150 miles of Lake Erie at Cleveland or Ashtabula.

While the Seaway is closed for about three months each year[50] due to the onset of winter - a regular routine event, the Mississippi is susceptible to unpredictable extended shutdown due to severe flooding and extreme weather on the open part of the river south of St Louis, MO such as when Hurricane Katrina struck New Orleans. Extensive damage to facilities also occurs during these events.

The Mississippi and its tributaries handle enormous volumes of traffic each year. In 2007, 313 million short tons of cargo were carried on the Mississippi - down slightly from 10 years previously. Major commodities handled included: Petroleum and petroleum Products–86.1 million tonnes; food and farm–71.2 million tons; Crude Materials–48.8 million tons; and Coal–47 million tons.[51] Figure 19 on the following page provides a snapshot of Mississippi River traffic from 1998 to 2007. From this figure, one can see that volumes have declined slightly over the 10 year period.

Traffic volumes

From a Canadian perspective, interest usually centers on grain and the potential to move Canadian grain to export position via the Mississippi. In this regard, the volume of grains shipped via Minneapolis and St Paul in 2006 proves instructive. In 2006, 2,000 tons of grain (all corn) was loaded at Minneapolis while 729,000 tons of corn was loaded at St Paul. In addition, 100,000 tons of grain was shipped from St Paul of which 99,000 tons were soybeans.[52]

Grain on the Mississippi

Northern Tier cereals grains are exported via the west coast and the Great Lakes but not the Mississippi. The Mississippi is a major conduit for corn, soybeans and for cereal grains grown in the more southern states.

It is often mooted that considerable Canadian grain could find its way into the Mississippi River System. Grain is never a simple subject and before large volumes of Canadian grain would go this way, several factors would have to be considered including:

- The US has from time to time had concerns about volumes of Canadian grain exports to the US. Any movement of Canadian grain through the US, even for overseas export might raise such alarms about the possible leakage into the domestic US market.

The need to preserve the identity of Canadian grain moving through the US will increase handling costs, and some grain handling facilities may not be willing to participate in identity preservation; or the extra handling procedures could increase grain transit times. Canadian grain might have to move in bond to ensure it did not leak into the US market.

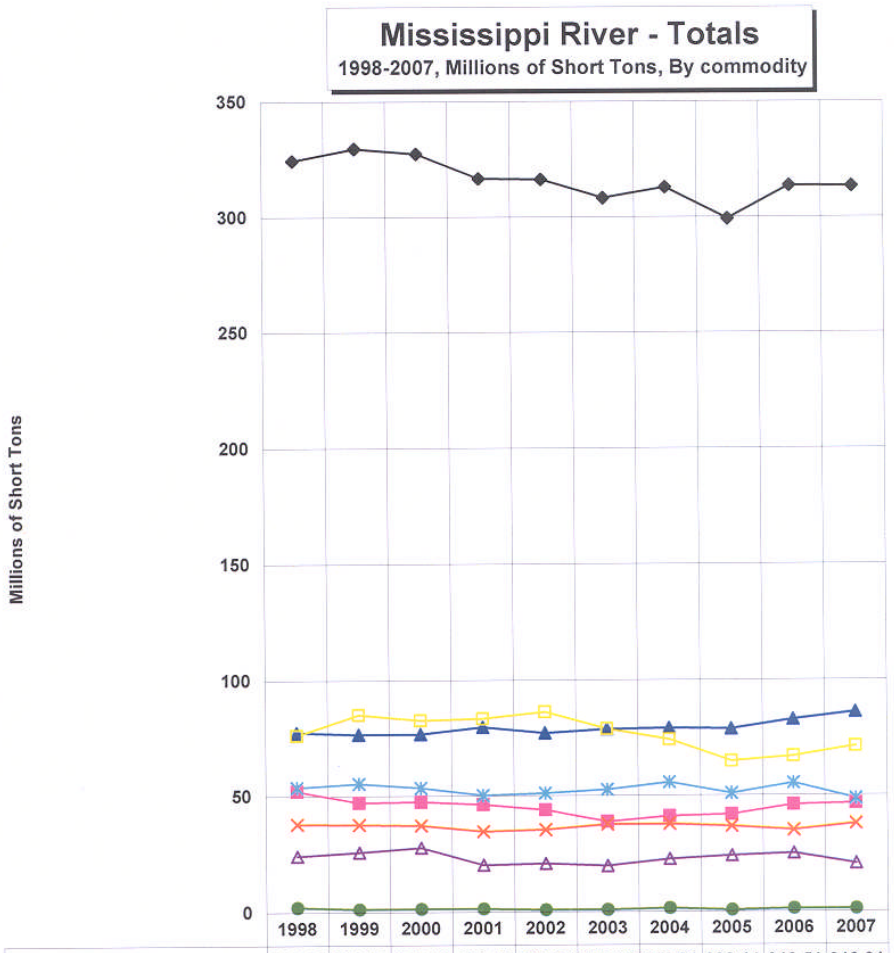
[50] At least part of the upper reaches of the Mississippi also close because of winter freezing.

[51] *Final Waterborne Commerce Statistics for Calendar Year 2007*, Institute for Water Resources, Navigation Data center, US Army Corps of Engineers, Waterborne Commerce Statistics Center.

[52] *Waterborne Commerce of the United State, Calendar Year 2006, Part 2 -Waterways and Harbors, Gulf Coast, Mississippi River System and Antilles*, US Army Corps of Engineers.

- The advisability of committing to the long-term utilization of the Mississippi River system for the export of Canadian grain may not be considered wise by Canadian interests, especially if the CWB is involved.
- As previously mentioned, the Mississippi system is subsidized and the US government, and some of the users, might be averse to Canadian grain being exported via this route in competition with US grain.

Figure 19.



	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Total	324.48	329.64	327.40	316.55	316.21	308.21	312.81	299.14	313.51	313.31
Coal	52.24	47.28	47.65	46.46	44.09	39.08	41.31	42.20	46.30	47.00
Petro & Petro Products	77.44	76.70	76.83	79.75	77.16	78.83	79.33	78.93	82.92	86.13
Chemicals	38.05	37.79	37.38	34.79	35.52	37.81	37.88	37.02	35.24	38.06
Crude Materials	54.01	55.47	53.59	50.36	51.38	52.81	55.85	51.12	55.49	48.79
Manufactured Goods	24.36	25.93	27.97	20.45	21.02	20.00	22.76	24.40	25.28	20.97
Food & Farm	76.22	85.12	82.59	83.28	86.15	78.76	74.15	64.76	66.92	71.17
Other	2.15	1.35	1.39	1.46	0.89	0.92	1.53	0.72	1.36	1.20

Domestic tonnage only (including coastwise).

Source: USACE Waterborne Commerce Statistics Center

- Canadian grain is cleaned to higher standards than US grain. Accordingly, Canadian grain would have to be kept segregated from US grain. Inspection of Canadian grain at point of offshore export might require either agreement with the US Federal Grain Inspection Service or the stationing of Canadian inspectors in the US.
- Railway or shipper owned cars would probably have to be used because of restrictions on the use of government owned hoppers.
- Dedicated, or at least assured, capacity to handle Canadian grain through the Mississippi system would be needed. This could raise concerns about the continued viability of the GLSL - would it still be there if needed?

Other commodities

As noted earlier, the Ohio River is not far below Lake Erie and some of the steel slab traditionally imported via the lakes could come up the Mississippi and along the Ohio. Also goods, particularly steel slab or iron ore could come up the Illinois and Chicago Rivers to steel mills on lower Lake Michigan. That, at least some of, this traffic continues to come in via the GLSL indicates that there is some competitive advantage to this latter route.

2.6.5 Churchill

The Port of Churchill opened in 1931. In 1997, ownership was transferred to Omnitrax, a US short line railway operator, which also took over the rail line, now called Hudson Bay Railway, from CN.

Facilities include four loading berths which can accommodate vessels up to 225m loa. Water depths are 8.5m, and the grain elevator has capacity for 140,000 metric tonnes. In 1977, it achieved its highest throughput of 736,000 tonnes. The port employs about 10 percent of the town's 1,000 residents, about 35-40 percent of its workforce. [53]

About 90 percent of the Churchill's cargo consists of grain exports, with the other 10 percent being fertilizer imports from Russia. Total grain exports are about 2 percent of Canada's volume. Most of the wheat originates in north eastern Saskatchewan and north western Manitoba, and is destined for ports in Europe, North Africa and Latin America.

From 2003-2005, the latest years for which data are available, Churchill handled the following volumes of cargo:

Table 5: Port of Churchill Vessel Movements and Cargo Tonnage, 2003-05

	2003		2004		2005	
	Domestic	***International***	***Domestic***	***International***	***Domestic***	***International***
Vessels	9	20	15	14	4	15
Cargo (tonnes)	13,100	615,400	30,500	400,000	21,900	467,600

Source: Statistics Canada, Shipping in Canada

[53] Joe Friesen, "In Churchill, open market in wheat sparks fear: Wheat Board decision could spell the end for Arctic port on the shore of Hudson Bay", *Globe and Mail*, October 31, 2006.

The Port of Thunder Bay has been concerned that past federal and provincial support for Churchill prior to transfer to Omnitrax's, threatened its own existence, and distorted the marketplace. Data produced for the port of Thunder Bay in 2001 indicated that one laker can carry 400,000 tonnes in a season, and employ 30-35 people, while contributing about $620,000 to SLSMC operating revenue. The forgone Seaway revenue in 2001 would have amounted to $7.5 million, if the cargo had not moved over Churchill.

The Churchill Gateway Development Corporation has recently signed an MOU with the Halifax Gateway Council to jointly pursue opportunities. This includes shipping grain to Halifax, for local consumption or to be transhipped onto larger vessels. A trial shipment took place in 2007. The signatories are also aiming at identifying backhaul cargo which could be delivered to customers on the Prairies or the North. This routing, although 400 nautical miles longer than via Thunder Bay, will compete with the Great Lakes and Seaway.

2.6.6 Containerization

The container industry now spans the globe and about 90 percent of the world's general cargo is now carried in containers. The other 10 percent of general cargo (as distinct from bulk) is carried in forest products carriers, refrigerated vessels and car carriers. Of course, bulk carriers transport most of the world's bulk products, such as petroleum, sulphur, gypsum, coal, and indeed, grain.

The first ISO standard containers in Canada were handled in 1967 in the Great Lakes ports of Toronto and Hamilton. Federal Commerce and Navigation (now Fednav), which carried bulk grain and steel on the Lakes, began carrying containers as deck cargo during the open navigation season. In 1969, Hamburg American and North German Lloyd put three partly converted semi-cellular vessels into service from Europe to Montreal-Toronto-Hamilton and a number of US ports. Another company, Poseidon Lines, ordered two semi-container ships of 250 TEUs to start service in late 1970, in conjunction with the new German carrier Hapag Lloyd, which had two smaller vessels of only 145 TEUs. In the meantime, Zim Line, an Israeli-flag carrier began carrying containers on conventional vessels between the Mediterranean and Montreal and Toronto.

Container shipping on the Seaway was short-lived, however. As early as 1970, a number of lines, including Manchester Liners and Canadian Pacific, withdrew from the Lakes in favour of stopping in Montreal or Quebec City and shipping containers inland by "fast, low cost container rail service".[54] The economies of scale of even the first generation of container ships made it difficult for the Seaway to compete.

Montreal saw the first transatlantic container service, with Manchester Liners operating from Manchester, England to Montreal in using three 500 TEU vessels November 1968. With a speed of 21 knots, they were able to provide a six day service between Manchester and Montreal. Loading and unloading time was reduced to about 20 percent of that required for a conventional vessel. In a previous incarnation as Furness Withy, the company had provided break bulk services into the Lakes and thus had a clientele and agency network already established. The size of their vessels was predicated on the Manchester Ship Canal and ice-

[54] Peter Hunter, *The Magic Box: A History of Containerization*, (Toronto: ICHCA Canada, 1993), p. 46.

breaking was promised on the St Lawrence for the 1968 navigation season, so they were confident of being able to provide year round service to Montreal. Service into the Lakes would have required additional vessels and terminal infrastructure and year round service would have been impossible but at some point in the 1970s, Manchester Liners began a feeder service from Montreal into the Lakes.[55]

Since the 1980s, container shipping on the Great Lakes has been sporadic. In the 1980s, Falline, a division of Fednav, carried containers from the Far East and Europe as far as Chicago in the open navigation season. In the winter months, the vessels called at Baltimore and containers were shipped to Chicago by rail. The Manchester Liners feeder service ceased operations in 1981. At other times, shipping lines such as Balt Canada Line, Shipping Corporation of India (SCI) or Canadian Christiansen Africa Line (CCAL), would send their container or semi-container vessels into the Lakes because they wanted to avoid paying for rail haulage from either Halifax or Montreal. In 1989, there were eight carriers which still advertised container services into the Lakes.[56]

By 1990, however, less than 30,000 tonnes of containerized cargo passed through the Montreal-Lake Ontario section, compared with about 5.5m tonnes at Montreal, 3.9m in Halifax and 12.5m in New York. A 1994 study by Robert J. McCalla suggests three reasons for this: physical limitations of the Seaway, economic limitations and institutional issues.[57] The maximum draft of the Seaway *was* 7.7m but a 1,000 TEU vessel drew about 9.5m and first generation 1,500 TEU ships, which were basically obsolete by 1980, needed 11 or 12m. Smaller vessels were still prevalent in some of the trades which had not yet been "containerized", such as Africa, South America and the Caribbean.

Seaway transits are also time-consuming for vessels, and shipping lines achieve better productivity and asset utilization by turning their vessels at Montreal. In 1980, the Seaway reduced container rates to the same as bulk cargo, to encourage container shipping, but with no evident effect. McCalla concluded that the Seaway's physical limitations were of greater importance than extending the season or rate reductions, and that sheer economies of scale made it difficult for 1,000 TEU vessels in the Seaway to compete with 2,800 TEU ships to Montreal and 4,000 TEU vessel calling at Halifax and New York. This would certainly be more true today with ship sizes on the North Atlantic in the 6,000 TEU range and those calling Montreal up to 4,200 TEUs.

In 2008, the only major container port in North America which experienced any growth was Montreal. Container volumes in the North Atlantic range of ports, which serve the St Lawrence/Great Lakes catchment area, have grown as illustrated below:

[55] Hunter, p. 188.

[56] These included Armada Lines, CCAL, Torm Lines, Fednav, Yugoslav Line, Lykes Line, Netumar and Saguenay Shipping.

[57] Robert J. McCalla, Water Transportation in Canada, (Halifax: Formac Publishing, 1994) p. 172.

Table 6: Container Volumes at Major North Atlantic Ports, TEUs

Port	2003	2004	2005	2006	2007	2008
Halifax	541,650	525,553	550,462	530,000	490,071	387,347
Montreal	1,108,837	1,226,296	1,254,560	1,280,000	1,363,021	1,460,500
Baltimore	528,899	557,858	602,475	627,947	610,466	n/a
Norfolk	1,646,279	1,808,953	1,981,955	2,046,286	2,128,366	2,083,278
New York	4,067,811	4,478,480	4,792,922	5,128,430	5,400,000	5,236,000
	7,893,476	**8,597,140**	**9,182,374**	**9,612,663**	**9,991,924**	

Source: Containerization International

Market share data is very revealing:

Table 7: North Atlantic Ports Container Market Share

Port	2003	2004	2005	2006	2007
Halifax	6.9%	6.1%	6.0%	5.5%	4.9%
Montreal	14.0%	14.3%	13.7%	13.3%	13.6%
Baltimore	6.7%	6.5%	6.6%	6.5%	6.1%
Norfolk	20.9%	21.0%	21.6%	21.3%	21.3%
New York	51.5%	52.1%	52.2%	53.4%	54.0%
	100.0%	**100%**	**100%**	**100%**	**100%**

Source: MariNova calculations

Since 2000, Halifax's market share has fallen from 8 percent to less than 5 percent. In 2008, its volume dropped over 21 percent, to 387,000 TEUs. Montreal was the best performer in the range in 2008, posting growth of 7.2 percent. Part of Montreal's gain was Halifax's loss, as Hapag Lloyd fulfilled obligations resulting from the sale of its Montreal Gateway terminals to Morgan Stanley, Montreal has also broadened its market range, benefiting from Asian cargo transhipped at Mediterranean port onto Montreal-bound ships, as well as a MSC feeder link from Freeport, Bahamas.

Other ports which serve markets in the North Atlantic for container traffic include Boston and Philadelphia. The latter is probably more relevant in the Ontario context, because it specializes in the reefer trades, and the north-south trades (i.e. South America and Australasia). Boston handled 220,139 TEUs in 2007, while Philadelphia handled 253,492 TEUs. Wilmington, NC also handled 191,070 TEUs. It specializes in fruit imports, especially the banana trade from Central America.

There have been a number of studies examining the potential to operate container feeder services into the Seaway from Halifax and/or Montreal, as well as across Lake Ontario between Oswego and Hamilton, and these efforts are discussed in Chapter 4.0–Opportunities. The main obstacle to bringing container services into the Great Lakes/Seaway system is the need to provide year round service to keep industrial and consumer supply chains full. There are other issues as well, such as the 25 percent duty, the cost of pilotage, and stevedoring.[58]

[58] MariNova Consulting Ltd. "Short Sea Shipping Market Study", Transport Canada, 2005.

2.6.7 General cargo

General cargo includes ro-ro (autos, construction equipment), forest products, refrigerated cargo, steel and project cargo. While containers and container ports receive lots of attention, a significant amount of cargo still moves as general or unitized cargo in vessels specially built for each purpose.

A significant amount of the Seaway's cargo base is general cargo, as illustrated below:

Table 8: Total Seaway cargo and general cargo tonnage, 000's tonnes

	2008	2007	2006	2005
Total cargo	40,800	43,010	47,165	43,301
General cargo	1,915	2,405	4,560	3,259
% general cargo	4.7%	5.6%	9.6%	7.5%

Source: Great Lakes St Lawrence Seaway Study, 2007

The Great Lakes/Seaway region's main competition for general cargo is most likely Montreal and Baltimore. In 2008, Baltimore handled 446,447 tons of forest products, 293,559 autos, 117,596 tons of steel, and 469827 tons of miscellaneous ro-ro cargo. Total break bulk cargo amounted to 3.1 million tons in 2008. Philadelphia handled a similar amount in 2005-06 (later data is not available). Hampton Roads (Norfolk) handled about 342,000 tons in 2008, down from over 500,000 tons in 2004. Montreal handled 237,732 tons, having handled over 500,000 tons the previous five years.

