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CENTRE FOR
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POLICY

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A SMOOTHER TRACK FOR EXPORTS

A framework for
ALBERTA RAIL POLICY



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The Canada West Foundation focuses on the policies that shape the West's quality of life. Through our evidence-based research and commentary, we provide practical solutions to vexing public policy challenges. For more than 40 years, we have been a passionate advocate for western Canada.

The Government of Alberta commissioned the Canada West Foundation to undertake this important review of transportation policy. The Canada West Foundation thanks the Government of Alberta for its support in the preparation of this report. The authors would like to thank the reviewers of this paper and the many information providers who agreed to interviews.

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EXECUTIVE SUMMARY

Railways Matter to Alberta

The grain surge of 2013-14 put Canada's railway system into focus. A combination of factors that included unexpectedly large volumes of grain, demands from other shippers and severe winter weather led to a failure of the railways to deliver grain to ports in a timely fashion. It also raised questions about whether Canada's rail system is broken.

Railways are vital to Alberta's export competitiveness. Almost all bulk commodities not shipped by pipeline are shipped by rail. Efficient operation is so important because the province is land-locked and the distance to tidewater is much greater than it is for our competitors. As Alberta seeks to develop new markets around the world, maintenance and development of trade infrastructure plays a crucial role.

The System is Working

An examination of the rail system in Alberta finds that, while there is opportunity for improvement, in general the logistics system works well. We found:

- The system is affordable. It has some of the lowest rates per kilometre compared to other jurisdictions in the Organization for Economic Cooperation and Development (OECD).
- Rates have been increasing, but at about the level of the consumer price index.
- Canada's two large rail companies, Canadian Pacific and Canadian National, have made large capital investments that have improved their operating efficiency – actions that are necessary to keep rates low.
- The other supply chain partners – including ports, shippers and producers – have also been investing to improve capacity, efficiency and reliability.

Opportunity for Improvement

There is still room for system improvement, which we address in 25 recommendations. Alberta's primary interest is a safe, low-cost freight transportation system that supports export competitiveness. Any effort to improve service must be assessed carefully through the lens of its impact on affordability. Tilting the scale heavily toward service could lead to unsustainable increases in freight rates. At the same time, the system needs to better accommodate shippers' needs for flexibility as they try to time their sales with market demand. Contractual arrangements provide a means of balancing these needs.

Safety, responsiveness and capacity can all be improved by implementing a series of improvements to the logistics system. Recommended changes include:

- replacing level crossings to reduce fatalities and remove speed reductions;
- investing in track capacity to remove choke points through the Rocky Mountains;
- integrating information systems to enable better real-time logistics co-ordination;
- improving commodity forecasting so all supply chain partners are starting from the same place; and,

→ encouraging shippers and railways to move towards greater use of commercial arrangements as recommended by the (Jim) Dinning facilitation exercise, which has already opened the way to more innovation and less ongoing uncertainty in the system.

The (David) Emerson Review's recommendations to improve the arbitration and dispute mechanism involved in commercial arrangements provides a path forward to negotiated agreements.

Fairness

Shippers, particularly smaller ones, face an imbalance of power when negotiating with the railways. Some shippers have only one real alternative for shipping bulk goods, which creates legitimate concerns about their ability to negotiate fair arrangements. Shippers, particularly grain shippers, have quite understandably relied upon a highly politicized process to provide a counterbalance to the railways' perceived power. The problem is that creating additional process in every shipper-railway relationship could drive up costs for everyone. While fairness matters, it is not the only value that matters. The Dinning model provided a reasonable, if imperfect response to the power imbalance that deserves to be revisited. Emerson's report has recommended additional improvements which may help it along.

We recommend moving the focus to improving overall operations, information and efficiency as a way to build trust, keeping in mind that the ultimate goal is a system that supports Alberta's export competitiveness, not necessarily one that makes everyone happy all the time.

NOTE *to* READERS

In the economics field, railways are an example of a “natural monopoly.” Primarily, this is because railway track is intrusive and expensive so it is not practical to have many competing railways. Do you really want more than one track running through your town? Having several companies operate on one track is an option, but it is logistically complex and tends to drive up costs.

In natural monopolies, there is a healthy tension between letting market forces drive efficiency and lower costs versus imposing regulation to ensure that benefits are shared between system users and rail company shareholders. Getting the balance right is difficult and seldom is everyone happy. In Canada, the two Class 1 railways, Canadian Pacific Railway (CP) and Canadian National Railway (CN), operate as a duopoly, having dominant control over the rail freight market.

This paper is not about railway market power in Canada and how to deal with it. In fact, we see the ongoing battle about that issue since the late 1800s as mostly ending in failure and increased acrimony. The governance debate has tended to overshadow other interests.

We are taking a different approach. This paper analyzes what Alberta’s interests are and how best to achieve them in practical, real world ways. For this exercise, we have focused largely on interests other than fairness (although the matter is addressed in the Fairness Analysis section). The scope of this paper considers Alberta’s rail interests, looking at issues affecting the shipment of large volumes of resource-based bulk commodities using the rail supply chain. Options for shipping these goods by transportation modes other than rail are limited because of their geographic location, sensitivity to transportation costs as a percentage of overall costs and physical characteristics. Intermodal shipment by container has not been addressed directly in this paper although many of the supply chain issues discussed are shared by both bulk freight and intermodal shippers.¹ This paper does not address passenger rail issues.

Economic forecasts used throughout this report pre-date commodity price declines in 2015 and should be viewed as optimistic assessments of future demand.

This report was produced before the public release of the *Canada Transportation Act* review by the Honourable David Emerson. Both reports start in the same place – the vital importance of Canada’s transportation infrastructure to Canada’s competitiveness in global markets and ultimately our long-term prosperity. The recommendations of this report are generally consistent with those of the Emerson review.

Framework of this Report

This report is in two parts. The first outlines Alberta’s interests in Canada’s national rail policy. Alberta’s interests are discussed using a six-pillar framework:

AFFORDABILITY

Moves bulk goods cheaply

RESPONSIVENESS

Responds to demand for capacity

RELIABILITY

Avoids disruptions and responds to disruptions in a timely way

CAPACITY

Carries more volume as exports grow

FAIRNESS

Shares the rewards of investment and the benefits of efficiency

SAFETY & ENVIRONMENT

Protects the health of Albertans and the environment

The second part provides an analysis of the state of the industry, assessed by the six pillars, followed by recommendations to improve the supply chain. Recommendations from each of the six pillars are summarized in the next section.