3.0 Competitiveness Assessment

In this section, we present a summary of the overall strengths, weaknesses, opportunities, and threats which are affecting the Ontario marine transportation industry.

3.1 Strengths

3.1.1 Stability of client base

The marine industry's core client base is well established. Clients such as the steel companies have large investments in their current locations and are dependent on raw material sources in Quebec, Ontario and the US that can only be moved economically by marine transportation. Similarly, cement companies and other users of aggregate located along the shores of the Great Lakes will continue to require marine movement of raw material and product.

Volumes of agricultural commodities fluctuate from year to year and previous large declines in volumes of export grain have now stabilized. Agricultural activity in western Canada, Ontario, and the Great Lakes states will continue to contribute traffic for the foreseeable future. Other commodities, such as salt and aggregate, will continue to be in demand throughout the Great Lakes basin and St Lawrence River Valley and will be supplied from mines located around the lakes.

3.1.2 Lower linehaul operating costs

The marine mode offers some of the lowest transportation costs per tonne/km of any mode. Advantage or disadvantage in competing for the traffic depends upon several factors including the size of shipment, routing (e.g. out of line haul), handling(s) and transit time. Industries that must transport heavy products as either inputs or outputs will locate on or near water transportation. However, when marine is not directly accessible, use of other modes and costly load-transfer operations are involved. The total cost of marine is discussed in more detail elsewhere in this report.

3.1.3 Available capacity for traffic growth within Seaway and port infrastructure

There is ample opportunity for any traffic increase to be accommodated in the current lock system and at most Ontario ports. Currently the System's locks operate at about 50 percent of capacity. There are no water based capacity constraints for traffic growth within and between lakes that do not involve the transit of all or part of the Seaway. Depending on the nature of any traffic increase, investment in port and connecting land-based infrastructure may be required.

3.1.4 Low energy consumption and GHG emissions per tonne-km

Marine is fuel efficient and has a low GHG intensity — average road energy intensity was shown to be about 12-times higher, and GHG intensity, about 11 times higher than marine bulk-cargo. GHG reductions could be available from truck to marine mode shift at the margin, but there is little difference in rail to marine mode shift. It should also be noted,

however, that energy and GHG intensity can vary widely within modes, and the longer haul intercity truck traffic, which is most conducive to modal shift, is also the cleanest and most fuel efficient trucking.

3.1.5 Ability to handle heavy and large dimension machinery and equipment

The marine mode more easily handles items that due to their weight or size exceed the standard capability of land-based vehicles. Such shipments require special arrangements when moved on land and in the case of trucking special permits from each jurisdiction traversed. Costs for moving such freight by rail or truck are much higher than for standard shipments and often incur longer transit times and circuitous routings. Shipment width is often an issue for items such as wind power generating equipment and material destined for Alberta oil sands development. Exceptional arrangements are required for very wide loads as they affect traffic moving in the opposing direction for both rail and truck shipments moving on two lane highways.

While marine service can seldom deliver such cargo direct to final destination it serves to minimize the land-based movement and transportation costs.

3.2 Weaknesses

3.2.1 Government investment in and commitment to maintain essential infrastructure

Unlike the railway industry that must invest in its own right of way infrastructure, the St Lawrence Seaway and the locks at Sault Ste Marie are a public investment with significant upgrading and rehabilitation funded by governments. The Canadian federal government has agreed that the asset budget for lock rehabilitation and renewal will be $270 million for the current five year tranche. Funds to pay for asset renewal and operating costs are paid from Seaway tolls. Government pays for any deficit by way of a statutory appropriation only if tolls do not cover costs.

Consideration was being given in the US for twinning the Poe lock at Sault Ste Marie at an estimated cost of US$ 475 million.[59] Plans were reported to be “shovel ready” upon funding allocation, however, the US Army Corps of Engineers turned down the request in late April 2009.

The SLSMC assumes risk strictly with whether it is able to control costs. All risk relative to traffic and revenue resides with the government. However, any risk from catastrophic failure of the system also carries considerable risk to industrial customers and shipping companies which would face enormous disruption costs should such an event occur.

If Seaway tolls do not generate sufficient revenues to cover operating and asset renewal costs, the government will make a payment to the SLSMC to cover any deficit. The government also bears risk with respect to any catastrophic failure of the system.

[59] http://www.greatlakesdirectory.org/Ohio/dec1208.htm.

3.2.2 Load transfer and inventory costs

While marine vessels often have a lower transportation cost per unit distance than rail or truck, it seldom has direct access to both originator and receiver of shipments. Marine must rely on other modes to do the final pickup and/or delivery. The transfer costs involved in moving the product from the originating and/or delivery mode to marine vessels can be significant. In addition, the slower speed, larger shipment sizes and in some cases seasonal shutdowns leads to higher inventory carrying costs by the shipper and/or receiver of the goods. Additional cargo conveyance equipment may be required due to longer equipment cycle time and the type of service provided i.e. container, Ro-Ro or Ro-Pax. The challenge for domestic marine is to lower these fixed cost components. The European approach to cost/service allocation between domestic and international transfers at major ports provides a possible model.

3.2.3 Vessel fleet – age and vessel type

The average age of vessels currently carrying bulk cargo is increasing with many of the vessels approaching or exceeding 40 years. No new vessels (other than tankers) dedicated to commerce within the Great Lakes and St Lawrence have been introduced to the bulker and self-unloader fleet since 1985. Much of the fleet has undergone substantive rehabilitation and retrofitting but regardless some may be approaching the end of their utility.[60] The significant investment required, the apparent lack of an economic Canadian shipbuilder, and the 25percdent duty imposed on offshore purchases, are impediments to fleet renewal.

While there are a few bulk vessels within the system surplus to current needs these vessels are unsuited to proposed new cargo operations moving containers, trailers and smaller parcels of bulk commodities. Carriers of smaller parcels of bulk cargo have found it necessary to purchase used smaller vessels, barges and tugs often paying the 25percent duty to import them.

3.2.4 Longer transit times and less frequent service than other modes

The longer transit times, and less frequent service of the marine mode compared to land-based transportation, are not significant issues with respect to the movement of large volumes of relatively low value bulk commodities. Smaller shipments of bulk commodities can also accept the transit time and frequency of marine service.

Difficulty arises in attracting non-bulk cargo, semi-manufactured or finished products, of higher value where transit time and schedule frequency are a primary concern for shippers and receivers. Transportation cost is often not a major element in the total cost within a supply chain for such goods. Reducing transportation cost by introducing a marine leg within the chain may have negligible overall cost benefit and can, due to increased transit time or loss of scheduling flexibility, increase costs elsewhere within the supply chain, e.g. inventory carrying costs, thus creating an overall negative impact. To be successful, an operation will have to provide something attractive to potential users and work hard to attract such users.

[60] Here we note that the tanker fleet is much newer with both newbuilds and acquisitions of newer existing vessels.

3.2.5 Lack of direct access to other than shore-based clients

The Great Lakes marine industry's core business is the movement of bulk cargo between shore-based clients or connecting with a land-based carrier at origin (e.g. rail connections for the movement of iron ore, coal and grain). There are also economic transfers of bulk cargo in the Lower St Lawrence to and from vessels too large to enter the Seaway system. Bulk cargoes moving in high volume can be economically handled in such transfers. There are also recently established movements of steel slab and coil by barge from Ontario steel mills to related companies within the lakes as well as inbound offshore steel movements in deep-sea vessels.

Difficulty arises in cost effective access to cargo where neither the shipper nor the receiver is shore based or close to a port. The costs associated with transferring and handling cargo from the shipping location to the vessel combined with similar charges at the receiving port can make the marine option uncompetitive with land-based modes. In addition, costs of handling finished and packaged goods exceed that of bulk cargo and concerns arise that the potential for damage increases with each transfer.

3.2.6 Seasonality of service

The interruption of marine service on the Seaway during winter months represents a challenge for both current and potential marine shippers, although there may be opportunities to develop north-south services not impacted by winter closures.

Current shippers through the Seaway must either build inventory to provide supply during the period of closed navigation or move material by land-based modes. Building and maintaining inventory introduces investment and storage costs. Usually, because material production and vessel availability cannot accommodate a surge of activity late in the fall, inventory build up has to commence during the summer and early fall. Consequently, inventory and storage costs must be borne over a period much longer than the winter shutdown of navigation. Hamilton mills are the most disadvantaged with Nanticoke and the Sault having slightly shorter periods without marine supply. All great lakes mills are at a disadvantage with respect to mills on tidewater that have no seasonal shipping constraints.

Moving freight by alternate, land-based modes, during the winter results in increased transportation costs. Furthermore, in some cases, railways or trucking companies may be reluctant to invest in equipment specifically for a freight movement of only a few weeks. Consequently, shippers are limited to accessing only whatever equipment and alternative transportation capacity happens to be available.

The period of closed navigation has been gradually reduced in recent years for both the Montreal – Lake Ontario and Welland Canal segments of the St Lawrence Seaway. The locks at the Sault are closed for an even shorter period. Within the lakes, navigation can continue year round, subject to ice conditions and the availability of ice breaking.

The length of the navigation season has increased by about nine per cent on the Welland Canal, from an average of 260 days in the 1963 to 1967 period to an average of 283 days in the 2003 to 2007 period – the Welland season was 285 days in 2007. Similarly the length of the season has increased by 11.6 per cent on the Montreal/Lake Ontario section from an

average of 251 days in the 1963 to 1967 period to an average of 280 days in the 2003 to 2007 period – the MLO season was 283 days in 2007.

Even if advanced technology were employed to keep the locks open longer, the St Lawrence Seaway requires some period of downtime for maintenance. This is less of an issue at the Sault where locks are twinned (although not all of the same dimensions).

3.2.7 Government imposed fees and constraints

Numerous constraints imposed by governments result in additional costs for moving existing traffic while creating disincentives for the development of new services. This weakens marine industry competitiveness.

3.2.7.1. Import duty

Primary among these (mentioned in interviews with marine operators and service users) is the 25 percent duty imposed on the import of new or used vessels (except vessels imported from the US, Chile, Costa Rica and Israel) - regardless of the fact that there is no economic domestic source for the vessels required. This not only acts as a disincentive to replace an aging fleet but also inhibits the acquisition of vessels appropriate for the development of new services. It should also be noted that other transportation modes (rail, truck, and air) do not face such a significant impediment to foreign purchase of transportation equipment. The importance of other government imposed fees and constraints vary according to the impact on any particular marine activity or interest.

3.2.7.2. Pilotage

Mandated pilotage and the level of fees for pilotage impacts primarily those domestic vessels trading below Montreal and foreign vessels operating anywhere within the system. Experienced domestic masters and mates can obtain a waiver of the need for pilotage services above Montreal but the pilot service is mandatory below Montreal. Operators claim that the services are not necessary for those officers experienced in the local waters and that pilotage requirements are outdated given current technology. Some operators of smaller vessels claim that with lower draft they have greater latitude in navigating channels, further reducing the need for pilots. There is a universal view among operators that the charges for pilotage are too high for the service provided and add unnecessary cost to voyages. There are also claims that lack of pilot availability, particularly in the fall, sometimes delays ships.

3.2.7.3. Marine navigation services fees

Fees for navigation aids and ice breaking are also an irritant for marine operators. Carriers are not opposed to paying government imposed fees for services that are necessary and that they use. However, major operators claim that current technology on board vessels makes many navigation aids redundant. Ice breaking fees are assessed seasonally on operating vessels regardless of whether ice exists and/or whether ice breaking service is provided. The industry view is generally that charges should apply only when service is required. In some cases, these current charges may deter operators from extending service into the winter season.

3.2.7.4. Harbor maintenance fee

The US Harbor Maintenance Tax is assessed on the value of cargo moving through US ports. While the charge is not onerous on low value, bulk cargo it offers a deterrent to the Canada/US cross border movement of higher valued cargos and has been cited as a negative factor affecting the development of cross border services focussed on containers or trailers carrying manufactured or consumer goods.

3.2.7.5. Cabotage

Constraints on the use of foreign vessels for carrying goods between domestic ports provide a significant limitation on vessel use and scheduling. Effectively, US vessels may not trade between Canadian ports and Canadian vessels may not trade between US ports. The US *Jones Act* precludes Canadian (or any foreign built, owned or crewed) vessel from trading between US ports. The *Coasting Trade Act* restricts Canadian domestic trade to Canadian registered ships unless a waiver is obtained for a foreign vessel.[61] Segregating the St Lawrence and Great Lakes fleets in this way by nationality limits the efficiency and flexibility of marine service. In addition, new short sea shipping services that might benefit from triangular routes, making more than one call in either country will not develop given these constraints. Competing land-based modes, while having some constraints on domestic movement of equipment and labour within a foreign NAFTA country, have considerably greater latitude in vehicle use. Issues also arise with respect to transhipped offshore import and export cargo that is considered to be a domestic movement to or from the Canadian transhipment point (e.g. import containers discharged at Halifax are considered domestic cargo if moved by vessel to another Canadian port). It is recognized, however, that until US cabotage is liberalized, or a NAFTA flag is adopted, Canadian cabotage will probably remain restricted.

3.2.7.6. Border services

New marine services can also be affected by the availability and cost for government Border Services in Canada. Current Canadian government policy is that the cost of such services (Customs, Immigration) must be borne by the transportation service operator or a third party for any entry point that lacks existing Border Services. At established crossings Border Services are provided at public expense although the requirement to provide accommodation without cost to the government may be the responsibility of the crossing operator. Those services established more recently such as the Windsor – Detroit Truck Ferry (and any other new service) are required to pay for Border Services personnel in addition to providing accommodation. This adds costs to any potential new service using ports (or parts of ports) that lack existing Border Services.

3.2.8 Dimensional constraints of the seaway system

When constructed in the 1950s the Montreal – Lake Ontario locks of the St Lawrence Seaway were built to the same dimensions as the, then existing, Welland Canal. Those dimensions could, at that time, accommodate much of the world's shipping. Since that time

[61] This can only be obtained if no suitable Canadian vessel is available.

vessels have become much larger and now fewer than 25 percent of the world fleet can navigate the system.

As a result, much foreign cargo inbound from overseas must be transhipped in the lower St Lawrence to domestic lake vessels for furtherance into the Great Lakes. This is not only costly but in the case of some commodities, the additional handling causes degradation of the cargo. Coke is an example. Furthermore, for imports that are ultimately destined to an inland point it may be economic to commence the land based movement at Montreal or Quebec City rather than to bring it into the lakes and then still have to arrange land transport to destination. An example of this is the movement of nickel concentrate from Labrador to Sudbury and Thompson, Manitoba by rail from Quebec City rather than attempt a further transfer at a northern Ontario port.

3.2.9 Low water levels

Water levels in the lakes and the various channels and rivers within the system are driven by variances in annual precipitation within the Great Lakes watershed. The levels can be controlled to a certain extent by dams within the system. However, this involves consideration of the entire systems needs. For example, holding water in the Great Lakes to maintain levels serves to reduce the flow into the St Lawrence River, affecting water levels and navigation there. Dredging shallower draft areas, notably in the Detroit and St Mary's River and in the St Lawrence can further accommodate navigation but also at times raises environmental issues.

Despite these interventions, water levels in some shipping seasons are sufficiently low that cargoes must be reduced below normal capacity to avoid grounding. This substantially reduces productivity, as the cost of vessel operation remains essentially the same with the reduced lading. During peak shipping periods, reduced lading can adversely affect inventory build up for the winter season and may result in diversion of freight to other modes.

3.3 Opportunities

3.3.1 Selective attraction of traffic from competing modes or routes

There are a few recently developed marine movements and many more potential proposed services.

Those that have been developed recently consist primarily of movement of smaller parcels of bulk commodities (agricultural, aggregate, asphalt, etc.) as well as steel and aluminium utilizing tugs and barges and small vessels. These are either new movements or represent a shift from land-based modes. Examples include steel movement from the Sault and Hamilton to destinations within the Great Lakes as well as transfers of grain from one Great Lakes port to another. Carriers have indicated interest in continuing to develop such business as opportunities arise.

There also has been extensive identification of potential opportunity to carry either tractor-trailer combinations or so-called drop trailers across Lake Ontario and Lake Erie as well as the transhipment of containers between east coast and Great Lakes ports.

Primary proposed candidates for cross-lake services are Hamilton – Oswego and various routes across Lake Erie. Port interests appear to be the primary proponents of such services. Yet to emerge, is any specific proposal by a carrier to provide such a service or a clear identification of interest among those who might use such services. Some potential clients of such services are sceptical of cost and/or transit time benefits while others acknowledge that they may be prepared to evaluate any specific service offering to determine its merits. For a successful result, any such evaluation will have to examine the cost and service implications for door-to-door transportation within the context of overall supply chains.

An important issue arises with respect to the movement of drop trailers, independent of tractors and drivers, in a cross border service. Movement of the semi-trailer to and from the port within each nation has to be accomplished by a domestic tractor and driver. Foreign equipment and drivers cannot be used for what is considered to be a domestic movement. Consequently a Canadian trucker currently operating between Ontario and the US can move loads between Ontario and US cities via a land-based crossing. However, if a marine service moves the trailer without the Canadian tractor and driver then a US tractor and driver must complete the movement on the US side. Similar constraints would exist for a US trucker in a movement to Canada. These limitations may be a significant impediment to truckers supporting a cross-lake service unless it provides for taking the tractor and driver or the pick up and delivery of the drop trailer is well co-ordinated on both ends of the service.[62] This type of service would likely be most suitable to large operators with significant business on both sides of the border. It will most likely not appeal to small owner operators, who will prefer to take their tractor with them, as an "accompanied" unit.

Several cost impediments to the development of such services are set out above under Weaknesses. There has been recent activity in the US Congress proposing relaxation of the *Harbor Maintenance Fee* for such cross-lake services. In addition it has been indicated that the Canadian Government may be examining the issue of the 25percent duty for vessels imported from offshore. A favourable outcome for the marine industry of both issues would make the introduction of new services more probable.

Marine transhipment of import and export containers between the east coast, Montreal, and Great Lakes ports has also been promoted and one operator has declared specific interest in establishing a regular service. However, it appears that difficulty has arisen in attracting container traffic away from the railway for price and service reasons. Many imports are consumer goods and retailers are anxious to get goods onto store shelves as quickly as possible. One party interviewed noted that at times containers were trucked from Halifax to Toronto when the railway was unable to accommodate traffic within the required timeframe. That company acknowledged that they would examine any proposal for marine movement but that price, transit time and frequency would be key determinants of its utility.

The winter closure of navigation is also an issue in exploring new services. While cross-lake services may operate all year, marine container transhipment would be interrupted and traffic would have to be diverted to land-based modes from January to March. Railways may be

[62] For a discussion of drop trailer service in the Newfoundland trade, see MariNova Consulting Ltd., "The Social and Economic Impact of Marine Atlantic Drop Trailer Service", Transport Canada, 2005.

reluctant to provide an alternative service under terms favourable to a shipper for only a short seasonal period.

3.4 Threats

3.4.1 Potential effects of industrial globalization and government policies

While the marine industry, as noted above, enjoys a client base with relative stability, significant change in raw material sourcing, product mix and markets may result from globalization. The most critical example is the steel industry where all three of the major Ontario producers have shifted recently from being domestic, local enterprises to become part of worldwide corporations.

Whereas previously decisions about material supply, production and markets were strictly made locally, it is to be expected that corporate head offices will have greater influence in the future. Ontario's automotive industry offers an example where decisions about parts sourcing, production and markets are made in Detroit and Japan from a broad global perspective rather than in Oshawa, Oakville, Windsor, Ingersoll, Cambridge, Woodstock, or Alliston. Global corporations tend to assign production based on factors such as cost, quality, and proximity to markets.

Interviews with Ontario steel executives touched on the emerging interest of corporate offices in local costs of production and elements such as the cost of building raw material inventory for the closed navigation season. Already there has been evidence of changes in transportation demand. One Hamilton mill now exchanges product by truck with an affiliate in Quebec. Another mill moves steel to a US affiliate by barge and instead of importing coke from offshore is now sourcing it in the US.

Clearly not all such changes may be negative for the marine industry but future transportation demand may be expected to shift either up or down and change in nature or direction. Furthermore, the Canadian mills are relatively small in world terms and are vulnerable to corporate decisions to adjust to any significant decline in world product demand, as evidenced by the recent US Steel decision to shut down its Ontario mills.

Agricultural product movement has always been susceptible to global forces and shifting demand and that will continue. If current trends in western Canada towards the development of value added product (e.g. pork vs. export grain) continue then grain movement may be expected to continue its decline. In addition, trends towards specialty crops that lend themselves to container movement further reduce opportunity for traditional bulk grain shipment. Also the trend towards grain cleaning capability on the Prairies facilitates all-rail routing to St Lawrence River ports. Finally, government subsidy of the Churchill/Hudson's Bay route combined with a lengthening Arctic navigation season due to global warming may continue to erode export grain volumes moving via Thunder Bay.

Some government initiatives such as supporting ethanol production have resulted in increased opportunity for marine movement of corn. However, this use of corn appears to be falling out of government favour so the growth in movement of this traffic may be short lived.

Ontario's move to cease coal fired power generation by 2014 has been well publicized and presumably has already been taken into account in marine industry planning. Loss of the movement of thermal coal could be seen to be partially offset by the opportunity to move wind generating equipment that will be used to displace the generating capacity of the coal fired plants. However, such project cargoes require quite different vessels and once in place support no ongoing transportation demand. Also, OPG is testing biomass (principally wood pellets and pelletized grain screenings) as a possible source of fuel for its thermal plants once the use of coal has ended.[63]

Two of the examples above (ethanol production and power generation) underline the vulnerability of the marine industry to the consequences of government policies that are driven by public policy considerations very remote from the marine industry but which can have a profound effect on marine transportation demand.

3.4.2 Environmental issues (Aquatic Invasive Species, toxic emissions)

Environmental issues continue to rank highly in public interest and offer the industry both positive opportunity and potential negative implications.

With respect to fuel, on the positive side marine transportation minimizes greenhouse gas emissions compared with other modes. On the negative, marine transportation uses fuels that produce significantly greater toxic emissions (NOx, SOx, and particulates). This can be addressed by burning more refined fuels and by scrubbing emissions but such changes require new engines and technology best adopted in new vessels, such as the new *Algonova* and *AlgoCanada*, which have reduced NOx emissions by 54 per cent over the previous 1969-built *Algonova*. Clearly there is a linkage between addressing the consequences of marine emissions with the need for government to remove the duty impediment to purchasing new vessels.

Public concern about AIS can be expected to continue but on balance studies appear to have identified that the substantial economic benefit of maintaining marine transportation in the system outweighs the risks, provided there are adequate ballast water controls.[64]

Perhaps the greatest threat is for there to be a disconnect between industry efforts to address environmental issues through investment in new equipment and operating methods and government initiatives to exercise controls through regulation. No one wants to have invested in yesterday's technology or to have regulation introduced that fails to acknowledge recent technical advances. The prospect of uncoordinated measures among national and sub-national governments resulting in patchwork and potentially conflicting regulatory measures is also a continuing threat.

[63] Ontario Power Generation website.

[64] *Great Lakes shipping, Trade, and Aquatic Invasive Species*, Transportation Research Board, Special Report 291, 2008 – www.trb.org/news/blurb_detail.asp?id=9267.

3.4.3 Environmental regulations

The current patchwork of environmental regulation emanating from various US states is a major issue impacting the future of shipping on the Great Lakes and those industries and communities who depend on it. Multiple conflicting regulations governing what is essentially one ecosystem make it very difficult, expensive and very risky to invest in new capital assets needed to comply with those very same regulations. There are major implications to complying with some new regulations that will ultimately impact on the cost competitiveness of the marine mode compared with competing, often less environmentally friendly modes. Ideally, US and Canadian legislation could be harmonized for the Great Lakes basin.

3.4.4 Seasonal fluctuations in demand

The demand for movement of some of the major commodities in the system fluctuates within the navigation season with several commodity movements tending to peak during the late summer and fall. While not a problem for the existing capacity of the lock systems, vessel availability can be constrained from time to time. Typically, the demand for the transport of agricultural commodities is (at season opening and then) in the late summer and fall, following harvest. Inventory build up of iron ore and coal for the closed season as well as the demand for transport of salt for highway use peaks about the same time.

Carriers are also challenged with respect to balancing up and downstream cargoes within the system to maximize productivity. In the case of salt, lack of timely vessel availability in the fall can result in diversion of shipments to other modes.

3.4.5 Labour force issues

Marine carriers report that the workforce is aging. While this is also a common characteristic for other Canadian employers, the marine industry reports that, particularly for skilled positions (mates, engineers, etc), it is difficult to attract new employees. In addition, training for the skills required is demanding and costly to obtain. The industry acknowledges government support of the training program at Georgian College, Owen Sound but notes that the program is costly for students. Alternative programs are available only in Quebec, Atlantic Canada, and British Columbia.

3.4.6 Competing land use priorities in and around ports

St Lawrence River and Great Lakes ports were the genesis for many of the communities located along the Ontario shoreline and initially served industries that were at the core of cities and towns. In many cases the industries formerly dependent on marine transportation have closed or moved inland. In other cases, the former traffic demand has shifted to other modes. This has resulted in some ports effectively ceasing commercial activity (e.g. Brockville, Kingston, Georgian Bay ports, etc.) and the former port area being converted to recreational marine use or non-marine commercial or residential development.

However, in some of the active commercial ports there is also pressure to convert port property to other such uses. This tends to be driven by factors such as the relative desirability and high value that waterfront property attracts and the higher municipal tax revenue

generated by condominium apartments and retail establishments compared with marine terminals. Pressures to further reduce commercial marine activity because it causes noise and dust, and attracts trucks follow such development.

In some port communities, recognition has evolved regarding the need for both commercial marine activity and residential and recreational use to co-exist. Often this is driven by the important role that marine transportation plays in sustaining local industry. Examples are Hamilton and Goderich. In other cases such as Toronto and Oshawa, where there is little direct local industry dependence on the port, there is less municipal or public support for accommodating traditional port activity. In Toronto, the only remaining shore based marine dependent industry is the sugar refinery, soon to be surrounded completely by commercial and residential development.[65] The commercial port has been relegated to Cherry Street where it accommodates salt and building materials (cement, aggregate and asphalt), the only commodities requiring marine transportation that the city needs.

[65] *Sugar plant worries condo owners won't find ships so sweet* – Toronto Star, Page A12, January 3, 2009.

4.0 Opportunities Assessment

This chapter examines potential future opportunities for the Ontario marine transportation industry.

We decided to take a slightly different approach from that envisioned in the RFP. We first examine best practices, focusing on the Baltic Sea and Nordic region of Europe, as it has a similar climate to the Great Lakes, as well as a similar population base. Yet, it has a very dynamic shipping sector. Following a general discussion of shipping policy in the region, we provide a snap-shot of several Scandinavian shipping companies, which could provide some inspiration to the Ontario marine industry, particularly in the realm of short sea shipping. Some of the learning we have taken away from this cursory examination of best practices, in terms of how some of these companies have positioned their services and the markets they appeal to, could be applied in the Ontario context.

This section is followed by a review of current initiatives to develop new shipping services in Ontario, again with the focus on short sea.

The next section looks at case studies of potential short sea routes, including:

- Contrecoeur – Hamilton (steel slab);
- Lake Ontario options:
  - Hamilton – Rochester;
  - Hamilton – Oswego;
  - Oshawa – Oswego;
  - Oshawa – Rochester (ro-pax);
- Lake Erie options:
  - Nanticoke – Erie;
  - Nanticoke – Cleveland;
  - Nanticoke – Toledo;
  - Port Stanley – Toledo; and
- Lake Superior – Lake Huron options:
  - Thunder Bay/Sault Ste Marie – Goderich/Parry Sound.

The case studies examine the cost operating a small ro-pax vessel which could accommodate tractor trailers and 100 drivers. Several of these options are compared with the cost of driving point-to-point. No attempt has been made to identify markets or clients; we have only endeavoured to demonstrate the relative competitiveness of the marine mode versus driving.

Another case study briefly examines the issue of fleet renewal, and the potential for new lakers assumed to be built in China, and paying duty, competing with existing tonnage that has long ago been paid for. There are environmental benefits to be gained, as well as fuel to be saved, but overall, older tonnage can be expected to remain competitive.

Following this section, we examine some of the environmental benefits of using the marine mode.

Finally, we provide a description of both the European Marco Polo modal shift program, as well as a program in Quebec, that appears to be modeled after it.

4.1 Best Practices

The RFP asked that the consultants identify and discuss best practices elsewhere. The Great Lakes and Baltic regions are very similar, in terms of geography and population, except the Baltic is surrounded by nine countries rather than two. The total population of the so-called Nordic countries (24 million), Baltic countries (8 million) and northwestern Russia (44 million) is a combined 76 million.[66] The climate and resource base are similar, and with the possible exception of the former Soviet republics, enjoy very high GDP per capita.

4.1.1 The Baltic

The present state of Canada's shipping industry, which has a big impact on the Great Lakes/St Lawrence region, and therefore the whole Canadian economy, is in stark contrast to that prevailing in Scandinavia and the Baltic. At one time, Canadian shipowners sold their aging tonnage to Norwegians and Swedes, but those countries remained committed to the industry and have developed as an important "cluster" in the classic "Michael Porter" sense. The so-called Nordic countries control 15 percent of the world fleet, 20 percent of the maritime insurance market, and 10 percent of the global market for shipping technology and equipment. It is also the home of several leading brands and some of the largest shipping companies in the world: Maersk Line, Wallenius Wilhelmsen, Hoegh Autoliners, Stena Line, Finnlines, and DFDS A/S. The cluster is estimated to employ 250,000-300,000 people directly and three times as many indirectly.

Within the Nordic cluster, each country has its own specialties. Denmark is very strong in commercial shipping, Norway specializes in the offshore oil and gas sector, Finland has very sophisticated ship design and shipbuilding as well as ice-breaking technology. Sweden has particular expertise in the ro-ro sector and state-of-the-art tanker design and operations. The region has also been able to change and adapt. Sweden was once a leading shipbuilding nation, but is now a leading player in ship management and software. Through its "Blue Denmark" program, Denmark also has a stated goal of becoming the leading maritime nation in Europe by 2015.

Perhaps the most successful policy regime of a developed country is that of Denmark, a country of some 5.5 million people, where over 100,000 people, or 6 percent of the population are employed in the maritime cluster either directly or indirectly.

Denmark has a three-pronged policy: 1) to promote open and unrestricted market access; 2) to ensure the global competitiveness of the Danish fleet; 3) to promote safety for ships and those on board, and to prevent marine pollution. "Open and unrestricted market access is essential to the Danish fleet, which operates on a global basis. The Danish cabotage market is open to all ships regardless of the flag".[67] One of the main elements of the policy and a

[66] Finnlines Investor presentation, September 2008.

[67] Danish Maritime Authority, "Danish shipping policy in general", www.dma.dk; "The Danish Maritime Cluster – an Agenda for Growth", Danish Maritime Authority, June 2006.

catalyst in creating the large Danish-controlled fleet was the Danish International Shipping Register (DIS). Ships registered under this regime must meet the same standards on safety, pollution prevention etc., as the Danish National register (DAS), but owners can reduce their manning costs to be competitive internationally. Tax exemptions have been given to Danish seafarers, and corporate tax has been replaced by tonnage taxes. The policy is viewed as a major success. The transfer of ships out of the Danish flag to foreign flags has been vastly reduced since its introduction in 1998, and the DIS has a high percentage of Danish seafarers.

As of late 2008, the Danish owned-merchant fleet consisted of 860 vessels of 24,263,000 gross tonnage (GT), or 2 percent of world tonnage, in three registries: DIS, DAS and FTJ. The largest by tonnage is the DIS, with 537 vessels and 10.093 million GT. The DAS had 8,746 vessels in it but only 527,657 GT. There are passenger ships, small cargo vessels and fishing vessels in this register. The FTJ is mostly for fishing vessels, and amounted to 2,822 vessels and 12,323 GT. The average age of the owner-controlled Danish fleet, excluding vessels less than 1,000 GT, was 11 years, compared with a worldwide average of 21 years.[68]

Norway's maritime cluster employs about 90,000 people directly and another 300,000-400,000 indirectly, in a host of sectors including commercial shipping, shipbuilding, finance, insurance, offshore oil and gas and the fishery. The country has the 5th largest fleet in the world, with 1,800 vessels, the second largest offshore industry, the largest classification society, and two of the largest shipping banks. The annual turnover from the sector is estimated to be 9 percent of Norway's GDP and 46 percent of its service industry exports. In commercial shipping, Norway has a strong position in vessels which carry chemicals, gas, cement, refrigerated cargo, autos, as well as dry and liquid bulks. The Norwegian shipping industry employs about 13,000 seafarers. Norway also introduced a competitive tonnage tax system, comparable with other EU countries. The country also has a very strong technology sector and about 50 shipyards which specialize in ferries, fishing vessels, offshore supply boats and other ships up to 40,000 DWT.[69]

All is not completely rosy in the region, however. Perhaps surprisingly, the Finnish fleet is rather small by Scandinavian standards, amounting to only 147 vessels over 500 GT. It consists of 83 cargo vessels, 29 ferries or ro-pax vessels and 35 "other" ships such as icebreakers.[70] Finland's foreign trade, however, is very extensive, totalling 95.6 million tonnes in 2007. About 17.5 percent of exports and 38 percent of imports was carried on Finnish vessels. Finnish vessels only sail on short sea routes and there are no Finnish cross-traders, as there are in Denmark and Sweden, especially. The total number of Finnish seafarers was 3,300 in 2007. Because of its geographic location and a number of aggressive companies in the sector, Finland is a leading player in ferry and passenger shipping. The missing ingredient in terms of further developing the shipping sector in Finland seems to be introduction of a tonnage tax, similar to Denmark's. Despite this, several Finnish companies have been aggressively investing in new vessels, particularly ro-pax and ro-ro, and cross-traders have introduced new short sea vessels into the Finnish market. The largest Finnish

[68] "Facts about shipping, 2008", Danish Maritime Authority, p.7.

[69] Dag Bakka jr., "Maritime Norway: A strong cluster facing challenges", Scandinavian Shipping Gazette, 21 November 2008, pp 39-40.

[70] Par-Henrick Sjostrom, "High expectations on Finnish tonnage tax", Scandinavian Shipping Gazette, 21 November 2008, p. 32-33.

company, Finnlines, has recently been taken over by the Grimaldi Group of Italy, but its new building program continues apace.

The Swedish-controlled fleet comprises 589 vessels of 9.9 DWT, of which 235 ships, totalling 2.5 million tonnes are Swedish flag. The fleet itself has declined by about half since the mid-1990s, while the Swedish flag fleet is about the same size. This situation is viewed not so much as an issue for Swedish shipowners as it is for the nation as a whole. The country lacks a tonnage tax and a maritime plan such as Denmark has. Yet, twice as many people travel to Sweden by ferry than by air, and, given its geographic location, 90 percent of its trade is carried by ships, totalling 185 million tonnes in 2007.

4.1.2 The European short sea sector

In this section we examine several examples of successful shipping operations in the Baltic region, including perhaps the most unique "industrial shipping" application in the world.

4.1.2.1. Finnlines

A good example of a short sea ro-ro operator (as opposed to a feeder service) is Finnlines, which has been acquired by the Grimaldi Group, which also owns Atlantic Container Line (ACL), a long-time Port of Halifax customer. Finnlines views the two segments (feeder and short sea) as quite distinct, and decided to focus on ro-ro and ro-pax traffic. The company considers itself the "market leader" in the northern Baltic, has 1,321 employees and operates 40 vessels, of which 15 are owned and the others chartered on a long term basis. The average age of the company's fleet is eight years old. Its turnover in 2007 was €685.5M, with EBITDA of €121.9M and profit of €34.4M . It carried 807,000 units, 500,000 passengers and 96,000 cars.

In 2007, the company took delivery of five large ro-pax vessels, worth a total of US$500M. These 25 knot vessels have capacity for 500 passengers and 4,200 lanemetres (or 4.2 km) of cargo. As of 2008, it had six 20 knot pure 3,245 lanemetre ro-ro's on order in China, for a total of UD$240M, which will be delivered in 2010-11.