SUMMARY *of* RECOMMENDATIONS

AFFORDABILITY

01 CONTINUE WITH LOW-COST BULK TRANSPORTATION AS THE CORE FOCUS OF FREIGHT RAIL POLICY.

This approach seems to be working well relative to competitors. Care should be taken not to imperil affordability in pursuit of other interests.

02 ELIMINATE LEVEL CROSSINGS WHERE POSSIBLE THROUGH GRADE SEPARATION PROJECTS OR SYSTEM REDESIGN. There is a strong case for both provincial and federal investment here, given the role of rail in Canada's export success. Investment would enhance safety and efficiency.

03 EXAMINE HOW BEST TO REPLACE THE AGING GOVERNMENT HOPPER CAR FLEET OWNED BY ALBERTA, SASKATCHEWAN AND CANADA. The cost to replace the Alberta portion of hopper cars is estimated at \$68 million to \$86 million, and it takes about three years to take delivery once an order is placed. The governments of Canada, Alberta and Saskatchewan should discuss action on government-owned grain cars under the new mandate of the federal ministers of Agriculture and Transportation. Industry is reluctant to act until the government position on hopper car replacement is decided.

04 SUPPORT MUNICIPALITIES FINANCIALLY AND POLITICALLY TO ADDRESS CONCERNS ABOUT TRADE INFRASTRUCTURE. While the private sector can and does invest directly in trade infrastructure, there are municipal safety and efficiency needs, as well. Municipalities need resources to make such investments, which can yield benefits that extend well beyond their boundaries.

RESPONSIVENESS

05 ELIMINATE THE MAXIMUM REVENUE ENTITLEMENT (MRE) FOR GRAIN SHIPPED BY CONTAINER. Removing containerized grain from the MRE would provide an incentive for railways to promote the use of containers for specialty grains, increase shipping options for farmers and add efficiency to the supply chain. It also creates the potential for revenue from containers that might otherwise return to the port empty. Grain is heavy, however, and cannot be moved cost-effectively in the common containers used for moving consumer goods. Grain is usually moved in 20-foot equivalent (20 TEU) containers.

06 EXPLORE THE OPPORTUNITIES FOR INNOVATION AND THE CONSEQUENCES OF ALLOWING PRODUCERS AND GRAIN COMPANIES TO OPT OUT OF THE MRE. In the same way that changes in the Crow Rate and allowing farmers to opt out of the wheat board led to innovations by farmers and investment by grain companies, the use of commercial arrangements to co-ordinate volumes and provide incentives and penalties may help spur innovation in the grain handling and transportation systems.

07 ACCELERATE INTEGRATION AND AVAILABILITY OF INFORMATION IN THE LOGISTICS SYSTEM TO IMPROVE FORECASTING AND SYSTEM-WIDE LOGISTICS CO-ORDINATION. Data collection and sharing depends upon its purpose, whether it is day-to-day decision-making, system monitoring or long-term planning. Consider, for example, the requirement for grain sellers to report weekly export sales as inputs to a logistics demand forecast. This can also act as a warning system of potential holdups for the entire grain handling transportation system.

08 IMPROVE AWARENESS OF GRAIN MERCHANDISING TOOLS FOR PRODUCERS AND GOVERNMENT AGRICULTURE AGENTS. This will help them balance the implications of futures pricing, storage costs and cash flow. Making contracts to deliver product later in the production cycle may reduce pressure on the logistics system at peak harvest time. Delivery later in the season, however, may aggravate cash flow challenges for farmers.

09 ENSURE PROTOCOLS FOR INCREASING OPERATING HOURS AT GRAIN ELEVATORS AND PORT TERMINALS ARE IN PLACE BEFORE PEAK OR CRISIS PERIODS OCCUR. Setting up protocols requires negotiation over triggers, union issues, 24/7 operating schedules, allocation of costs and benefits. These protocols should be established well in advance of critical moments and should be agreed to by all supply chain partners.

RELIABILITY

10 MAINTAIN FOCUS ON WINTER PREPAREDNESS. Through ongoing public and private investments, railways are making incremental gains to improve performance during extreme winter weather periods.

11 IMPLEMENT MORE OPEN AND INTEGRATED INFORMATION-SHARING. As recommended under responsiveness, this will also reduce delays and their impact on the system.

12 INVESTIGATE BARRIERS TO MORE FLEXIBLE LABOUR ARRANGEMENTS THROUGHOUT THE SYSTEM, ESPECIALLY DURING PEAK AND SURGE PERIODS. Improved labour relations at both the railways and terminals is fundamental to achieving greater flexibility and avoiding potential strikes that disrupt supply chain operations.

CAPACITY

13 PROVIDE SUPPLY CHAIN FORECASTING. Planning exercises like those run by Port of Vancouver and the provinces of B.C., Alberta and Saskatchewan for the New West Partnership Transportation Summit provide long-term supply chain forecasts indicating industry growth and future demand on supply chain capacity. To be accepted and used by all supply chain partners, forecast providers need to be independent, third-party actors, who can provide forecasts without direct financial interest. The Pacific Gateway Alliance has taken on some of this task and increasingly reflects a pan-western perspective.

14 PRIORITIZE STRATEGIC INFRASTRUCTURE REQUIREMENTS. Supply chain, stakeholder and community alignment are required to set the priorities for infrastructure investments. Leadership from the western provinces needs to step up the pace. Prioritizing strategic infrastructure projects that support export competitiveness for federal/provincial funding is critical. The western premiers should provide these priorities quickly as the federal government makes infrastructure funding decisions.

15 PROVIDE POLITICAL LEADERSHIP TO ADDRESS COMMUNITY SUPPORT FOR TRADE INFRASTRUCTURE. Lack of support at a critical chokepoint (e.g. Port of Vancouver) can restrict total system capacity.