The company's ro-paxes are owned, while the ro-ro's are chartered. It has invested in ro-paxes because it is considered to be a profitable niche, especially for passengers travelling between Finland and Germany. The tourist season is June-September, while the freight season experiences lower volumes during those months.

Finnlines operated 70 weekly departures from Finland in 2007, covering all of Finland's ports. The route with the highest frequency is Helsinki-Travemunde (Germany), with nine weekly departures in both directions, using five different vessels. The company operates in the Baltic, North Sea and Bay of Biscay. The biggest growth has been seen in the Russian market. Traditionally, they earned most of their revenue on southbound movements of industrial and manufacturing shipments such as newsprint from Finland to the rest of Europe. A downturn in the Finnish and Swedish paper industry has been offset by a surge in Russian consumer spending, fuelled by petroleum exports. Because of congestion in St Petersburg, however, much of this cargo moves via the Finnish port of Kotka.

4.1.2.2. Transfennica

A kind of hybrid service (and vessel) is being introduced by one of Finnlines' competitors, Transfennica. It is in the process of taking delivery of 6x 2,963 lanemetre capacity con-ro vessels, capable of carrying 2,900 lanemetres of ro-ro cargo and 643 TEUs. They are being built for Transfennica's Belgian owner Splietoff in Poland, for US$50 million each. They are being introduced into service between Finland and Antwerp and are catering to a mix of cargoes, including sto-ro containers, lo-lo containers, trailers, cassettes and project cargoes. They can load and discharge in one day.

Figure 20. Transfennica Splietoff-class vessels in Kiel Canal

Source: www.transfennica.com

4.1.2.3. DFDS A/S

DFDS is a Danish short sea operator, which specializes in the southern Baltic and North Sea. In 2007, it had a pre-tax profit of DKK 526 m., or CAD $110M on revenues of DKK 8.3b, or CAD $1.74 B. DFDS has three distinct short sea divisions, with several different brands within each, and very distinct value propositions for division.

For ro-ro cargo, DFDS targets shippers of heavy industrial goods, and develop tailor made logistical systems. These partnerships are entered into on the basis of long-term contracts, where DFDS serves as an integral part of the logistics chain. Success criteria are reliability and frequency of service matching customers' needs. DFDS Tor Line has six North and Baltic Sea services as illustrated below.

Figure 21. DFDS Tor Line Route Network

Source: www.dfdstorline.com

DFDS has some of the most sophisticated ro-ro tonnage in the world. The latest generation of ships is similar to the *Tor Ficaria* (below), which was built at Flensburger yard, in Germany. The 22.5 knot vessel had 3,831 lanemetre capacity, is 199.80 m loa, 26.50 beam, and draft of 7.65 m. It also carries 12 passengers.

The company also has a door-door container service, which operates throughout the north Europe including the Iberian Peninsula. This service does not compete with container feeder services, but rather caters to European shippers. Over 50 percent of its volumes are covered by long term contracts. Commodities include paper, metal, plastics, as well as finished goods. Its success is measure on the basis of frequency, lead time, flexibility in terms of haulage capacity and cost.

DFDS also has a trailer service, which is integrated into its ro-ro service as well as rail, providing intermodal door-door service. It offers substantial capacity to its clientele, and guaranteed delivery at competitive cost. The company considers this to be “an environmentally-positive alternative to road transport.

DFDS Seaways is a ferry operator which has services from Denmark and Norway, Denmark and the UK, and UK to Holland.

Figure 22. DFDS *Tor Ficara*

Source: www. www.dfdstorline.com

4.1.2.4. Transatlantic A/B

A much smaller, but interesting example of short sea "industrial" shipping which might be appropriate in the Great Lakes context is Rederi AB Transatlantic, of Skarhamn, Sweden. This company has metamorphosed over the past five years, resulting from a merger between B&N Nordsjöfrakt AB and Gorthon Lines. These two companies had been heavily involved in the forest products trade, participating in a pool called "F Ships", which called at Canadian ports. The company has decided to de-emphasize transatlantic shipping in favour of industrial shipping, catering to large Scandinavian forest products and industrial interests.

Working with forest products companies, Transatlantic helps to reduce inventories and minimize damage. They have contracted long distance and local transport, using customized vessels and transport nodes. A key component is high departure frequencies, with vessels on fixed schedules. Vessels are on long term charter, allowing the owners to order new vessels and have systems custom designed for the shipper. They also charter part of the vessel to third parties, and sell the backhaul under a separate brand.

4.1.2.5. StoraEnso NETSS

A variation of short sea feeder or ro-ro services is found in "industrial" shipping operations. StoraEnso's short sea solution to delivering paper products from Finland to Europe and the UK is the most ambitious such project, with full implementation by 2007 comprising eight ships and 2,750 specialized SECU containers fully integrated with mills in both Sweden and Finland. Direct shipping from southern Finland to the UK and Belgium was replaced

beginning in 2005 by the hub-and-spoke Northern Europe Transport Supply System (NETSS).

In Gothenburg, the cargo was to be transhipped to Zeebrugge, Belgium and both Tilbury and Immingham, in the UK, on board vessels provided by DFDS Tor Line and Coblefret under long term charter. The concept was predicated on the Stora Enso Container Unit (SECU), a much larger than standard ISO container that carries a maximum payload of 79.5 tonnes, is 13.575 m in length, 3.43 m wide and has an inner height of 3.43 m. purpose-built rail cars were introduced to handle the units and vessels were designed to accommodate their extraordinary tare weights. New terminals were also built in both Gothenburg and Zeebrugge and in 2004, Gothenburg was experimenting with an automated loading and unloading system using specially designed mafis. Reports claimed overall supply chain savings of 15percent for movement of some 16 million tonnes of cargo, and a vast improvement in terms of damage claims and overall quality.

We have been able to confirm this in-house short sea supply chain system has achieved the expected cost savings for which it was developed. However, the SECU system has not met with universal acclaim either, as it is a move away from industry standardization. There has also been some labour resistance in Sweden.

Much new ro-ro tonnage has been introduced on the Baltic as a result of long term charters, which is illustrative of the type of investment that shipowners will make with some market certainty. An example of this is Transatlantic AB, which generally provides "customer-adapted vessels and customized transport solutions", and which built three vessels under 15 year charter to StoraEnso.

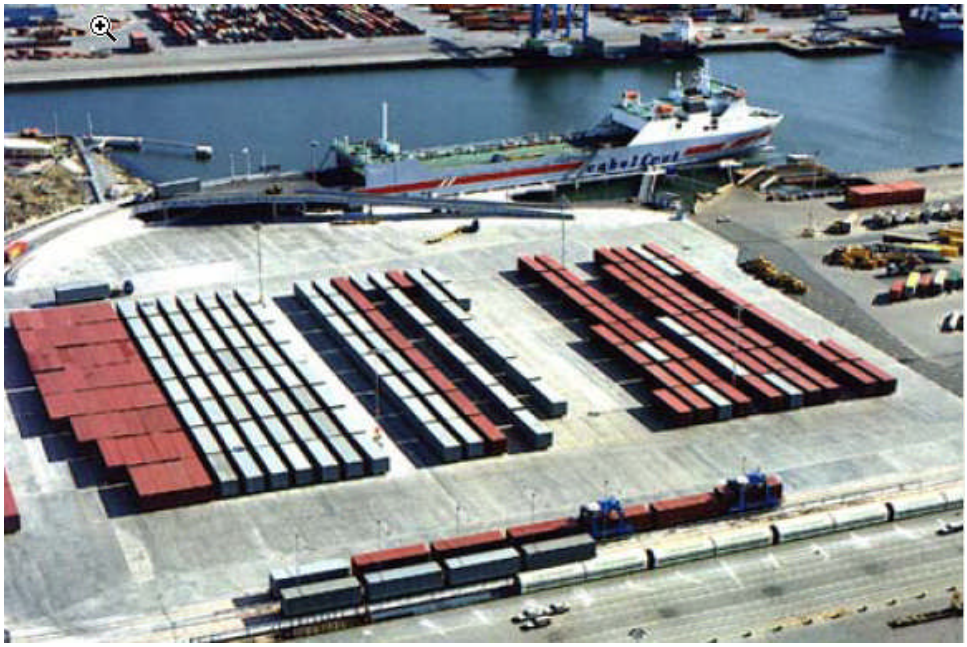
As it gains more experience with the system, it is clear StoraEnso continues to refine it. A recent decision was made to outsource management of the system. As of 1 January 2009, Imperial Shipping's subsidiary Swedish Orient Line (SOL) will take over management of StoraEnso's transport system. SOL will have the overall responsibility for the handling of StoraEnso's SECU containers and four ro-ro lines operated by nine vessels. Two vessels are owned by SOL, Cobelfret and Transatlantic (above) have three vessels each on charter to the service and Stena Ro-Ro will have one.[71]

[71] Scandinavian Shipping Gazette, 8 August 2008.

Figure 23. StoraEnso cargo unit (SECU)

Source: www.StoraEnso.com

Figure 24. SECU Terminal, Gothenburg



Source: www.StoraEnso.com

4.2 Status of Initiatives

The 2006 Mariport study identifies 15 potential new routings, which could provide an alternative to trucking, three of which are undergoing in depth analysis.[72] The three services could handle 250,000 one way truck moves. The report also identifies about 2.5 million tonnes of low value bulk commodities in lots of 10,000 tonnes, which could potentially switch to small bulk-carrying vessels. It envisions container feeder services linking the Lakes with the east coast, as well as container services going directly into the Lakes from overseas. It considers intermodal opportunities involving truck/marine and rail/marine, as well as cross lakes ro-ro services which would avoid major congestion points at bridge crossings. The study describes some of the regulatory impediments to increased marine activity, such as the HMT in the US, *Coasting Trade Act* and *Jones Act*, as well as tariff and non-tariff barriers relating to the importation of foreign vessels.

The St Lawrence Seaway has also recently received attention vis à vis short sea shipping. A 2003 study by the Pennsylvania Transportation Institute was undertaken to determine whether opening the Seaway year round would result in a significant increase in container traffic on the system.[73] It evaluated two reports, including one by the US Army Corps of Engineers in 2003. It concludes the Corps had not demonstrated there would be a diversion of container traffic, that long transit times in the Seaway would dissuade container ship owners from using the Seaway, the transportation cost savings should include supply chain analysis, that east coast ports were not capacity constrained (in 2003) and the cost/benefit of opening the Seaway year round, and developing container services into the Lakes had not been established.

More recently, two studies have examined the potential for short sea shipping and the development of new cargoes for the Seaway. The Great Lakes St Lawrence Seaway (GLSLS) Study devotes a chapter to opportunities and challenges.[74] A big unfolding opportunity is seen in the potential shift of Asian cargo being rerouted from the Panama to the Suez Canal, the so-called Asia-Suez. The study speculates that as much as 30 percent of west coast traffic could be diverted to east coast ports such as Halifax, Norfolk and Freeport. This and the trend to ever-larger vessels are seen as creating opportunities for the GLSLS. Short sea shipping of containers or neo-bulk commodities from the coast to the Lakes holds some promise, as does cross-lakes shipping. It also suggests the GLSLS should concentrate on domestic and cross border traffic using ro-ro vessels carrying trailers rather than containers. It suggests filling a 700 TEU ship daily would "nearly" double Halifax's cargo volume.

A background study[75] to the one noted above examines three route options:
1) Duluth/Wisconsin/Chicago; 2) Halifax/Montreal/Hamilton; 3) Chicago/Detroit/Lake Erie/Montreal. It envisions services predicated on international as well as domestic cargo, the latter particularly for a route between Chicago and Montreal. This would bypass congested

[72] Mariport Group Ltd., "Marine Transportation Study", Ontario Marine Transportation Forum and the Ontario Ministry of Transportation.

[73] Pennsylvania Transportation Institute, "Analysis of the Great Lakes/St Lawrence River Navigation System's Role in US Ocean Container Trade, Save the River and Great lakes United, August 2003.

[74] "Great Lakes St Lawrence Seaway Study", Transport Canada and US DoT, 2007.

[75] TEMS Inc and Rand Corporation, New Cargoes, New Vessels Market Assessment, US MARAD, 2007.

road and rail congestion around Chicago, Detroit/Cleveland, Buffalo/Toronto and in the northeast. It also envisions easily transitioning from small 300-400 TEU vessels to larger 400-800 TEU capacity. In terms of Canada-specific analysis it suggests a Halifax-Montreal feeder could link up with CP Rail to provide an alternative to CN. It also suggests the vessel could haul less valuable cargo onwards into the Lakes rather than turning at Montreal. The report suggests short sea shipping could enhance mid-west service offerings of both Montreal and Halifax. Many of the concepts advanced here go to the heart of the issue to be dealt with in the present study. The issue of seasonality is treated as an afterthought. The idea of transitioning easily from small to large vessels is very naive given existing cabotage regimes in Canada and the US, and the lack of suitable vessels available sailing either flag.

The St Lawrence River (apart from the Seaway) has received some attention. In *Short Sea Shipping Opportunities in the Lower St Lawrence Region*[76] the authors reviewed major commodity flows, existing shipping services, potential short sea services in the Lower St Lawrence region, and provides port profiles for the region. The report describes several short sea operations in this region, including Aluminerie Alouette (Sept Îles-Trois Rivières), Kruger Paper Forestville-Trois Rivières), several services operated by STQ, the Quebec Ministiere des Transports as well as CTMA to and from the Magdalen Islands. It also mentions a service provided by Transatlantic AB of Sweden operating between Port Cartier and Port Canaveral in 2003. (The same company carried newsprint between Port Cartier and Searsport, ME until 2006). The report indicates that there is sufficient cargo available for short sea operations but that this does not necessarily mean it is feasible to convert to short sea. It sets out 10 criteria for success: 1) move freight from origin to destination; 2) be predictable and reliable; 3) competitive transit times; 4) on-time; 5) convenient; 6) reasonable cost; 7) capacity; 8) damage free; 9) secure; 10) reliable documentation provided.

4.2.1 Halifax and Melford – Great Lakes

The concept of short sea shipping between the east coast and the Great Lakes has received much attention recently, and has been the subject of several studies, both public and private. It is being promoted by many stakeholders, including both the Canadian and US Seaway administrations, ports in the Great Lakes such as Hamilton and Cleveland, and potential new terminal operators such as Melford International Terminals.

The Short Sea Shipping Market Study[77] by MariNova concluded that there are several issues that need to be addressed, and which have an impact on the financial viability of domestic short sea shipping in Canada. These are 1) the 25 percent duty required to be paid on foreign-built ships; 2) the inability to obtain pilotage exemption for Canadian-flag vessels in the St Lawrence River; and 3) the potential to obtain reductions in both Seaway tolls and marine service fees. However, 4) the biggest issue was maintaining supply chain integrity during winter, when the Seaway is closed. The latter findings have recently been confirmed by stakeholder interviews for the so-called "Hub-and-Spoke" study by CPCS.[78]

[76] Maritime Innovation, Short Sea Shipping Opportunities in the Lower St Lawrence Region, 2006.

[77] MariNova Consulting Ltd., "Short Sea Shipping Market Study", Transportation Development Centre, Transport Canada, TP 14472E, September 2005.

[78] CPCS Transcom, "Eastern Canada Container and Short Sea Hub-and-Spoke Study", Transport Canada, 2008.

The lead consultant for the present study has had several follow up discussions regarding some of the conclusions reached in the 2005 MariNova "Market Study". These relate mainly to vessel costs and vessel financing. In particular, there was some dispute relating to residual value and the percentage amount that would be financed. The consultant was contacted by Price Waterhouse Coopers in the Netherlands after the study was completed and after it had been published on the Internet. In the Netherlands, vessels are amortized over a longer period of time than in Canada, and thus, daily vessel costs tend to be lower than were indicated in the study. Operating conditions in Europe are much more benign than they are in the Gulf of St Lawrence in wintertime, and the experience of Canadian shipowners is such that vessels intended for use in Canada should be financed over a shorter period of time with little residual value at the end.

There was also some subsequent discussion of the comparative costs of a short sea feeder operation versus rail. The study compared "apples with apples" i.e. all in costs, terminal to terminal. It was contended by proponents of the short sea routing that rail rates had gone up and were not reflected in the study. So (at the time) had vessel charter costs, however, which had doubled in less than three years.

In the fall of 2008, Great Lakes Feeder Line announced it was commencing a service from Halifax to the Great Lakes. In 2007, the company obtained a waiver from the Canadian Transportation Agency allowing the importation of a ship that had partly been built in Canada, but decided to import another vessel and pay duty on it instead. Based on a vessel cost of $3.5 million, the duty paid would amount to $875,000, which can never be recovered if the vessel is re-sold on the international market. Thus far, as of March 2009, the service, which is proposed to run between Halifax and Montreal year round with a 221 TEU vessel, extending to the Great Lakes in the Seaway-operating season, has sailed one voyage between Montreal and Halifax. (It is presently requisitioned by the French government, operating between Halifax and St Pierre et Miquelon on a weekly basis).

The promoters of the $315 million, 1.5 million TEU capacity Melford container terminal in the Strait of Canso have suggested it could be a transhipment point using ship-ship transfers.[79] Feeders would emanate from the Strait of Canso into the Great Lakes and down the east coast, to ports unable to handle vessels with capacities of 8,000 TEUs and upwards. Whether this ship-ship is feasible has not yet been proven. The only operation of its type in the world is direct ship-barge in-stream transfers which take place in Hong Kong. Most large ports such as Rotterdam are trying to develop feeder berths adjacent to the main berth to transfer direct from mother ship to feeder, without the containers being grounded.

In previous research, two major Canadian retailers indicated that short sea shipping cannot provide the frequency of service they require, and which is currently available with trucks and rail. Transit times would have to be competitive and rates very attractive to get one retailer in particular, to switch. Only general merchandise would be a candidate for using such a service. The other retailer indicated it required very short cycle times to and from the Maritimes so short sea shipping would not work for domestic shipments. Another issue raised by a major container line is the location of distribution centres and warehouses in the Toronto

[79] Melford International Terminal Inc., Presentation to Highway H2O Conference, Toronto, November 2007.

area, which are some distance from port facilities in Hamilton and Toronto. Of critical importance is the fact that service would not be 12 months of the year.