16 RECOGNIZE THE IMPACT OF GOVERNMENT ACTION ON INCENTIVES FOR PRIVATE INVESTMENT. Political actors should avoid hiding behind regulators. Risk-adjusted rates of return need to consider not just direct system risks (e.g., future volumes) but also political risks associated with changes to the regulation, especially in the grain transportation system and infrastructure project approvals. Actions that reduce political risk will reduce the total cost of capacity improvements. Significant investments will be needed to meet the growth in exports that are anticipated by the Saskatchewan Plan for Growth, the Port of Vancouver Port 2050 scenarios and the Pacific Gateway Alliance, among others. Investors at every point in the supply chain need assurances that the dollars they put at risk will be rewarded.

FAIRNESS

17 RECOGNIZE THE INHERENT DIFFERENCES AMONG SHIPPERS. Reasonable service levels can be negotiated under commercial arrangements. Where parties cannot agree, third-party intervention (mediation or arbitration) that recognizes the inherent differences among shippers and their products may be required. This leaves the problem of the definition of reasonableness under the common carrier obligations of railways. Common carrier obligations should represent the minimum obligations required, not aspirational levels of service.

18 REDUCE UNCERTAINTY IN HOW THE GRAIN HANDLING SYSTEM IS REGULATED. Ongoing reviews and a history of successful lobbying creates uncertainty for all parties by raising the spectre of regulatory change. Higher uncertainty leads to higher risk adjustments and higher costs. Shifting the focus to improving supply chain operations could improve results and build trust among the partners.

19 SUPPORT COMMERCIAL ARRANGEMENTS, WHENEVER POSSIBLE. In non-regulated sectors challenged by low commodity prices, the railways have responded by negotiating lower rates to maintain volumes that enable the system to operate efficiently overall. Shippers have also responded by investing in cars and storage to reduce their reliance on the railways' capacity and mitigate service deficiencies.

20 GIVE THE SERVICE AGREEMENT AND COMMERCIAL DISPUTE RESOLUTION PROCESS THAT CAME OUT OF THE DINNING FACILITATION A CHANCE TO OPERATE. The system of incentives and penalties generally works for most shippers. Although there was disagreement on how reciprocal financial penalties in the service level agreements (SLA) should work, the results of the facilitation provided a starting point for further discussion. Effort should be made to improve the dispute resolution and arbitration process so that it serves all shippers and is easy to use, timely and cheap.

21 SUPPORT INFORMATION SHARING EFFORTS AMONG ALL SYSTEM PARTICIPANTS TO PROVIDE INFORMATION THAT WILL INCREASE TRANSPARENCY AND SUPPORT BETTER SERVICE. All players would benefit from better information integration and transparency, including those with commercial arrangements. Trust would increase if railways would open and integrate their information systems with the rest of the supply chain. The railways, on the other hand, would be more inclined to trust other stakeholders with information if they could see value in it beyond its use in ongoing disputes heard at the Canadian Transportation Agency (CTA).

Data collection from supply partners involves three levels of useful information:

- a) **Day-to-day** – Micro-data collected from all supply chain partners can be used to adjust operations in real time to improve service by all partners.
- b) **Monitoring** – Data is used to identify problems and work with partners to achieve solutions. The data collected to monitor the Grain Handling and Transportation System

(GHTS) does not provide a complete view of the supply chain and some supply chain partners do not agree on the methodology of some of the measures. Data from other sectors is limited and does not drive solutions to supply chain issues.

- c) **Long-term capacity** – This is data that drives decisions about long-term capacity planning and investment.

SAFETY & ENVIRONMENT

22 INVEST IN SAFETY AND EFFICIENCY IMPROVEMENTS.

The province should identify high-risk/high-traffic grade separation projects and develop a long-term infrastructure investment plan to improve the safety at rail crossings. The province could also look at cost-sharing mechanisms to assist municipalities in undertaking these infrastructure investments.

-
- ### 23 SUPPORT INNOVATION.
- The province could support technology innovation to improve rail safety by allowing pilot projects to be tested in the province.

-
- ### 24 RAISE PUBLIC AWARENESS.
- Alberta might consider launching its own rail safety campaign, with online ads and infographics shared on social media. Alberta Education could ensure teachers are aware of resources for students available through Operation Lifesaver, especially in districts with higher incidents of crossing accidents.

-
- ### 25 VEHICLE STORAGE DISTANCE AT GRADE CROSSINGS.
- Some rail crossings in Alberta have insufficient vehicle storage to meet the new federal Grade Crossings Regulations minimum standards. (The minimum storage distance is the amount of space required between a provincial highway/road and the nearest rail track to adequately store queued vehicles safely.) Although some crossings can be grandfathered, adjustments will be needed once there is a change in road traffic, rail operation at the crossing or developments in the area. Modifying the storage distance to meet minimum standards will improve safety.



PART ONE

Framework for Alberta

Introduction

In the late 19th and early 20th centuries, the construction of railways was a condition of Alberta's and indeed Canada's development. Railways opened the land to agricultural production by providing access for people, supplies and export opportunities.

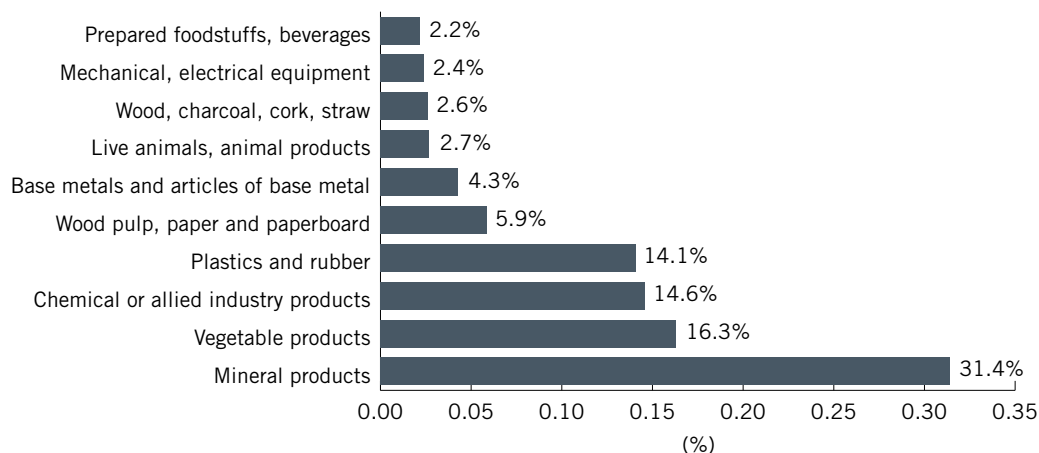
Railways are still essential to Alberta's future. Almost all commodities that do not move through a pipeline (and some that could) are shipped by rail. The majority are bulk commodities, including mineral fuels, cereals, mineral compounds, wood, pulp, chemicals and other food products. The top 10 commodities shipped by rail are shown in Figure 1.

Rail transport is crucial to Alberta. While the province is not alone in being a land-locked producer of bulk commodities, it differs from most of its competitors that have four options

to move commodities – rail, road, pipeline and water – via seaports or inland waterways. Alberta has a relative shortage of both water and pipeline options and its commodities typically have much further to go. For example, rail transport of grain in Canada ranges from 1,300–1,800 kilometres from elevator to port terminal, whereas Australia's road and rail transport of grain ranges from 100–400 kilometres.²

Alberta is served by two Class 1 railways, Canadian Pacific Railway (CP) and Canadian National Railway (CN). Only one short-line railway, Battle Creek Railway, operates in the province under provincial responsibility. While rail regulation for Class 1 railways is a federal responsibility, it would be reckless for Alberta not to consider national rail policy a primary concern.³

FIGURE 1: ALBERTA EXPORTS BY INTERMODAL (RAIL & MARINE) – TOP 10 COMMODITIES (RANKED BY VALUE) 2014*



*Other exports contribute 3.5% to total exports

Source: Nominal 2014 Alberta exports, International Trade and Merchandise Database

This paper provides a framework for understanding Alberta's interests under the pillars in Figure 2:

AFFORDABILITY

Moves bulk goods cheaply

RESPONSIVENESS

Responds to demands for capacity

RELIABILITY

Avoids disruptions and responds to disruptions in a timely way

CAPACITY

Carries more volume as exports grow

FAIRNESS

Shares the rewards of investment and the benefits of efficiency

SAFETY & ENVIRONMENT

Protects the health of Albertans and the environment

The first section of this paper explains why these six pillars matter. The second section analyzes the current state of each pillar and suggests what can be done to improve the railway supply chain.

FIGURE 2: SIX PILLAR FRAMEWORK FOR UNDERSTANDING ALBERTA'S RAIL INTERESTS



Alberta's Rail Interests

AFFORDABILITY

A rail system that moves goods at low cost is vital to Alberta. It will:

- **Save consumers money.** Much of what Albertans consume comes from outside the province. In 2014, \$32.3 billion in merchandise, representing all types of goods, arrived by truck, rail and air. Logistics costs on consumer goods range from 4.3% to 12.6% of sales.⁴ Keeping transportation costs low helps maintain an affordable standard of living for all Albertans.
- **Increase producer competitiveness.** In most product lines, Alberta commodity producers sell their products into export markets at globally set prices. The volume of commodities produced in Alberta is a small portion of total world production, making Alberta producers price-takers. Any increase in transportation costs represents an increase in operating costs that cannot be passed on to buyers; instead, it reduces the competitiveness of producers. Given the distance to most of these markets, this is a substantial determinant of exporters' success. It is to the advantage of the railway industry that it grow with its customers (one of the reasons that railways will lower prices for industries in crisis – think coal, oil – is that railways need exporters to flourish as the railway business turns on long-term volume).
- **Attract investment.** The availability of transportation infrastructure is an important component of attracting investment to the province, especially for products with a high logistics component. A survey of corporate real estate

executives ranked access to transportation infrastructure – including highways, railways, seaports and airports – as the most important factor in making location decisions. This was ahead of labour, taxes, utilities, and land and buildings. Survey respondents indicated that unless the transportation infrastructure was in place, the other decision criteria were irrelevant.⁵ The Chemistry Industry Association of Canada (CIAC) ranks Alberta at a competitive disadvantage when it comes to logistics. Distance from major markets and dependency on rail with “declining railway level of service” are noted as contributing to the downward trend in competitiveness of logistics.⁶

RESPONSIVENESS

A rail system that responds to manageable variations in demand will:

- **Increase returns for exporters when price opportunities arise.** Lack of flexibility in the supply chain can lead to producers missing peak price windows and losing potential revenue. A maximally responsive system could create huge value for producers. For example, during the “surge” of 2013-14, Canadian grain farmers were unable to get their grain to market during the price peak. Extreme weather in Canada and large crop volumes were both factors. Alberta grain farmers are reliant on international prices set by global supply-and-demand conditions. Grain farmers strive to sell their product when global prices and demand for their products is high, instead of when there is an oversupply and prices decline.

A system with maximum responsiveness would mean a great deal of excess capacity in normal operating conditions and higher costs for shippers. Responsiveness trades off with affordability. We will discuss the issue later in this paper.

RELIABILITY

A rail system that resiliently handles disruptions will:

- **Reduce the costs of delay.** Canada's supply chain operates on a just-in-time basis with bulk commodities generally spending minimal time in storage. Delays in the railway supply chain add costs for producers, shippers, railways and ports. Idle crews and assets are also costly to railways. Shippers face demurrage charges,⁷ fee-for-service charges and the costs of storage. Unreliability also reduces responsiveness and can lead to lost sales.
- **Reduce mitigation costs.** Delays triggered by cold weather, fires, derailments or strikes/labour action occur with varying frequency. By their nature, they are largely unpredictable. Actions to reduce these incidents and their impact on rail operations when they occur could mitigate the financial impact. However, the effect of winter's cold weather on railways cannot be completely mitigated.

- **Protect the Alberta brand.** Missing delivery deadlines increases the risk to the Alberta brand as a reliable supplier, leading to lost sales. The threat of Japanese contract cancellation was mentioned as part of public comments made during the New West Partnership Summit after the 2013-14 crisis (reported in Bloomberg).⁸ Although it is difficult to quantify the impact of system unreliability on contracts, the total dollar value of exports to Japan is sizeable. Exports of Alberta wheat, meslin (a flour typically consisting of wheat and rye) and canola seeds represented 41% (or \$725.7 million) of total average exports to Japan between 2010 and 2014.⁹

CAPACITY

A rail system that increases capacity will:

- **Have the ability to carry Alberta's growing export volume.** Under a medium growth scenario, the cargo having to move over rail and through B.C. ports is expected to grow 40% by 2024.¹⁰ It could be higher. If the long-term capacity of the system to carry growing exports (not just from Alberta but also from all sources in the West and beyond) is not considered well in advance, economic growth could stagnate, simply because of the inability to move product. Decisions on trade infrastructure need to move ahead in a timely manner to avoid long delays in approval and permitting processes.