4.2.2 Cleveland – Port Stanley

A 2003 study examined the potential for a service between Cleveland and three ports on the north shore of Lake Erie in Ontario. In the Great Lakes region, land connections do exist, unlike many areas served by ferries. The land distance between Cleveland and London is 284 miles, or five hours. There is significant commercial vehicle traffic between the two regions, but O/D data suggest "only" 103 truckers per day between London and Cleveland. The cargo market would depend on a modal shift taking place. A survey conducted highlighted the importance of reliability, on board customs, major cost savings, frequency and time savings. The study considered three port locations on the Canadian side and concluded Port Stanley had the most potential. A limiting factor in terms of acquiring suitable vessels is the Seaway beam of 23.8m. According to the authors, the Canadian *Coasting Trade Act* would apply to the service, even though it would operate between two foreign ports. The service would also have to absorb the cost of providing customs service. Any vessel imported would need to pay duty *and* GST. A $15M vessel acquisition cost with "down payment" of $5.6M is provided, as well as terminal construction costs and vessel operating costs are estimated. Another major obstacle, however, is the inability of Port Stanley to accommodate large vessels, and the requirement for the harbour to be dredged. As of early 2009, Cleveland is still interested in the concept, as well as developing short sea feeder links to Halifax and Melford.

4.2.3 Hamilton – Montreal feeder service

The port of Hamilton has been working to establish a container feeder service linking it with Montreal. In the fall of 2008, a trial shipment of 68 containers filled with recycled metal products was barged between the two ports, to connect with a CMA CGM mainline vessel, for eventual onward carriage to Pakistan.

The Hamilton Port Authority and stakeholders have developed a business plan which envisions a 39-week per year service, utilizing a container vessel capable of carrying up to 220 TEUs per week. The target market is neo bulk, heavy containers, non-time sensitive, and lower value commodities that originate or are destined to south western Ontario or upstate New York.

The value proposition is based on providing significant cost savings in comparison with current modes of handling, as well as the ability to handle more weight per container due to there being fewer restrictions on a marine move. It is also expected that trucking costs will be lower for a local delivery to an uncongested terminal and lower wait times. Storage costs are also expected to be lower than at a rail intermodal yard.

The proponents have sought proposals from two vessel operators and the port is proposing to develop an 8 acre site capable of storing 700 containers. The initiative has attracted support from municipal, provincial and federal interests. The project has an aggressive timeline, with a start-up expected in August 2009.

4.2.4 "Long Sea" shipping to the lakehead

The Port of Thunder Bay is actively promoting itself as the Gateway to the West. The port authority has partnered with CN Rail to develop a western gateway for oil sands cargoes. The shipment of dimensional traffic to the oil sands in northern Alberta has been enhanced by recent changes to CN's route from Thunder Bay, which has enabled the port to obtain traffic that would have been formerly unloaded at a US Great Lakes port. CN acquired a short line railway between Boyle and Fort McMurray, Alberta, and has widened rock cuts and improved the line to allow large, heavy equipment and components to reach the oil sands by rail.

The port's objective is to increase its market share of inbound project and general cargo destined for western Canada at the same time providing a supply of ocean vessels for Canadian grain export. The strategy is to provide a cost effective alternative to US gateways such as Houston Texas and Duluth Minnesota. The port's intention is to market itself to shipping lines and cargo interests in Europe and other markets, and to persuade them to bring their vessels all he way through the Great Lakes Seaway system to Thunder Bay, where the cargo will move onwards by rail or truck. The notion is to move the cargo as far as possible by water.

4.3 Opportunities Assessment

In this section, we examine 10 different routings for potential new shipping services in Ontario. We have examined two services that utilize the Seaway, and eight cross-lakes services. Previous work has suggested that requirements to keep supply chains open and cargo flowing, will render it difficult for short sea container services to operate into the Lakes from Halifax or Montreal. We have, however, examined the potential to move an industrial product from a point downstream from Montreal to Hamilton, as well as a pure ro-ro trailer (no passenger) service between the Lakehead and the Soo, and points in Lake Huron and Georgian Bay.

We also examine the potential for eight cross-lakes ro-pax services, which could accommodate tractor trailers and their drivers. The overall market for trucks moving between Canada and the United States is enormous. In 2008, about 2.8 million trucks crossed the Ambassador Bridge between Detroit and Windsor, 1.5 million crossed the Blue Water Bridge, 1.3 million crossed the Peace Bridge between Fort Erie and Buffalo and 789,000 crossed between Lewiston, NY, and Queenston, ON.[80]

A cross-lakes service could appeal to an "industrial" shipper wishing to feed its own supply chain, or a large trucking firm with operations on both sides of the border. It could also appeal to drivers simply wishing to avoid congestion either around the GTA, or at border crossings. It would only need to capture a small share of the market to be viable.

In terms of the potential for a modal switch, the TransSystems Cleveland-Port Stanley study suggested that drivers would need to save at least $100 to be persuaded to use a ferry. On this basis, very few of the routing options we have examined are viable.

[80] "US-Canada trucks decline", *Journal of Commerce*, January 12, 2009.

Research by Brooks and Trifts, however, suggested that a number of factors influence whether shippers will switch modes, including price, reliability, distance, and frequency of service.[81] Stakeholder consultation for both the 2005 MariNova "Short Sea Market Study," and the recent "Hub-and-Spoke" study suggests that a saving of 15-20 percent would be needed. Real life experience in Atlantic Canada demonstrates that truck drivers will use ferry services to save time, save driving time and overall cost. Large trucking firms, however, tend to avoid sending their drivers on a ferry if they can avoid it, preferring to keep them "driving". Ideally, a cross-lakes service could cater to trailers-only, but this assumes a company has operations on both sides of the border. It also assumes the "drop" part of the service is well co-ordinated, such that a trailer is brought into the ferry terminal and the driver hooks up another load which has been discharged from the arriving vessel. This type of operation is not unusual; indeed, it is a feature of the marine Atlantic service between mainland Canada and the Island of Newfoundland.[82]

In looking at various route options, we assumed that all obstacles have been removed in terms of barriers to entry, and the best possible conditions are present to encourage such investment. This includes removal of the 25 percent duty. In our view, no operator will begin to consider bringing a vessel (or vessels) into the Lakes if it is not assured of being able to sell the vessel later on the international market, and having the ability to upgrade the vessel as traffic and cargo builds. They would also not likely start a service without sufficient cargo commitments to at least achieve breakeven.

4.3.1 Case studies

4.3.1.1. Contrecouer – Hamilton (Damen 11000 combi freighter)

For the purposes of discussion we have done an analysis of the costs for the carriage of steel slabs from Contrecouer, Quebec to Hamilton, Ontario.

It is assumed that this business would be moved over a contract of at least five years duration, so as to offer an economic incentive for the carrier to purchase new equipment and to bring a vessel under Canadian flag.

It is also assumed for the purposes of this case that cargo flow is one way. In a realistic situation, once a westbound route was established, the operator would seek eastbound cargo to generate additional revenues.

The typical steel slab dimensions are 6m x 1.25m x .16m with a unit weight of 9.42 tonnes. For ease of handling, we have assumed that the carrier will use 40 foot ISO flat racks, which have a payload capacity of four slabs per unit. The flats have an assumed tare weight of 4200 kgs for a total lift weight of 41.88 tonnes.

The daily cost of containers is assumed to be $6 USD + 12/52 layup cost or USD $7.38/effective/day (GESeaco). Should the shipper wish to transport by truck during the

[81] Mary R. Brooks and Valerie Trifts, "Short Sea Shipping in North America: Understanding the Requirements of Atlantic Canadian Shippers, *Maritime Policy and Management*, Vol. 35, Issue 2, 2008, pp. 145-158.

[82] See MariNova, "Social and Economic Impact of Marine Atlantic Drop Trailer Service", 2005.

winter, these units could be used for road transport on chassis, reducing the effective daily unit cost.

At 11,000 t cargo capacity, we can assume a vessel carrying capacity of 262 units and net cargo capacity of 9,900 tonnes per voyage.

Based on our own experience operating a geared feeder vessel over a period of five years, we assume a load and discharge rate of 10 units per hour using ship's gear. Stevedoring costs are $200 per unit on and off for loaded containers, and $100 on and off for empties.

We assume a ship operating season of 40 weeks annually with layup for 12 weeks, with only debt service costs accruing in the interim.

We have looked a various financing models for the vessel to arrive at a blended rate which will closely approximate the real cash flow implications and which will satisfy return on equity requirements for capital investment. These include financing the total capital investment over 20 years with a 40/60 equity debt distribution and 24% / 6% capital costs respectively, as has been suggested for a purely domestic application, or as below, a shorter financing period with an accelerated paydown of duty, as might be applicable to a vessel which is not expected to spend its entire working life in the Canadian trade. In both instances the daily debt service equates to approximately CAD $16,150 per day.

Vessel assumptions
Damen CombiFreighter 11000
Cost - €20,000,000 (as per Damen Shipyards 26 Jan 09)
Cost – CAD $32,000,000 – 7.5%/12 yrs
Duty – $8,000,000 – 7.5%/5 yrs
Repair and Maintenance $3,500/d
Crew - $6,000/d

Base operating cost
CAD $25,686/d
Layup cost (12/52) of daily debt service, CAD $3,735

Effective daily cost
CAD $29,421

(Note that this makes the very conservative assumption that the vessel can only be used in this trade and will not be traded in the winter season.)

Transit	14 knots on 19 tpd (plus allowance for locks and reduced speed)
IFO 180	19 tpd @ CAD $400
MGO	1 tpd @ CAD $600

We have assumed that the vessel will be Canadian flagged and that the Master will be eligible for a pilotage exemption per the Great Lakes Pilotage Authority Regulations.

Laurentian Pilotage charges per Zone 1 tariff schedule from Contrecouer to St Lambert plus pilot mobilisation charge are $220 per trip.

Table 9: Round Trip Costs

Ship	$205,598
Fuel	$38,862
Pilots	$8,006
MLO Tolls	$11,468
Lines	$4,000
Total	$267,935
Per tonne (9725t)	CAD $27.06

Table 10: Handling Costs per container

Stevedoring (on Loaded)	$200
Stevedoring (off Loaded)	$200
Stevedoring (on Empty)	$100
Stevedoring (off Empty)	$100
Container Rental 7d x 1.23 (12/52)	$65
Drayage Load port per round trip	$150
Drayage Discharge port per round trip	$150
Total per container	$965
Per tonne (37.68 t per container)	CAD $25.61

Total cost $52.67 per tonne or CAD $496 per slab.

This compares with:

Road distance (round trip) 1200 km
Truck Costs[83] at $1.80 per km $2,160 for four slabs
CAD $540 per slab
Truck Costs at $1.60 per km $1,920
CAD $480 per slab

4.3.1.2. Cross lake truck ferry options

We investigated the possibility of a number of routes from the US to Canada that would allow trucks to avoid the Detroit Windsor corridor and the associated congestion found there. The most probable of these would cross Lake Erie using the US ports of Toledo OH, Cleveland, OH or Erie, PA and the Canadian ports of either Port Stanley or Nanticoke, ON or would cross Lake Ontario from the ports of Rochester or Oswego, New York to the ports of Oshawa or Hamilton.

[83] Ray Barton Associates Ltd., "Operating Costs of Trucking and Surface Intermodal Transportation in Canada", Transport Canada, March 31, 2008. As the author of that report informed us, a typical vehicle would be a five-axle van trailer unit doing 160,000 km per annum with a 5% profit margin. The estimated cost to run this vehicle in 2007 was $1.80 per km. The fuel cost used for the report was $0.85 per litre for Ontario. The price of fuel is about the same as of this writing (April 2009).

For purposes of discussion we have sought a Ro-Ro ferry with the ability to carry approximately 100 standard trucks and drivers. Although a significant number of vessels exist in the world fleet with the desired capacity, the beam restriction posed by the Seaway locks limits the number of these vessels that could possibly enter the trade (and the Lakes).

We have selected the *Galileusz* operated by the Poland's Unity Line and currently trading in the Baltic as an example of the type of vessel we believe suited to this trade. This vessel is 1990-built and although a newer unit might be preferable, the capital costs and associated duties of a new build are likely to prove prohibitive for a new service. For example the 2005 built *Hammerodde,* a vessel of similar dimensions and capacity trading between Bornholm and the Swedish mainland had a reported new building price of € 76m or approximately CAD 121m.

Figure 25. Unity Line *Galileusz* ro-pax vessel

Duty and Pilotage

We have assumed for the purposes of this study that an operator contemplating a trans-lake service between Canada and the United States would be required to register the vessel to be used in Canada and would have to pay the 25 percent import duty imposed by the Government of Canada on foreign built vessels. This payment is generally very difficult to finance as, from the point of view of a financial institution, it does not add anything to the market value of the vessel in the international market, and so is considered an unsecured amount.

Duty can be dealt with either by a lump sum cash payment, or through amortisation on a 1/120 per month basis over 10 years if no Canadian ship currently exists which could undertake the trade. In such a case the operator would have to apply for a Coasting License annually and would face the risk every year of having the application blocked by a Canadian duty paid ship. The determination as to whether a vessel proposed by another Canadian shipowner is suitable for the proposed trade is made by the Canadian Transportation Agency based on arguments put forward by the parties involved. The Agency's mandate is limited to the question of whether a vessel is physically capable of undertaking a particular trade and does not consider such issues as age, fuel efficiency, manoeuvrability and the like.

The daily increment added to operating cost imposed by duty on the ship contemplated for this trade would range between CAD $3,500 and CAD $7,000 per day, depending on the amortisation period acceptable to those financing it. Our assumption after discussion with financial institutions is that a minimum payback period would be required because of the

significant commercial risk. We have used five years as an assumed value, however this may be unrealistically long.

The effect of duty on individual vehicles carried does not add a significant cost increment to the break even level, although it may be argued that in an attempt to shift modes of transportation, any increase in cost is undesirable. The real effect on the imposition of duty is as a barrier to entry. Under the present regime a ship operator is unlikely to bring a vessel into the lakes trades with a view to establishing the viability of a service, because of the significant risk of the additional fixed cost that duty represents. If the owner is obliged to pay the duty as a lump sum, this represents a substantial non refundable cash outlay before the viability of the service can be confirmed. Alternatively if an owner is successful in acquiring a Coasting License and duty is calculated on a 1/120 basis, while some other fixed or semi-variable costs can be deferred during the establishment of a route, the duty component represents a guaranteed loss during this period.

The international cross lake trades described here do not constitute "coasting trade" under the *Coasting Trade Act*. This means that vessels engaged in this trade do not have to be flagged in Canada in order to legally carry goods from a port in the United States to a port in Canada and vice versa. However, the Great Lakes Pilotage Authority Regulations state that in order to obtain a pilotage waiver, a vessel must be inspected by the Board of Steamship Inspection (Transport Canada Ship Safety), typically meaning a Canadian ship must be procured. The alternative requirement to carry a pilot on daily cross lake trips would be prohibitively expensive.

The possibility exists under the wording of the Great Lakes Pilotage Authority Regulations, that a non-Canadian or US flag vessel could be used in the cross lakes trades without the need for a pilot, substantially reducing the operating cost for the vessel and significantly increasing the economic viability of such a service if the vessel is a "ferry operating on regular schedule" (GLPR part 4(1)a) The term "ferry" is not defined in the Regulations, nor in the *Canada Shipping Act*, the *Canada Marine Act*, the *Coasting Trade Act* or the *Pilotage Act.* However, the experience of the operators of the former Rochester-Toronto fast ferry suggests that any attempt to operate a non-Canadian or US Flag unit in these waters without the use of a pilot would meet with significant resistance.

Assumptions

Capital Cost	USD $35m (CAD $43,750k) at 6%/12 yrs
Duty	CAD $11m at 6%/5 yrs
Crew	CAD $7,000
Maintenance	CAD $3,500

Base Operating Cost

CAD	$31,400
Transit	18.5 knots on 45 tpd
IFO	180 45t pd @ CAD $400
MGO	2 tpd @ CAD $600

Wharfage/harbour taxes

We have spoken with terminal operators in a number of ports in the Lakes and have received indications that a charge of CAD$50 per unit per direction would be reasonable for the

service envisioned. At full capacity this should generate between CAD $2,500 and CAD $5,000 per day to cover capital investments and terminal operations. We have assumed that the currently envisioned remission of the US Harbour Maintenance Tax for Great Lakes ports will come into force and that this supplementary charge will not apply.

We have assumed that the vessel will be Canadian flagged and that the Master will be eligible for a pilotage exemption per Part 4(c) of the Great Lakes Pilotage Authority Regulations.

In all cases we have assumed a total load discharge time per round trip of four hours or approximately one hour per direction per trip.

4.3.1.3. Lake Erie options

The distance from Toledo to Nanticoke makes this route problematic. It is desirable from the perspective of scheduling and for development of a regular clientele to offer at least one scheduled sailing per direction per day. At a distance of 180 nautical miles this route would require either two vessels on the route, each travelling one direction per day or a single vessel with a transit speed in excess of 22.5 knots, a speed which would not be sustainable during winter conditions. The same restriction applies to the potential route from Oswego to Hamilton.

The route from Erie, PA to either Nanticoke or Port Maitland, ON offers the possibility of twice daily service. The marginal cost for such an increase would be the extra fuel consumption, and if traffic volume exists to fill the vessel chosen, this could translate into significantly lower risk. Note that fuel consumption does not double in a twice daily service, as an allowance must be made for ship's service during layup time in a single service scenario. Whether the vessel is hooked up to shore power or operates its own generators this power requirement represents a real cost. We have not looked at detailed power generation costs to establish the difference between shore power and ship's own.

Table 11: Round Trip Costs – Lake Erie

Route	Toledo – Nanticoke	Toledo – Pt Stanley	Cleveland – Nanticoke	Cleveland - Pt Stanley
Ship	65,213	30,533	32,705	32,337
Fuel	16,521	11,944	11,458	7,634
Pilots	0	0	0	0
Lines	2,000	2,000	2,000	2,000
Total	85,734	44,497	46,164	41,971
Wharfage per unit	100	100	100	100
Per Truck @ 100% Capacity	529	323	331	310
Per Truck @ 50% Capacity	957	546	562	520

Table 12: Round Trip Costs – Lake Erie 2

Route	Erie - Nanticoke	Erie – Nanticoke (2)

Ship	32,431	32,431
Fuel	5,018	8,763
Pilots	0	0
Lines	2,000	4,000
Total	40,947	46,246
Wharfage per unit	100	100
Per Truck @ 100% Capacity	305	217
Per Truck @ 50% Capacity	509	331

Table 13: Round Trip Costs – Lake Ontario

Route	Rochester – Hamilton	Rochester - Oshawa	Oswego - Hamilton	Oswego – Oshawa
Ship	30,610	31,488	62,239	32,224
Fuel	8,378	7,115	15,099	5,764
Pilots		0		
Lines	2,000	2,000	2,000	2,000
Total	40,988	40,602	79,338	39,988
Wharfage per unit	100	100	100	100
Per Truck @ 100% Capacity	305	303	497	300
Per Truck @ 50% Capacity	510	506	893	500

A further potential route system was investigated to and from Thunder Bay, with termination at either Sault Ste Marie or possibly at the Lake Huron ports of Goderich or Parry Sound.