THE 2013-14 Surge

Grain is one of the top commodities moved by rail in Alberta and experiences large changes in volumes from year to year. In 2013, western Canadian grain farmers harvested an unexpected 76.3 million tonnes, higher than any previous year. Total crop production in Alberta was 25.2 million tonnes in 2013 – 38 per cent above the average for the previous 10 years*.

This surge created a perfect storm. Demand for carrying capacity outpaced supply by almost 10 per cent, leaving about 1,000 carloads of grain unmoved each week.** Bottlenecks in the rail system quickly spread throughout the supply chain; elevator stocks rose and ships sat waiting to be loaded with the specific type of grain requested by buyers. The supply chain problem was aggravated by railways' and grain companies' reliance on forecasts that understated the harvest for that year. Extreme winter conditions also forced the use of shorter trains and slower rail speeds. Farmers were not only unable to take advantage of higher world prices for grain, they also experienced a discount as the price offered at backlogged country elevators began to widen from the port price. The price gap discouraged farmers from delivering into a congested grain handling and transportation system.

A federal Order in Council in March 2014 ordered CP and CN to carry a minimum amount of grain during the peak period to alleviate grain backlogs. Failure to meet these weekly levels would result in penalties. This restricted deliveries of other commodity exporters (including coal, oil, gas, forestry), and those industries believed they were put at a lower priority for shipping than grain. Both railways moved the bumper crop in a record amount of time.

Conditions contributing to the crisis:

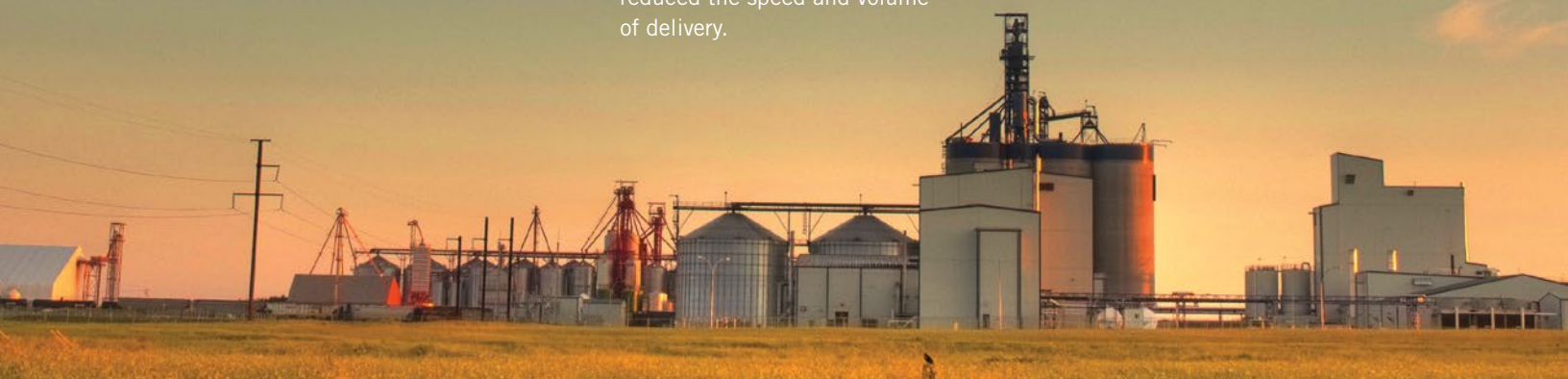
- High market prices provided an opportunity to increase revenue if grain could be shipped during the peak price window.
- Bumper grain crops on the Prairies increased demand for capacity.
- Lack of communication between railways and shippers regarding the weekly demand forecast for grain shipments based on export sales resulted in much fewer railcars being made available than needed.
- Western Canada grain markets were adapting to the dissolution of the Canadian Wheat Board, which previously co-ordinated logistics on behalf of producers.
- Extreme winter weather conditions reduced the speed and volume of delivery.

This transportation failure raises the following questions:

- 1. To what extent should we design a system to meet a rare demand scenario such as this?**
- 2. What would designing for peak demand cost in terms of capacity investment or reduced efficiency?**
- 3. Would the costs outweigh the benefits?**
- 4. To what extent did the system actually respond to changes in demand?**
- 5. Were shippers' expectations of the system reasonable?**
- 6. Was any of this foreseeable and preventable?**

* In 2013, total grain production in Canada was 92.5 million tonnes and 23.8 million tonnes in Alberta (CANSIM table 001-0010). Production data indicated in the text for western Canada and Alberta is from Quorum's Annual Report of the Monitor – Canadian Grain Handling and Transportation System, 2013-14, data tables, table 1A1 for major grains.

** Annual Report of the Monitor – Canadian Grain Handling and Transportation System, 2013-14, p. 4.



SAFETY & ENVIRONMENT

A rail system that is safe and transparent will:

- **Prevent injuries and deaths.** In 2013, there were 50 railway-crossing accidents on federally regulated track in Alberta; the number has been steady over the past 10 years.¹¹ Seven of these resulted in fatalities and an additional five in serious injuries.¹² Reducing these levels is of paramount public interest.
- **Avoid contamination or incidents involving dangerous goods.** As demand for Alberta's products grows, rail traffic through the province is increasing. For example, Alberta produces about 94% of Canada's crude oil; the amount of petroleum products being shipped by rail for export from Canada has increased 10 times from 2012 to 2014, increasing the risk of environmental contamination and even explosions.¹³ For example, a derailment caused 800,000 litres of oil to spill into Wabamun Lake, Alta., in 2005.¹⁴ Safety measures (including reduced speeds for dangerous goods moving through municipalities) are now in place as prevention against catastrophic accidents involving dangerous goods (including petroleum, natural gas and chemicals).¹⁵ Figure 14 shows the number of incidents involving dangerous goods has declined over the past decade and remained relatively steady since 2010 despite a 17% increase in dangerous carloads, nationally.