The Sault Ste Marie option would most likely be a Ro-Pax truck ferry, potentially with year round service. Winter conditions in Lake Superior might make this very challenging. A recent discussion with management at the Port of Thunder Bay indicates that as of 1 March 2009, there was approximately 1.2 metres of fast ice within the port and that the local temperature was in the vicinity of -30C. These conditions would be workable with an appropriately built vessel, however such a vessel would carry a significant capital cost.

The proximity to the GTA of both Goderich and Parry Sound/Midland via Ontario Highway 400 offers an interesting possibility for a seasonal drop trailer operation from the Lakehead. Such a service would not require carriage of drivers allowing for a smaller ship's crew and use of a "straight RoRo" vessel.

No infrastructure currently exists at the Port of Thunder Bay to undertake Ro-Ro operations, although there is a general cargo terminal which could be fitted with a ramp at a reasonable cost. Further terminal modifications would be required at the eastern end of the service as well to establish a suitable terminal at the port of choice. The capital costs for these have not been considered in this study with the exception of wharfage charges by which means the various ports are able to recoup the necessary capital outlays.

For ferry services it is assumed that load/discharge would be drive on/drive off by the vehicle operators, so no stevedoring charges would be incurred with the exception of line handling. For a drop trailer service we have allowed $150 per unit per direction for load and discharge.

4.3.1.4. Lakehead – Sault Ste Marie

This route avoids a driving distance of approximately 700 km over a difficult stretch of two lane highway and would require a marine transit time of approximately 14 hours.

We have assumed use of a similar vessel to *Galileusz.* The distance involved in this route would mean that an operator would be able to offer service either on the basis of one direction each day or would require two vessels to offer daily service. We have assumed for the purposes of this study that the vessel would lay up for a period of two months from about mid-January until about mid-March. Debt service costs have been increased to reflect the period.

As with other "ferry" services it is assumed that drivers would self load and discharge under direction of the ship's crew

Assumptions	
Debt Service	13,998
Duty	6,933
Layup	3,220 (Includes debt service on purchase and duty)
Maintenance	3,500
Crew	7,000
Daily Op Cost	34,650

Table 14: Round Trip Costs – Lake Superior

Route	Thunder Bay – SSM
Ship	67,710
Fuel	21,798
Pilots	
Lines	2,000
Total	40,988
Wharfage per unit	100
Per Truck @ 100% Capacity	510
Per Truck @ 50% Capacity	920

4.3.1.5. Lake Superior – Lake Huron

Thunder Bay – Parry Sound – Drop trailer service

We have used a newly built vessel of the "Clipper Point" class as an example of the type of vessel which would be suited to this trade. The vessel is s straight Ro-Ro with capacity for twelve passengers

We have assumed that for the purposes of this study that the vessel will be duty paid into Canada and Canadian flagged allowing a pilotage exemption. We have assumed a two month layup period between mid January and mid March

Characteristics
New Build Cost € 30m
Duty € 7.5m
LOA 142.00
B 23.03
D 5.70
1530 Lanemetres

Assumptions
Debt Service 15,360
Duty 7,606
Layup 3,220 (Includes debt service on purchase and duty)
Maintenance 3,534
Crew 5,400 (12 person)

Daily Operating Cost
CAD $35,396

A standard North American trailer is 53', so it is assumed that approximately 17-17.5 lanemetres per trailer will be required giving a carrying capacity of about 90 units.

The vessel has a transit speed of 21 knots on about 55 tonnes of IFO.

For the purposes of calculation this has been reduced to an average transit speed of 18 knots to allow for locking at Sault Ste Marie and transit of the St Mary's River to Lake Huron.

The vessel will require load and discharge by shore personnel using shunt tractors. We have allowed $150 per unit per direction for this process with an assumption of an average of 10 moves per hour.

Table 15: Round Trip Costs – Lake Superior – Lake Huron Drop Trailer

Route	Thunder Bay – Parry Sd
Ship	123,725
Fuel	49,053
Pilots	
Lines	2,000
Total	174,778
Wharfage per unit	100
Stevedoring per unit	300
Per Trailer @ 100% Capacity	1,370
Per Trailer @ 50% Capacity	2,342

The length of the route at 431 nautical miles per direction means that it is likely that the service could be offered with twice weekly departures. This route would replace a road distance of 1150 km.

4.3.1.6. Ferry and trucking comparisons

The following section compares trip costs between destinations by road and by road-ferry combination using both 50 percent and 100 percent load factors. A cost of CAD $1.67 per km was assumed based on a recent study for Transport Canada.[84] We have assumed for calculation purposes that there is no cost attached to trucking while the vehicle is at rest on the ferry. It is assumed that this cost will be substantially counterbalanced by reduced requirements for driver rest and meal times.

We have also calculated the incremental cost per truck included and imposed by the 25 percent import duty on foreign built vessels for load factors of 50 and 100 percent, and the percentage of the ferry cost per truck for these load factors.

Routes compared are:

- Pittsburgh – Hamilton via Erie – Nanticoke (twice daily) (Ro-Pax);
- Columbus – Toronto 1 via Erie – Nanticoke (twice daily);
- Columbus – Toronto 2 via Cleveland – Port Stanley; and
- Thunder Bay – Parry Sound (Drop Trailer) – Toronto.

Table 16

Route	Pitts - Ham	Col-Tor 1	Col-Tor 2	TB-PS - Toronto
Road Distance	457	690	690	1,377
Road Cost	**763**	**1,152**	**1,152**	**2,300**
Road Dist 1	206	133	221	0
Road Dist 2	60	383	228	228 (drayage)
Ferry Cost 50	331	331	520	2,340
Ferry Cost 100	217	217	310	1,370
Total 50%	**597**	**847**	**969**	**2,568**
Total 100%	**483**	**733**	**759**	**1,598**
Duty 50 CAD	35	70	70	266
Percentage 50	10.5 %	21 %	13 %	11 %
Duty 100 CAD	17	35	35	150
Percentage 100	7.8 %	16 %	8.8 %	11 %

Thus, it can be seen that the pure cost of a ferry, including trucking to and from the terminal, can be competitive with the cost of driving around. The only exception is Thunder Bay-Parry Sound at less than 100 percent capacity.

We should point out that our cost comparison does not include costs for administration, marketing, accounting, legal fees, etc.

[84] Ray Barton Associates Ltd, "Operating Costs of Trucking and Surface Transportation in Canada", Transport Canada, 31 March 2008; in April 2009, Mr. Barton confirmed that the operating cost of a typical tractor trailer is $1.75-$1.80. It is recognized that independent truckers will likely "charge" less, particularly in a recession.

4.3.2 New laker justification analysis

Arguments justifying the continued use of older tonnage range from the fact it is fully paid and depreciated, to the relatively benign (fresh) waters of the St Lawrence and Great Lakes system, which do not subject these vessels to the same kinds of operating conditions faced by salt water tonnage.

However, ship design and propulsion systems have made great strides over the past 40 years, and even 25 year old ships (the last new lakers built), are not as fuel efficient as they could be.

One is left to contemplate whether the lack of new tonnage and new, efficient engines and vessel design, is related to the overall decline in cargo tonnage moving through the Seaway or whether the converse might be true.

The average age of a Canadian flag lakes bulk carrier is 34 years with almost half of the fleet having build dates of 1969 or before. Many of these vessels operate with their original engine and propeller arrangements. Engine technology has evolved rapidly in the past several decades and specific consumption, that is, the theoretical fuel consumption per kilowatt hour produced by an engine has declined dramatically. The models of engines found aboard many of the existing lakes vessels had consumptions ranging from about 195 to 240 grams of fuel per kilowatt hour. New engines of a similar configuration and specification have consumptions in the 170-180 gram range and some consume less. For engines of the sizes typically found in Great Lakes bulkers the fuel savings related to a new engine could run to about 25 percent, offering a cost reduction in the area of CAD $2,500 per day or more.

A second significant area of possible improvement arises from changes in propeller design. Some manufacturers claim increases in efficiency in the area of 15 percent over installed propellers translating into a savings of a further CAD 1500 in fuel costs. While laker designs are limited to the dimensions of the Seaway, new developments in hydrodynamics suggest that efficiency gains can be made in this area too.

Below, we examine the financial feasibility of replacing existing older tonnage with new vessels built in China, at an assumed cost of USD $40M.

Assumption	
Dimensions	
LOA	222.5
B	23.25
D	14.65
d	7.9 (Lakes)
Lakes dwt abt	32,000
Main Engine	8000 kW
Transit	13 knots
Main Engine	8000 kW
Consumption	170 grams per kWh
Crew	18 person
Crew Cost	CAD $7,500/d

Debt/Equity	60/40 – 6%/24%
Equates to	13.75% on total
USD	1.25 CAD
Capital	40m USD/13.75%/20 years (assumes blended debt equity rate)
DDS	CAD $20,200
Duty	10m USD/13.75%/20 years (assumes duty can be amortised over the life of the ship as it will not be trading internationally)
DDS	CAD $5,000/d
Maintenance	CAD $3,000/d
Insurance	500/d

Assume that the vessel has been fitted with the most efficient possible propeller and coating systems (reduce fuel consumption by 15 percent).

Assume that the vessel is laid up for 12 weeks in winter.

Capital	$20,200
Layup allowance	$4,662
Duty	$5,000
Layup allowance	$1,154
Crew	$7,500
Maintenance	$3,000
Insurance	$500
Daily operating	$42,016

Daily operating	CAD $42,016 without allowance for overheads and profit
Daily fuel consumption	27t IFO at CAD $400 less 10% for propeller efficiency
Daily fuel cost	CAD $9,720

With a transit speed of 13 knots the vessel could theoretically make 312 nautical miles per day carrying 32,000 tonnes of cargo at a cost of CAD $51,736 per day or CAD $166 per vessel mile or CAD $0.0052 per tonne mile.

By comparison with an older bulk carrier fully amortised:

Capital	0
Duty	0
Crew	$8,000
Maintenance	$7,000
Insurance	$250
Operating	$15,250

Fuel consumption is likely to be at 200 grams per kWh
Speed 11 knots
Deadweight 26,000

Daily Operating Cost	$15,250
Daily Fuel Cost	$10,800
Total	$25,050
Daily distance	264

Based on our analysis, using an older laker carrying 26,000 tonnes and offering a daily operating cost of $25,050, translates to $94.89 per vessel mile; this in turn would be the equivalent of $116.78 per vessel mile with a 32,000 tonne vessel.

Removing the 25 percent duty lowers the new vessel's operating cost to $146 per vessel mile, or $0.0046.

Great Lakes vessel owners have limited their capital investments to modifications of existing vessels including fitting new stern sections and engine room spaces to existing hulls. Unless incentives are provided, either passively through tax incentives or actively through subsidy it will be difficult for new vessels, even if they are built in China, to compete with the existing aging fleet of lakers. New environmental legislation, however, as well as an aging fleet, necessitates investment in new tonnage.

As noted elsewhere the operating conditions in the Great Lakes system are relatively benign giving rise to very long operating lives for lakes vessels. These conditions have led to a tendency to refurbish or reconfigure old vessels rather than to replace them with new buildings. However even in these conditions there arises a point at which the refurbishment or rebuild of older assets becomes a losing proposition, where the cost of steel replacement and the inherent limitations of older tonnage make it impossible to justify any further capital investment in these vessels. This situation is exacerbated by the challenges posed by changes in the regulatory environment, primarily as applies to new environmental regulations for emissions and ballast water. Canadian shipowners are now faced with the necessity of a massive investment in new tonnage if the shipping industry in the Great Lakes is to remain viable.

Shipbuilding capacity for lakes vessels in Canada is for all intents and purposes non-existent leaving operators with little choice but to purchase new vessels from outside of Canada and to incur import duty of 25 percent on the purchase price of new vessels. As is shown above the obligation to pay a 25 percent import duty adds a significant increment to the daily operating cost of the vessel over its life reducing its profitability and increasing its level of financial risk and in direct result reducing the attractiveness of new vessels for lakes service as a capital investment.

4.4 Environmental / Social Cost/Benefit of Marine Transportation

4.4.1 Cost structure of marine

The marine mode offers low linehaul operating costs per tonne/km. This is particularly true in open waters, where the only infrastructure requirements are navigation aids. While vessel operating costs are low on a tonne-km basis, capital costs are high. Marine vessels require a much higher investment per tonne of capacity than trucks[85]; and, while they have a longer life, the investment decision involves market risks affecting asset utilization over that longer life. Ocean vessels have some flexibility in markets/routes over their lifetime, whereas lakers

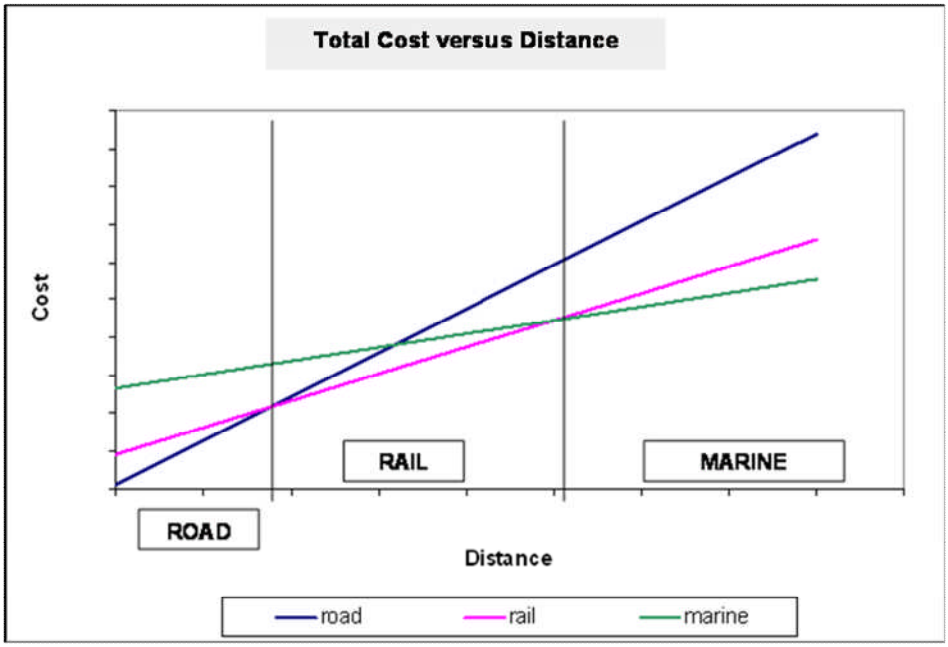
[85] While the vessel cost is higher for marine the investment cost/tonne of capacity is substantially lower. A truck/trailer unit that can carry about 36 tonnes costs about $200,000, or about $5,500 per tonne of lifting capacity. A ship that can carry 36,000 tonnes costs about $40,000,000 or about $1,100 per tonne of lifting capacity or about 20% of truck's cost. Marine's advantages of scale are even greater when the lifespan of the asset is considered.

are more dependent on the industries within the Great Lakes/Seaway system. Railway motive power and freight cars fall between the truck and marine modes in terms of magnitude of flexibility of routes/markets served over their useful lives. The higher duty imposed on imported vessels than on other modes exacerbates the capital magnitude/risk issue for marine.

While shipping has a lower transportation cost per unit distance than rail or truck, it seldom has direct access to both the originator and receiver of shipments. The marine mode must rely on other modes, such as trucks or rail, to do the final pickup and/or delivery. The transfer costs involved in moving the product from the originating and/or delivery mode, as well as from ship to shore and vice versa 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 leads to higher inventory carrying costs by the shipper and/or receiver of the goods. These same factors apply to rail in comparison with truck; however, rail has lower transfer and inventory costs than marine. Consequently, trucking has an advantage over both rail and marine for short distance trips, rail has an advantage over trucking and marine for medium distance trips and marine has an advantage over trucking and rail for long distance trips. Generally speaking, road is most competitive up to 400 miles, and rail from 400-1,000 miles, while the marine mode is most competitive over 1,000 miles. This total cost versus distance profile of the three modes is illustrated in the diagram below.

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 transfer costs are often set on the basis of international vessel movements where they are a smaller portion of the overall trip cost. Stevedoring labour agreements related to work rules, shift premiums, crew sizes and remuneration have not hampered the competitive position of ports in relation to the international movement of goods; but may affect the marine mode's ability to compete for domestic movement of general cargo and containerized commodities.

Figure 26. Surface Modes' Cost/Distance Profiles



4.4.2 Environmental footprint

4.4.2.1. GHG emissions per tonne-kilometre

Large scale marine cargo transportation is very energy efficient and has low GHG emissions. Figure 27 illustrates the relative energy intensity, and Figure 28 relative GHG emissions intensity, of the surface modes. The data in the two figures are summarized in Table 17. All data with the exception of the marine-bulker are from the 2006 Natural Resources Canada (NRCan) energy intensity database (transCa2006).

The marine mode's data in NRCan's database is limited, such that fuel consumption and associated emissions for all marine operations (except pleasure craft) are included in the numerator, while only cargo activity is included in the denominator. Thus, marine cargo's intensities are overstated. In order to better estimate the intensities of marine cargo vessels, we have included our estimate of the fuel and GHG emissions of large bulk laker vessels.

Table 17: Comparison of Surface Mode Energy and GHG Intensities

Mode	Energy Intensity (MJ/tkm)	GHG-Intensity (t/Mtkm)	Relative to NRCan marine	
			Energy Intensity	*GHG-Intensity*
Heavy Truck-NRCan	2.31	166	5.9	5.5
Rail Freight NRCan	0.23	19	0.6	0.6
Marine (all)-NRCan	0.39	30	1.0	1.0
Marine (bulker-our estimate)	0.19	14	0.5	0.5

* NRCan allocates all marine fuel consumption except recreational boating to freight activity

It is evident from Figure 27, Figure 28, and Table 17 that the fuel and related GHG emissions intensity of the truck mode are much higher than for the rail and marine modes. However, one can see from Table 17 that trucking's energy intensity is 5.9 times that of marine, while its GHG intensity is only 5.5 times marine's. This is a consequence of the fuel types and engine emissions regulations that exist. The components of GHG emissions for each mode are summarized in Table 18. As indicated, trucking has a lower GHG emission rate per litre of fuel than either rail or marine, which partially offsets its much higher fuel intensity.

Figure 27. Modal Energy Intensity Comparison

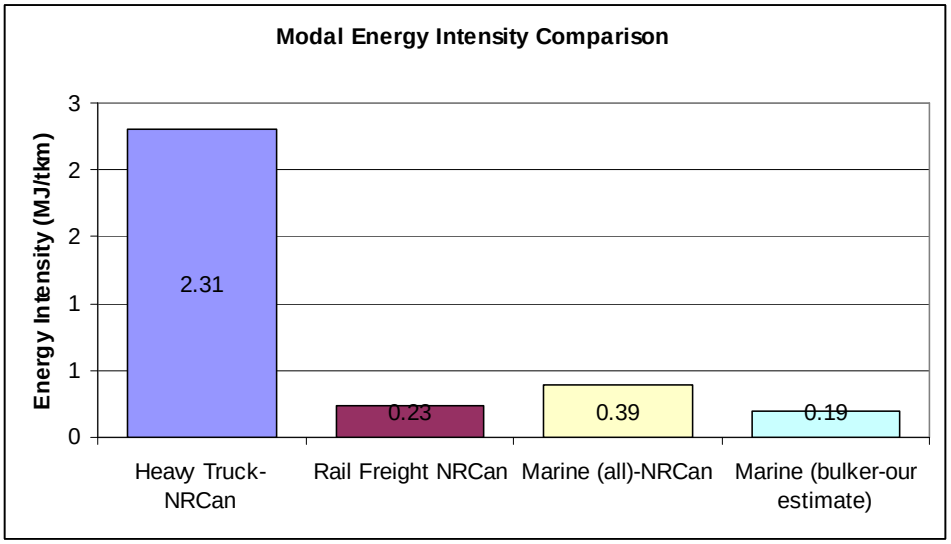


Figure 28. Modal GHG Emissions Intensity Comparison

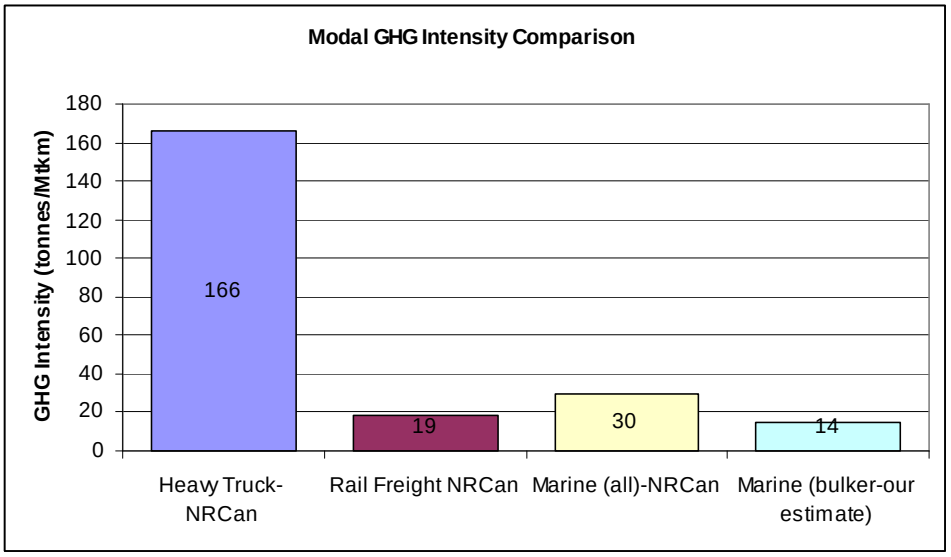


Table 18: GHG emissions weighting by mode (grams/litre)

Fuel	CO_2	CH_4	N_2O	CO_2e
Truck diesel	2360	0.331	0.34	2,471
Rail diesel	2730	0.150	1.10	3,074
Marine diesel	2730	0.150	1.00	3,043
Marine fuel oil	3090	0.300	0.08	3,121

Source: Natural Resources Canada, for the Transportation Table

Thus, for heavy freight transport, GHG reductions of 50 to 75 percent in linehaul emissions would be available for shifts of intercity movement from truck to marine, but there is little difference in rail to marine modal shift. Modal shifts from truck to marine for lighter weight products would realize lower linehaul savings.

It should also be noted that, the most intense emissions associated with trucks are from the local pick-up and delivery activities in urban areas. The use of trucks for pick-up and delivery is required for marine as well as truck and, given the greater flexibility of truck interchange locations, could be a larger element for marine-truck than for all-truck movements. Thus, the full cycle savings that would be realized by a truck-to-marine mode shift would be very service specific. For a wide range of goods and for a full shipment cycle, the 50 to 75 percent range noted above for the linehaul leg of heavy freight would be an upper range of the potential GHG reductions, particularly as new trucks are much cleaner.

A move to long combination vehicles (LCV) on Ontario's highways could further reduce truck's GHG emission and bring the two closer together for many commodities. However, LCVs are still restricted to the present weight limits and therefore, cannot be used for heavy commodity transport. Our best estimate of a like-for-like comparison of the linehaul segment in bulk commodity transport for present truck and marine configurations/technology is a 50-to-75 percent reduction.

4.4.2.2. CAC emissions

The different fuel and engine types also influence the modal emissions of criteria air contaminants (CAC). Marine's historic use of a high sulphur fuel has meant that its Sulphur emissions are high relative to the other modes even though its fuel consumption is lower.

John Lawson estimated the relative CAC emissions performance of the three modes in a hauling bulk commodities based on late 1990 and early 2000 performance data.[86] Fuel and engine regulations are evolving in all modes, and Lawson cautions that the late-1990s era emission data for trucks could be seriously out of date, particularly for NOx, for which increasingly stringent heavy truck engine standards in both US and Canada are changing average emissions of the truck fleet rapidly, and will continue to do so for at least the coming decade.

Similarly, the SOx emissions for marine are the subject of regulatory improvement that would reduce a CAC emission component where marine has historically had significantly

[86] John Lawson, Lawson Economics Research, Inc., "The Environmental Footprint of Surface Freight Transportation", Transportation Research Board Special Report:, 291, June, 2007.

higher emissions than rail and truck. One of the CAC that is unlikely to improve for marine relative to truck is particulate emissions (PM10). Trucks are being targeted to reduce many of the CAC emissions including PM10 because of the high density of trucks in urban areas and the simpler technology solutions for smaller engines, which provides a better cost benefit ratio of addressing the problems on trucks first. New EPA regulations on highway diesels that came into effect in 2007 and will be phased in for new engines by 2010 call for reductions of NOx and PM10 emissions to 10 percent of the 2001 values. These significant reductions in PM10 and NOx require engine modifications and exhaust treatment that negatively impact engine efficiency and thereby CO2 emissions. Thus, we have estimated a five (5) percent increase in CO2 emissions for the 2010 model trucks over the late-1990s truck.

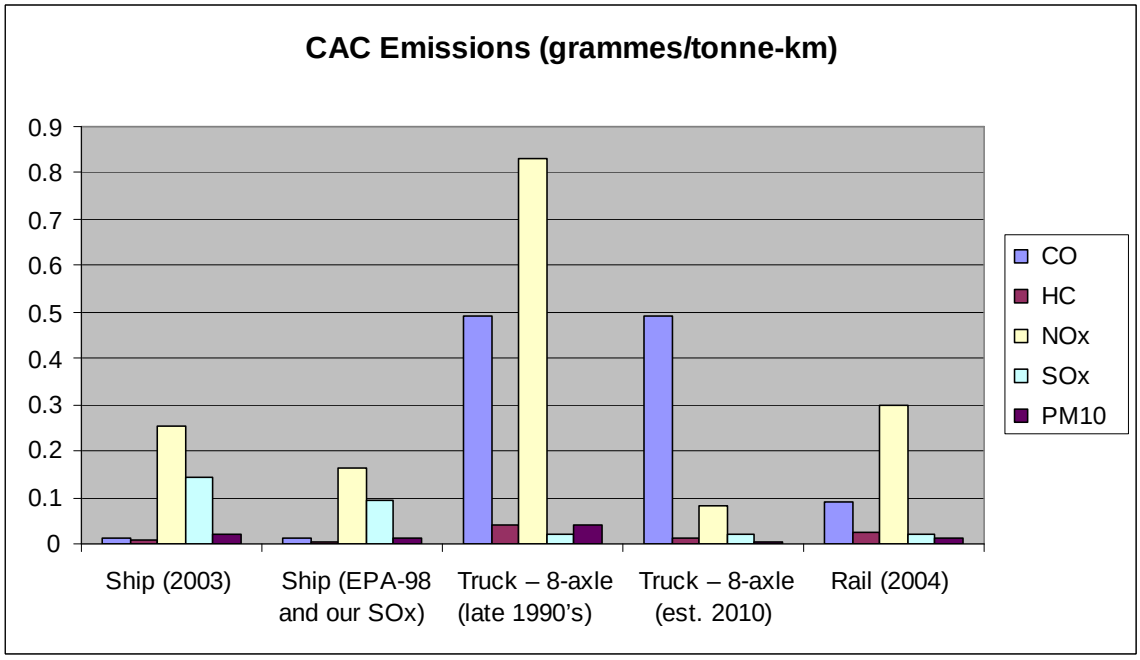
While the marine mode is also evolving, the bigger issue with the marine data is the lack of accurate characterization of the fleet and its performance. The data Lawson used for marine was developed by Levelton Consultants for Transport Canada, specifically for the St. Lawrence River and Great Lakes regions.[87] While it was the most complete and most recent attempt at characterizing emissions, it still had drawbacks. The dominant one is that the fuel and engine characteristics were based on an ocean going fleet, whereas the marine activity in the Great Lakes region is dominated by lakers using a different mix of engines and fuel sources than international ocean vessels, and the fact many of these vessels are very old. Transport Canada is updating its marine emissions estimates for the region. Lawson also noted a 1998 U.S. EPA report of marine emissions in the U.S.[88] While the EPA study was less complete (SOx was not included) and older than the Levelton study, it might be more representative of the fleet and fuel involved in the Great Lakes region. Thus, we include the EPA estimates for marine CAC emissions in the following comparisons; and, as a rough estimate for SOx, we assume that the fleet has SOx emissions at the same proportion of the EPA-to-Levelton NOx emissions.

Figure 29 illustrates Lawson's CAC emissions intensity estimates for ship, rail and truck for the vintages indicated in the chart. Also shown on the chart are our two additions of: 1) the scaled emissions that will be attained by the new EPA engine regulations for trucks in 2010 and 2) the EPA estimates for Great Lakes marine. We also note that the chart corrects a transcription error in Lawson's original chart and his Table 6 that showed truck PM10 emissions values to be 1/10th of the actual values (shown correctly in his Table 4).

[87] Levelton Consultants Ltd. and Maritime Innovation, Marine Emission Inventory Study: Eastern Canada and Great Lakes, March 2006, Transport Canada (Publication TP 14564E).

[88] EPA: "Commercial Marine Emissions Inventory for EPA Category 2 and 3 Compression Ignition Marine Engines in the United States Continental and Inland Waterways", report EPA420-R-98-020, August 1998.

Figure 29. Modal CAC Emissions Performance



Source: Derived in part from John Lawson, "The Environmental Footprint", 2007

4.4.2.3. Monetary value of emissions

Global warming and the accumulation of GHG gases in the atmosphere is derived from all sources at all times of the year. The consequences are also global and will affect future generations. One needs a reference tax or incentive policy to deduce an economic cost of GHG and CAC emissions. While there is general agreement that GHG emissions will have global economic costs, the monetary value to be attached to those future costs and the regional impacts are less evident. Canada's climate change initiative identified a number of measures that could be taken to reduce GHG emissions but selected none that did not pay for themselves. Thus, the value assigned to GHG emissions in Canada is essentially zero. In contrast, European countries have adopted measures with significant front end costs to taxpayers.

The costs of CAC emissions are better understood than are the costs of GHG emissions, but CAC impacts are site specific. Elevated concentrations of SO_2 are associated with human health impacts, including respiratory (breathing) effects, especially asthma. Environmental effects include acid deposition and formation of particulate matter (PM). PM is the collective term used to describe a mixture of airborne solid and liquid particles (excluding pure water) with a wide variety of size ranges. Due to its microscopic size, PM2.5 can be inhaled deep into the lungs and is associated with a range of human health concerns - especially heart and respiratory effects. It is also causes visibility degradation (both local and regional haze) and, along with ozone, is a major component of the photochemical smog.

PM and ground level ozone (smog) are considered to be among the most toxic to human health, via their impact on people with respiratory problems. Smog also has indirect impacts

on health and safety via the reduced visibility and affects the quality of life of those directly subjected to it. Ground level ozone is most influenced by NOx and VOC/HC emissions. NOx represents the sum of the various nitrogen gases found in the air, of which Nitric Oxide (NO) and Nitrogen Dioxide (NO_2) are the dominant forms. NO_2 is felt to be the more significant concern from a human health perspective, being associated with nose, throat and lung effects, and development of air quality standards have focused on this pollutant.

The generation of photochemical smog from emissions requires sunlight and warm temperatures. Thus, it is a seasonal phenomenon. The level of hazard is tied to the number of people exposed to the consequences. Since large urban areas produce the density of emissions (from vehicle and stationary sources) to generate smog in the summer and also have the population density to achieve a high exposure rate, CAC emissions are most acute in urban cities during the summer. In Canada three Tropospheric Ozone Management Areas (TOMAs) have been identified: the Lower Fraser Valley in British Columbia, the Windsor–Quebec City corridor, and the Saint John area in New Brunswick. Environment Canada also identifies the 5 warmer months of the year as most significant for ground level ozone.

Thus, CAC hazards are local and temporal while GHG impacts are global and long term. The relative weighting one applies to the economic impact will vary with local circumstances. As extreme examples, operations in Lake Superior would have a higher GHG and lower CAC impact weightings than would the city of Los Angeles or the state of California, which was the driving force behind the U.S.'s CAC regulations. Lakes Erie and Ontario, and the St. Lawrence region would be somewhere between these two extremes. Rather than exclude emissions costs, we have assessed the societal value of GHG and CAC emissions to Canadians in the Great Lakes region as one half the value developed by European researchers (see Table 19).[89]

Table 19

Bickel's Rate	Our Assumed Canadian Value ($/tonne)
42 €/tonne for CO2	34
14,000 €/tonne for NOx,	11,200
180,000 €/tonne for PM	144,000
31,000 €/tonne for SO2.	24,800

The range of values in Table 19 is quite wide; however, the seemingly low value attached to CO2 (i.e. GHG emissions) is a result of the large amounts of CO2 required in the upper atmosphere to affect climate change relative to the amounts of PM and NOx required to affect a local population in the summer. Another factor that equalizes the cost/tonne impacts is the fact that CO2 emitted in combustion is more than 10 times the NOx emissions and more than 100 times the PM emissions. This is illustrated in Table 20 which summarizes the GHG and CAC emissions rates noted in the prior sections. If one applies the assumed Canadian values to the emissions rates, one gets the modal costs per million tonne-km shown in Table 21. As one can see, the high marine emissions rates for Sulphur and PM10 mitigate its superior performance in CO2 emissions. The EPA estimates have marine at a similar

[89] Peter Bickel, Rainer Friedrich, Environmental External Costs of Transport, Institut für Energiesysteme und Rationelle Energieanwendung, Universität Stuttgart, 2001.

performance to rail. Both rail and marine are superior to the late 1990s truck but future generation trucks will have a CAC advantage over marine and rail, while marine and rail will maintain a GHG advantage over truck. To reiterate, the economic costs and the balance between CAC and GHG costs is very much dependent on the location and public policy. The example numbers applied here may or may not be representative. The actual economic costs and CAC/GHG balance in the Great Lakes region can be refined with more detailed analysis of CAC impacts and with evolution of Canadian public policy regarding the global economic costs of GHG emissions.

Table 20: Summary of Surface Mode Emissions Rates (tonnes/million tonne-km)

Freight mode (year)	CO2	HC	NOx	SOx	PM10
Ship (2003)	10	0.008	0.253	0.144	0.021
Ship (EPA-98 and our SOx/CO2)	10	0.006	0.163	0.093	0.012
Rail (2004)	17	0.024	0.3	0.022	0.011
Truck – 8-axle combination (late 1990s)	33	0.04	0.83	0.02	0.04
Truck – 8 axle (est. 2010)	34	0.012	0.08	0.02	0.004

Source: Partially derived from John Lawson, 2007

Table 21: Derived Canadian Value of Emissions ($/million tonne-km)

Freight mode (year)	CO2	NOx	SOx	PM10	Total
Ship (2003)	$340	$2,834	$3,571	$3,024	$9,769
Ship (EPA-98 and our SOx/CO2)	$340	$1,826	$2,301	$1,728	$6,194
Rail (2004)	$578	$3,360	$546	$1,584	$6,068
Truck – 8-axle combination (late 1990s)	$1,122	$9,296	$496	$5,760	$16,674
Truck – 8 axle (est. 2010)	$1.178	$930	$496	$576	$3,180

4.4.2.4. Low accident rate per tonne-km

Lawson also compared the accident rates of the surface modes in the US (where data were readily available). Table 22 provides the figures for the eight States that border the Great Lakes. Of a total of nearly 25,000 incidents for the three modes over the five years, marine only had 12. Further, while the other modes' incidents led to 18 fatalities and 265 injuries, none were reported in marine transport.

Table 22: Surface Mode Hazardous Materials Incidents in US Great Lakes States (2001–2005)

Mode	Incidents	Major Injuries	Minor Injuries	Fatalities	$ Damages
Water	12	0	0	0	0
Rail	906	2	35	3	12,799,273
Highway	23,795	25	201	15	48,956,026

Source: Lawson, 2007

Table 23 compares the fatality, injury and accident rates per tonne-km of freight for the surface modes in the US in 2003. It can be seen from the table that ship transport has the lowest (reported) rates of casualties per tonne-km, and truck the highest.