- **Reduce greenhouse gas (GHG) emissions.** Alberta's transportation sector contributes more than 16% of the province's total GHG emissions, as reported in Canada's National Inventory report.¹⁶ Rail produces 4.9% of transportation emissions, or 0.8% of total emissions in Alberta. Rail is a far more GHG-efficient system than road for moving large, bulky goods but it is less GHG-efficient than pipelines for petroleum products.
- **Maintain public support.** Given that railways are the linchpin of Alberta's export economy, a major incident such as the 2013 disaster in Lac Mégantic, Que., could be devastating in both human and economic terms. Prevention is vital.

FAIRNESS

A rail system that allocates benefits fairly, and is seen to do so, is essential for advancing other interests. Such a system, characterized by an environment of improved trust, will:

- **Ensure gains in efficiency are used to keep shipping affordable.** Improvements in rail efficiency are of little value to Alberta if they are not passed on to Albertans in the form of better service or lower costs. Fairness is about making sure that happens.
- **Incentivize investments to improve operations and infrastructure.** If partners in the supply chain have confidence they can get a financial return on improvements, then they are far more likely to make those investments.

→ **Reduce the reliance on political lobbying to solve disputes.** The public interest is best served by improving the supply chain rather than endlessly debating its governance. Political resolution of disputes has typically benefited some at the expense of others and done little to improve the system overall.

The challenge to achieving fairness in the rail supply chain is the limited competition available. Canada's two railways operate as a duopoly in some locations and monopolies in others, having control over the market and pricing for many commodities exported by Alberta producers. The railways are set up in such a way that CN operates primarily in the northern portion of Alberta and CP operates primarily in the southern portion (see Alberta railways map on following page). This limits choice of service provider to one or the other railway for many shippers in these areas. In larger centres, industrial and commercial shippers have access to both railway companies and other modes of transportation. Depending on where a shipper is located in the province, the physical structure of the railway supply chain reduces competition between railways and promotes a market imbalance between the railway and shipper.

Interest Intersections

Affordability, safety and environment, reliability and fairness are foundational interests. Without them, there is little point in a rail system. Great care is needed to ensure actions taken do not diminish affordability below the break even point for many of Alberta's exporters.

Responsiveness as an interest intersects with efficiency. The end of the wheat board monopoly gave farmers the opportunity to seek the highest price in global markets if they could gain timely market access. Can responsiveness be improved without sacrificing efficiency and increasing costs? A system that has enough excess capacity that farmers could book and commit to rail volumes at the last minute, for example, would be more expensive to operate, much like a courier service is. Beyond a certain point, the value of greater efficiency is compromised by lost sales as a result of diminished service levels. Responsiveness has been a fairness issue. The debate has been whether service levels should be mandated by regulation or negotiated through commercial arrangements.

Capacity is a long-term interest to watch. Canada's experience with essential economic infrastructure is that it can take more than a decade to build. Thinking ahead to future needs could prevent economic challenges later on if the system's core infrastructure becomes over-subscribed.

Alberta Railways



PART TWO

Analysis

ANALYSIS: AFFORDABILITY

Efficiency drives the affordability of rail transportation. When railways focus aggressively on becoming more efficient, it serves Alberta's interests.

Investments in improving efficiency benefit railways and their shareholders through higher profits. When efficiency gains are also passed down through the system, they create greater affordability for Alberta producers who rely on rail. There are signs the system is focused on efficiency in both rail operations and some other parts of the supply chain (for example, the integrated potash exports system operated by Canpotex).

Affordability in the long run will be driven by success in two key areas:

- 01 Improving the efficiency of the entire system, including non-rail elements;
- 02 Ensuring efficiency benefits are passed along to shippers (see Fairness).

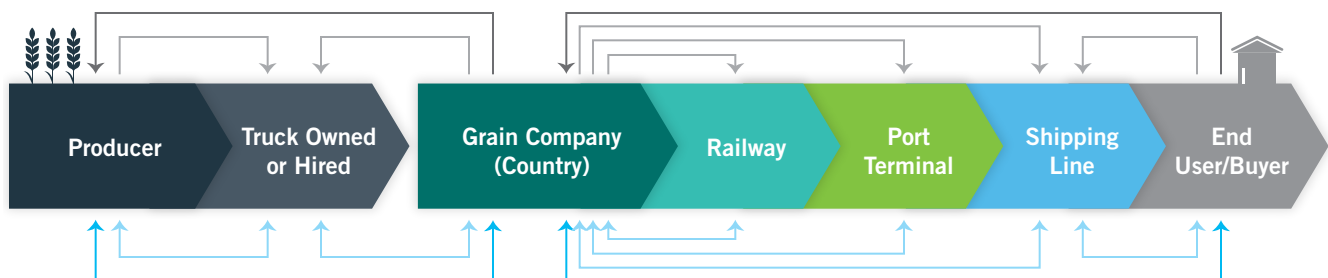
An effective supply chain is a network where the different players in the system understand their interdependence.

The smooth functioning of Canada's transportation and logistics system depends on players operating in a co-ordinated manner. A breakdown in any part of the system creates problems throughout the rest. The system players include producers, shippers, trucks, railways, port terminals, ocean carriers and buyers.

The grain supply chain involves many partners and is subject to seasonality, year-to-year variability in grain production and dynamic international markets. The bulk of grain shipments occur from October to March. Further pressure on the supply chain has come from the growth of specialty grain products creating a broader range of products that need to be stored at port terminals. The requirement to store each grain product separately affects capacity at port terminals, when some storage units are below capacity. In addition, the capacity of bulk ships has been increasing, putting further strain on terminals to have enough product available when the ship is available for loading. An illustration of the grain supply chain is provided in Figure 3 below.

The major drivers of affordability are capacity utilization, wait times and speed.

FIGURE 3: CANADIAN GRAIN SUPPLY CHAIN MODEL (BULK THROUGH GRAIN COMPANY)



Source: Quorum Corporation, PGA working group meeting on Performance and Market Access: Grain monitoring program overview, August 2015

Capacity Utilization

Rail capacity is determined by more than the physical infrastructure of tracks, locomotives and rail cars. Capacity utilization involves “managing three basic areas of influence – the efficient use of assets and resources, the management of flow and operations, and the overall basic track structure.”¹⁷

Railways manage their network to maximize the number of times they can cycle their locomotives and cars in a given period. Generally, railways optimize efficiency by running consistent volumes over time to provide a constant utilization of assets. Avoiding idle assets is paramount. To optimize efficiency, rail assets may be stored to avoid incurring variable costs (crew time, fuel, maintenance) during demand troughs. When volumes decline for a foreseeable period, as they have with the recent downturn in the price of oil, railways may also renegotiate rates to cover at least their variable costs or they may lease out rolling stock. When volumes increase, they may be able to lease or purchase additional rolling stock. It can, however, take several years to bring on new locomotives. Optimizing efficiency can conflict with providing a more responsive system (an issue addressed in the next section).