Table 23: US Surface Mode Casualty and Accident Rates (2003)

Freight mode	Fatalities per billion tonne-km	Injuries per billion tonne-km	Accidents per billion tonne-km
Ship	0.05	0.23	5
Rail (excl. crossings)	0.21	3.12	1
Rail (incl. crossings)	0.34	3.52	2
Truck	0.36	13.22	214

Source: Lawson, 2007

The US Federal Railway Administration applies the following monetary values in evaluating grade crossing improvements:

- loss of life $2,710,000
- injury $65,950
- property damage $61,950

If one applies these values to the occurrence rates shown in Table 23, the economic costs of accidents shown on Table 24 result.

Table 24: Surface Modes Cost of Accidents

Mode	Cost ($/million tonne-km)
Marine	$460
Rail (excl. crossings)	$837
Rail (incl. crossings)	$1,277
Truck	$15,105

4.4.2.5. Congestion externalities

There is severe congestion during rush hours in all the major cities in the Great Lakes area, and some, such as Toronto and Montreal are experiencing increasing congestion in the daytime off-peak periods.

While trucks benefit from access to infrastructure that has been politically attractive to provide to both passenger and freight users, it consumes a disproportionate share of the available capacity. Trucks represent the equivalent of about two automobiles in normal traffic situations and close to four automobiles in queuing situations such as arise on bridges at border crossings. While trucks are much more likely to use off-peak hours than are automobiles, there is little incentive for companies that pay drivers on a per-mile basis to avoid congestion.

Research and Traffic Group (RTG) recently assessed the costs of congestion to trucks on the 100 km segment of the 401 across the GTAH. Aggregate costs of delay to trucks on the 401 during the day were estimated on the basis of an hourly value of time of $47. The aggregate annual cost of week-day/daytime delays to trucks was $255 million. The net present value of truck delay costs over the next 30 years, assuming the congestion grows at 2 percent per year and applying a discount rate of 10 percent is $2.9 billion.

There is a second aspect to congestion costs. While the direct costs of congestion delay have some influence on individual driver decisions, the costs do not fully reflect the total costs incurred. The other aspect of congestion costs is the indirect costs of delay that the presence of an additional vehicle in the flow of traffic imposes on every other vehicle in that flow. Economists use the term externalities to refer to direct effects of an activity on persons not directly involved in the activity. One of the more succinct definitions attributed to DeSerpa is:

> "an externality is a relevant cost or benefit that individuals fail to consider when making rational decisions".

Congestion is a classic example of an externality. While drivers experience congestion delays, their own rational choice of time and route does not consider the impact that the decision has on incremental delay to every other traveller sharing that route at that time of day. These external costs are relevant to congestion pricing mechanisms.

Since individual decisions do not lead to economic efficient allocation of resources in the presence of externalities, other measures are required to reflect the true costs of these externalities. One way to recognize the external impacts of that choice is to introduce pricing measures that apply those costs.

If congestion influences are being assessed in a mode-shift evaluation, it is important to recognize that the costs are only incurred in passing through urban areas, and at certain times of day. The truck routing and travel times through relevant urban areas needs to be known to assess the magnitude of costs avoided. Also, as was the case with emissions discussed earlier, local pick-up and delivery is still required to be made by truck and the associated congestion impacts would not be mitigated (and could be exacerbated) in a mode shift.

RTG assessed congestion impacts by looking at the incremental delay to other vehicles if extra vehicles travel across the GTAH on the 401 (Milton to Oshawa) during the daytime. Daytime was the 13 hr. interval 5:00 to 19:00 hrs for which data were available.

From a congestion pricing perspective, the cost per incremental truck round trip made during the daytime was estimated to be $27.5 to $33.4 (15 to 19 cents/km) depending on whether a 1.25 or a 1.5 PCE is allocated to through-trucks. Compared to this daytime average cost impact, the cost impact would be higher during the a.m. and p.m. peak periods and lower in the mid-day period.

It should be noted that if congestion pricing were imposed, it does not mean that the cost of truck shipments would increase by that amount, many truckers would make a time shift to avoid the congested time periods (and thereby the congestion tolls). Nonetheless, in the absence of congestion pricing, trucks were estimated to presently impose a social cost in the

amount of $30/round trip on the severely congested highway segments such as the cross-GTA 401. We would consider Highway 40 across Montreal to have similar congestion characteristics and similar social costs.

As discussed above, there is a viewpoint that marine transportation can help alleviate highway congestion, as it does in Europe, and as is hoped for in the US. As the Phase I report demonstrates, the role of marine transportation is well defined and very significant for the transportation of bulk commodities essential to the Ontario economy.

Where the role of marine transportation is less well defined or understood, is whether it can, indeed, relieve highway congestion. The biggest potential is intercity, whereas the biggest congestion is intra city. In other words, most such congestion occurs around major urban centres, and much less outside of them. As our case studies have demonstrated, cross lakes services have the potential to be competitive with trucking (we have not considered rail in our comparisons). Marine transportation is not likely to alleviate urban congestion caused by trucking activity, and should not be viewed as a panacea because the interurban distances are too short, and handling costs too high, for marine transportation to be viable.

There may also be another opportunity to use the marine mode in a way used elsewhere around the globe, for passenger transportation. The TTC has examined the use of passenger-only fast ferries from Scarborough and Mississauga/Oakville to downtown. The city of Halifax is also examining the use of similar ferries for the same purpose. This technology is in use in hundreds of locations globally, and has proven to be a cost effective way to move lots of commuters very quickly on underutilized corridors and waterways.

4.5 Promotion of the Marine Industry in Ontario

Both Canada and the US have taken inspiration from the European experience with short sea shipping.

4.5.1 EU Marco Polo and Motorways of the Sea programs

The EU Marco Polo programs are one way to promote the concept, as perhaps are the 19 short sea promotion centres scattered throughout the EU.

In September 2008, there were 22 new projects announced that will be funded by Marco Polo II. Amongst them include a new scheduled container service between Rotterdam, Gdansk and Bremerhaven, a new ro-ro service between Santander, Spain and Poole, UK., an upgrade of service between Rome and Barcelona, a new feeder between Antwerp, Rotterdam, Bremerhaven and Riga, Latvia, and a new ro-ro service from Zeebrugge, Belgium and Bilbao, Spain. Whether these investments would have been made by the private sector without government support has long been debated in Europe. However, this program is an example of the type of program that might be considered in the Canadian context. Indeed, Transport Canada has recently provided funding for several projects on the west coast.

There are a variety of new services to be funded under the current (2008-09) Marco Polo program, which are summarized in the tables below:

Table 25: Feeders

Company	Route	Funding
MCL	Antwerp/Rotterdam/Bremerhaven-Riga	€1,241,961

Table 26: Short Sea Container

Company	Route	Funding
IMCL	Rotterdam-Gydnia/Gdansk, Bremerhaven	€1,037,357
Logitec	Sassuolo (Italy)-Castellon de la Plana (Spain)	€4,000,000
Mac Andrews	Bilboa-Sheerness-Rotterdam	€1,714,711

Table 27: Short Sea Ro-Ro

Company	Route	Funding
Brittany Ferries	Santander-Poole	€870,877
Grimaldi Logistics	Civitavecchia-Barcelona (upgrade)	€4,500,000
Transmediterranea	Livorno (Italy)-Barcelona (Spain	€4,847,392
DFDS	Lubeck (Germany)-Riga (Latvia) (upgrade)	€1,555,475

Table 28: Sea & Rail

Company	Route	Funding
NIKO Transport	Slovenia-Zeebrugge-Killingholme	€1,062,790

There are five types of programs in the Marco Polo Program:[90]

- modal shift actions;
- catalyst actions;
- common learning actions;
- motorways of the sea actions; and
- traffic avoidance actions.

The modal shift actions are the most popular, and cover almost 80 percent of the program's expenditures. It is aimed to shift freight from the road to other modes, i.e. short sea shipping, inland waterways (canals) and rail. It is measured in tone-kilometres or volume kilometres shifted, and applicants are required to estimate how much tkm/vkm their projects will be able to take off the road. It is aimed at new services or existing ones that can be significantly upgraded, i.e. larger vessels or more frequency of sailings.[91]

[90] http://ec.europa.eu/transport/marcopolo/calls/docs/2008/call08_summary.pdf, last accessed 31 October 2008. CPCS has also provided extensive analysis of the Marco Polo program in the "Eastern Canada Hub-and-Spoke Study", Transport Canada, 2008.

[91] Phillipe Holthof, "Marco Polo was Italian", *Shippax Guide 09*, pp. 85-89.

4.5.2 Assistance program for modal integration (Quebec)

Since 2006, Quebec has had a program in place to encourage modal integration. This program currently incents modal shift based on demonstrable GHG savings.

The province has also established a Shortsea Shipping Roundtable to discuss maritime matters and to promote the use of the St Lawrence system. This follows the release of the *Quebec Marine Transportation Policy: Quebec at the Helm* in 2001.

Similar to the EU program, there are five components to the Assistance Program for Modal Integration:

- intermodal, rail and maritime infrastructure;
- pilot projects;
- studies;
- promotion of the maritime and rail modes; and
- promotion of maritime transport and the St Lawrence River.

Some $21M has been allocated to the program. Applicants must provide a detailed description of the project, including a business plan. They must also describe the project's impact in terms of:

- new transportation of handling activity;
- modal transfer (total tonnage or truck trips transferred);
- reduction of social costs;
- competitiveness of shippers, users, carriers, and other enterprises affected by the project; and
- assessment of the impact on the Quebec transportation network.[92]

4.5.3 Highway H20

In 2003, the St Lawrence Seaway Development Corporation along with several ports and shipping lines, established the Highway H2O "brand", to promote the use of the Seaway and marine transportation in the Great Lakes/St Lawrence region.

According to its web site, Hwy H2O "works to identify and promote key opportunities for the marine mode to alleviate mounting pressures on our transportation system characterized by overloaded coastal ports and increasingly congested road and rail arteries. It is also "committed to raising awareness of the Seaway's untapped potential for meeting current and future transportation challenges in an economically sound and environmentally responsible manner".

Along with Transport Canada's initiative to promote the concept of short sea shipping in Canada (as well as NAFTA), Highway H2O has raised the profile of the marine industry in central Canada and piqued the interest of many would-be investors. Besides the infrastructure programs funded on the west coast, and two Quebec pilot projects (Aloutette Alumniere and

[92] "Modal Integration Assistance Program: Funding Application Form", Direction du transport maritime, Province du Quebec, November 30, 2006

Kruger Paper), and a trial container shipment of containers from Hamilton to Montreal in November 2008, thus far more obstacles that stand in the way than opportunities worth investing in, have been identified.

5.0 Conclusions and Recommendations

As was pointed out in the Conclusions for the Phase I report, the ability of major Ontario industries such as steel, construction and power generation to compete in an increasingly integrated global economy depends on their access to efficient modes of transportation. In this respect, water transportation plays a key role, with the Great Lakes-St Lawrence Seaway system handling a significant amount of cargo annually. The *Great Lakes St. Lawrence Seaway Study* notes that this volume simply could not be handled by an already overburdened land-based transportation system without compromising the competitiveness of these industries. This is most obviously the case for steel, where there is currently no practical alternative for transporting the substantial volumes of iron ore and coal essential to this industry.

Key findings of the report include the importance of the marine mode for the movement of bulk commodities to base industries. The steel industry, in particular, is of strategic importance to Ontario as well as to the broader Canadian economy. The province's 60 or so steel manufacturers create direct employment for over 15,000 in Ontario, paying wages in excess of $1.1 billion annually. The industry generates over $3.0 billion in direct GDP, on revenues in the $9.4 billion range.[93] It spends over $5 billion annually on various materials and supplies, which it buys from thousands of suppliers in the province. In addition to these strong backward linkages, the steel industry is integral to the success of Canada's automobile industry.

The two most important issues affecting the Ontario marine transportation industry are interrelated. One is the need for fleet renewal, in order to address impending environmental regulations regarding ballast water and emissions. Fleet renewal will address these concerns and make the industry competitive with other modes in this respect. In order for fleet renewal to take place, as well as new investment in short sea shipping and other marine transportation opportunities, the issue of the 25 per cent duty needs to be tackled head on. The status quo penalizes shipowners and equally important, the end users, industry and consumers, and derives no benefit to the shipbuilding industry, which, in any event, does not have the capacity to build a new laker in Canada. New investment in short sea shipping will require access to second-hand tonnage initially, and payment of duty adds another layer of cost on a sector where there is widespread interest, but so far very few investors or users in North America.

While there is widespread interest in short sea shipping amongst port authorities and the shipping sector, many obstacles stand in the way. These include the aforementioned duty, the US Harbor Maintenance Fee, 24 hour notice for marine movements to the US, pilotage costs, customs charges, stevedoring costs, seasonality of Seaway operations and logistical challenges relating to pure ro-ro drop trailer operations. It is also unlikely that short sea shipping will have any impact on urban congestion issues in Ontario (except perhaps high speed passenger-only vessels). The most potential seems to lie in cross-lakes operations, and perhaps the seasonal movement of heavy containers through the Seaway.

[93] Statistics Canada, Cat. No. 301-0006, Principal statistics for manufacturing industries.

There are obviously many issues impacting the marine industry in Ontario, as well as many different priorities that need to be addressed if it is to grow and prosper, and serve the needs of industry and communities in the Province. Below, are some key initiatives we believe should be undertaken.

5.1 Infrastructure

Government should consider setting up and making available to the private sector a fund for marine infrastructure development. This could potentially tie into the federal Public Private Partnership Fund of the Build Canada Plan. Funds should be allocated on a call for proposal basis. The private sector should fund at least half of the cost themselves and provide a commitment to operating the facility for a fixed period (this is not intended to be a handout program). Funds should be awarded on the basis of demonstrated business case, and economic benefits resulting from project (metrics to be defined by the program ahead of time).

5.2 Seaway

The future of the Seaway is a key issue for Ontario's marine industry and all stakeholders, including governments, need to be vigilant concerning its future. The Seaway's Board of Directors should begin negotiations now, for an agreement beyond 2018, so that investment decisions in both vessels and ports can begin to be made. To a great extent, the so-called Seaway study maps out a future view of the Seaway, but this needs to be implemented.

For any stakeholder contemplating investment in any assets with a life beyond 2018, particularly for new lakers, it is necessary to know what the rules of the game will be beyond 2018, whether government will continue to be committed to maintaining Seaway infrastructure in its current state of reliability, whether it will continue to cover any deficits and whether toll increases will be tied to the cost of living or less.

5.3 Duty Issue

The most important policy issue is the imposition by Industry Canada of a 25 percent duty on foreign built vessels. This policy may support the shipbuilding industry, a dubious assertion, but it is an impediment to fleet renewal and impacts on the end users such as critical manufacturing capacity in the Province. MTO and other stakeholders should join the CSA and lobby various government departments at the federal level for removal of the duty. Perhaps a comprehensive multi-departmental study of this issue could be undertaken to bolster the industry's arguments.

The issue goes beyond "new lakers", however, and if there is any realistic expectation that investment in short sea shipping is going to take place either cross-lakes or through the Seaway, this impediment needs to be removed on second-hand tonnage as well.

The duty is also a major obstacle to the adoption of new technology necessary for domestic shipowners to comply with impending ballast water and air emissions legislation.

5.4 NAFTA Cabotage

Longer term, Canadian authorities should work with US Counterparts to create a North America Cabotage regime. Many prospective Great Lakes trades may be more viable if additional flexibility to combine domestic and transborder trades is available.

5.5 Regulatory Reform

There is little the Province of Ontario can do about some of the issues above, but they should actively lobby federal government to address duty and related cabotage issues. This is the "elephant in the room", and until addressed, unlikely that other initiatives will get much traction.

5.6 Pilotage

Consider creating Marine NavCanada, a not-for-profit corporation, to take over the functions of Pilotage and Marine Navigational Services. This would operate in a similar way as NavCanada, a private sector, non-share capital corporation financed through publicly-traded debt, which provides air traffic control, flight information, weather briefings, aeronautical information services, airport advisory services and electronic aids to navigation throughout Canada.

Rationalization and modernization of services related to ship navigation, currently provided by government, needs to take place in order to create a lower-cost, more efficient regime. Such an initiative could include the federal government on the ground floor or at a later stage.

5.7 Human Resources/Training

Georgian College has a program to train marine personnel at its Owen Sound campus. If no local qualified labour available, these training programs/scholarships and certificate upgrades should be marketed to attract international marine HR, in collaboration with private marine groups that would commit to then hiring.

5.8 Opportunities

There have been many opportunities identified in previous studies and workshops, particularly for short sea shipping either cross-lakes or via the Seaway. These could involve bulk commodities, containers and ro-ro cargo.

At the present time, there are too many barriers in the way of allowing cross-lakes or via Seaway short sea shipping to take place. These include:

- 25 percent duty;
- Coast Guard Hull Construction regulations should move to a high international standard;
- US HMF needs to be removed;
- inability to obtain pilotage exemption for a "ferry";

- the requirement to pay all customs infrastructure and personnel costs;
- for Seaway-based short sea shipping, a viable and cost effective winter alternative is required; and
- proponents of short sea shipping should work with large industrial shippers or trucking firms to develop supply chain solutions.

5.9 Promotion of Marine Transportation

An increase in the amount of cargo moved by water, whether in bulk, by container or by multimodal truck transport may have some potential to reduce traffic congestion, reduce road maintenance costs and may have some potential to reduce pollution and GHG production. In this very capital intensive industry, there exist significant barriers both to entry and to continued operation posed by Canadian Government policy.

Governments should consider making funds available to the private sector to share the cost of feasibility and market studies, and work with the federal government, the Seaway and other stakeholders to identify sustainable opportunities for the marine sector.

5.10 Maintain Cost Competitive Marine Bulk Transportation System

Because of its importance to Ontario's industrial fabric and the competitiveness of its industrial base and other sectors of the economy, the government of Ontario should continue to advocate on behalf of its marine industry and their customers for continued access to marine transportation of bulk materials to base industries (steel, construction, agri-products, chemicals, energy), versus the alternative of a modal shift from marine to already overburdened road infrastructure.