Railcars themselves vary in their efficiency (lighter/better design for loading and unloading) and carrying capacity (volume carried). The railways and many of their large customers (e.g., Teck Resources and Canpotex) have invested in newer, more efficient cars. The exception is the grain hopper fleet. About 45% of the total hopper car fleet is owned by the federal and provincial governments. (For more information, see Appendix B.) These cars are inefficient and starting to fail. While Canada has been struggling with the issue of who should pay for new cars, operators in the United States have invested in a fleet that holds up to 30% more per car.¹⁸ New car designs support longer trains and faster loading and unloading. Until governments decide whether they will get involved, the railways and grain companies will only make selective investments. If governments decide not to invest, it is questionable whether sufficient incentives exist under the current MRE formula for the railways to make the investment. Replacement cost estimates range from \$75,000 to \$95,000 per car and total replacement at \$765 million to \$970 million. Alberta’s share of the hopper car replacement is estimated at \$68 million to \$86 million.¹⁹

Wait Times

Bottlenecks within the system interfere with optimizing capacity utilization. Reducing load and unload times at ports and points of product pickup will increase railway capacity utilization.

There is a lack of agreement among industry stakeholders as to why bottlenecks occur in the supply chain: why a ship/grain elevator/train is late; where in the supply chain the issue should be addressed; who should address it; and, whether the solution requires improving the process, providing information, or making new capital investments.

Implementing measures that improve shipment forecast timing, accuracy and information sharing across the system would allow supply chain partners to better manage anticipated cyclical demand, and one-off surges in demand. However, the benefits of better information flow to each party as a result of improved supply chain efficiencies need to be identified; many of the current challenges in the system relate to the willingness of parties to incur additional costs for which they may not be compensated. Cost management is a driving consideration for all system participants.

For example, the AG Transport Coalition reports on the fulfillment of requested grain hopper cars weekly. For the grain year 2015-2016, as of week 34, CN and CP delivered on average 87% of hopper car orders during the week they were wanted.²⁰ This raises several questions: 1) Is this an indicator of lack of capacity? 2) Is this a normal threshold in a well-operating system? 3) Is it possible to do better than this, given winter weather and demand from other commodities? and 4) How do we mitigate the costs of the other 13%? Better grain sales forecasts and flexibility in labour scheduling along the system could help decrease the remaining gap.

Speed

Increasing the running speed of trains permits a greater number of trips with the same assets. Railways are already making efforts to do so. Since 2013, CP’s average train speed has increased 15 per cent, from 18.1 mph to 21 mph.²¹ CP plans to increase trains speeds another 20 per cent by 2018, by investing in terminal and corridor infrastructure. CN’s average train speed in 2015 was 26 mph.²² Improving speed will be increasingly difficult without

further investment. That is because rail traffic in Alberta alone is projected to rise by more than 47 per cent over the next decade, from 2.2 million railcars in 2012 to 3.3 million in 2024.²³ Speed can be improved by adding double track and more passing tracks (sidings) plus adding intermediate block signals on existing track to increase throughput.

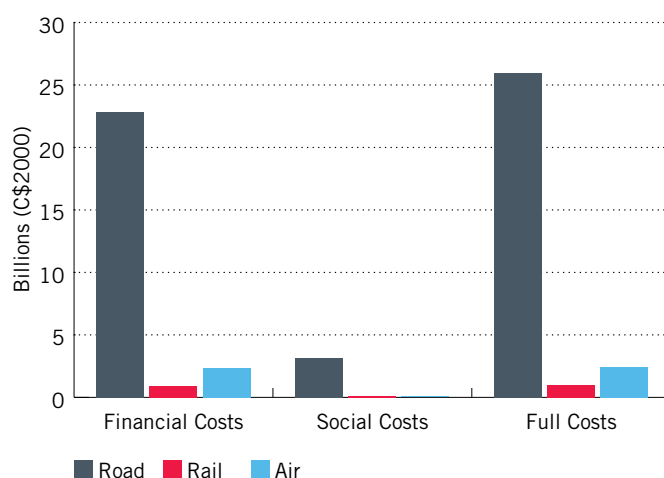
Some running speed bottlenecks are beyond the control of the railways. Typically, these are related to safety. Transport Canada's *Canadian Rail Operating Rules* regulate maximum speeds, with restricted speeds for dangerous goods, urban centres and challenging sections of track, such as curves, bridges and hills. Winter weather can also disrupt service and cause slowdowns.

While speed reductions for safety are non-negotiable, alternatives are possible. These include moving tracks out of city centres and replacing level crossings with grade separations. The financial requirement involved was reflected in the November 2014 agreement of premiers at the New West Partnership Transportation Summit to seek a federal commitment of \$1 billion-\$1.5 billion to “support and enhance essential port and transportation infrastructure.” Municipalities have a critical role in the efficiency of the rail transportation system. Community support for rail is a challenge. Communities bear the inconvenience and risks of railway traffic and prefer lower speeds, which reduces efficiency. Roads and public transit dominate their infrastructure requests. Their participation in the investments that enhance Alberta's export competitiveness should not be lost in the shuffle.

Rail is More Cost Effective Than Alternatives

Rail remains the most cost-effective way to transport most commodities. As shown in Figure 4, greater costs are incurred to move freight by road than by rail in terms of infrastructure, capital assets, operation costs and social costs. As a result, the full cost of rail transportation is nearly 25 times less expensive than road transportation. For most bulk commodities moving east-west, trucking is cost-competitive only on short-haul distances.

FIGURE 4: COST ESTIMATE BY TRANSPORTATION MODE, ALBERTA (BILLIONS \$2000)



Source: Transport Canada, *Estimates of the Full Cost of Transportation in Canada, 2008*

Railways are Investing in Becoming More Efficient

Canada's transportation system moved towards deregulation and privatization in the 1980s and 1990s. Examples include changes to the *Canada Transportation Act* (CTA), privatization of CN, and transfer of port operations to commercial entities. These changes have resulted in increased productivity and dramatically improved infrastructure across the transportation system.²⁴

Canada's Class 1 railways are investing in improving the efficiency of their operations by increasing capital investment and decreasing operating ratios. From 2004-2014, Canada's railways spent more than \$17 billion on capital investments in Canada. The largest portion of capital investment has gone to track and roadway infrastructure (48%). Investments in rolling stock (locomotives and rail cars) received 21%, while about 5% of total investment went to information technology. These investments contribute to higher efficiency, responsiveness, reliability and capacity.

As shown in Figure 5, from 2004-2014, the railways were making annual investments of more than \$1 billion per year in Canada. The forecasts for 2015 were more than \$2 billion. Additional capital investments made by Canadian railways in the United States improve the overall North American rail network. These investments contributed to improved efficiency and capacity. Shippers have suggested that recent gains in efficiency resulting from increased railway investment have not been passed on to them as lower freight rates. However, freight rate increases have been lower than inflation (CPI). Increasing freight rates (Figure 8) suggest railways have been investing more and passing through some of those costs to shippers as higher freight rates.

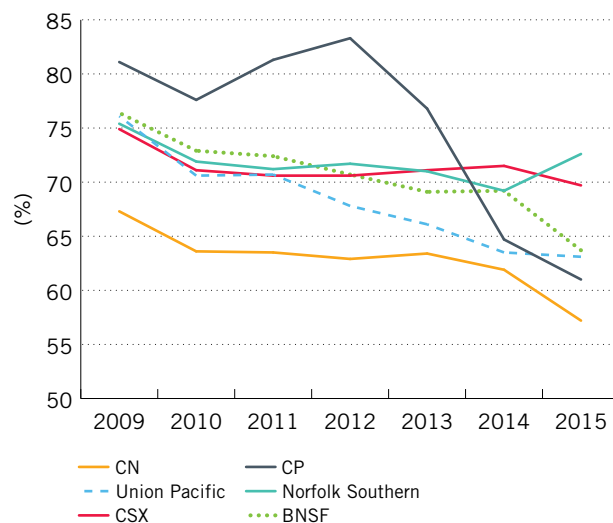
FIGURE 5: CANADIAN RAILWAY INDUSTRY, ADDITIONS TO PROPERTY (2004-2014) (\$ MILLIONS)



Source: Railway Association of Canada 2014 Railway Trends

Operating ratios measure a company's operating expenses as a percentage of revenue. For railways, this is the key measure of efficiency – the lower the operating ratio, the more efficient the railway. As shown in Figure 6, CN has the lowest operating ratio of North American Class 1 railways, with CP achieving a dramatic reduction since 2012.

FIGURE 6: NORTH AMERICAN RAILWAY OPERATING RATIOS (2009-2015)



Source: Railway company annual reports

Over the long term, both railways and their customers have made investments to achieve system efficiency improvements:

- Grain companies have consolidated small rural elevators into larger inland terminals. This allows for faster loading and fewer stops and shippers can receive discounted rates.
- In 2013-14, major grain companies and terminal operators invested \$763 million in expansion and productivity improvements, including: port terminal expansion and productivity investments (\$304 million), country elevator expansion and productivity investments (\$284 million), and new builds for country elevators (\$175 million).
- Railways' investments in track improvements and rolling stock have led to longer trains and higher speeds, where allowed.

Capital investments come with upfront costs to the railway, but improve efficiency, lowering costs in the long run. To the extent that operating ratios are improving and capital investment is increasing, the system seems to be providing incentives to the railways to improve efficiency.

Some of the returns to these investments have accrued to shareholders. Both CN and CP have paid out steady dividends during this period and stock prices have increased (Figure 7).

FIGURE 7: CN AND CP STOCK PERFORMANCE (2005-2015)



Source: Yahoo Finance, Google Finance, Statistics Canada, Canada West Foundation

Freight Rates are Low Compared to Our Competitors

In the future, price and brand will matter more than ever as competition heats up in the Trans-Pacific Partnership trade environment. Alberta's exports compete on the delivered price.

Canada is doing relatively well on keeping its rail freight rates competitive. For example, the rail freight-per-tonne/kilometre cost in Canada is nearly five times lower than Australia's (\$0.03 net tonne/kilometre in Canada versus \$0.14 net tonne/kilometre in Australia).²⁵ In 2013, Canadian grain freight rates were 25% lower than U.S. grain freight rates (Cdn\$0.046 versus Canadian rates of Cdn\$0.036).²⁶

However, because of the longer distance our grain products travel from country elevator to port, transport costs in Canada account for 44 per cent of the total supply chain costs for grain compared to 32 per cent in Australia (Canada ships 1,300-1,800 kilometres by rail: Australia 100-400 kilometres by rail or road).²⁷ Every dollar spent to ship Alberta commodities is a dollar lost to producers. In the battle for market share, competitors with lower transportation costs can pass those savings on in price reductions to win the sale.

Freight costs vary by commodity and depend on numerous factors. These include: volume commitments by shippers, distance travelled from producer site to marine terminal, storage, demurrage and other handling costs. It also includes the amount of capital investment producers, shippers and railways contribute to sidings, rail cars and other supporting infrastructure.

- Canadian freight rates are lower than competitors from the United States and Australia and are among the lowest in the OECD.²⁸
- Freight rates have increased over the past 15 years, and especially in the last four, for regulated grain, but increases are no higher than the Consumer Price Index (CPI). Regulated rates have increased 29% for grain and 23% on average for all freight from 1999 to 2013. This includes the period when the Maximum Revenue Entitlement (MRE) has been in operation. (See Appendix A for additional information on the Maximum Revenue Entitlement program.) The Canadian CPI increased by 34% in those 15 years. (While CPI is not the best measure of inflation of commercial prices, it provides context.) U.S. railways use commercial arrangements to set prices. Their price increases have tracked a rail-specific cost index (independently audited).²⁹

→ Regulated grain moves at a lower rate than the average of all rail freight (Figure 8) although commercial grain rates sit in the same general priceband as regulated ones.

Freight rates for certain types of grain are regulated by the Canadian Transportation Agency under the MRE program.

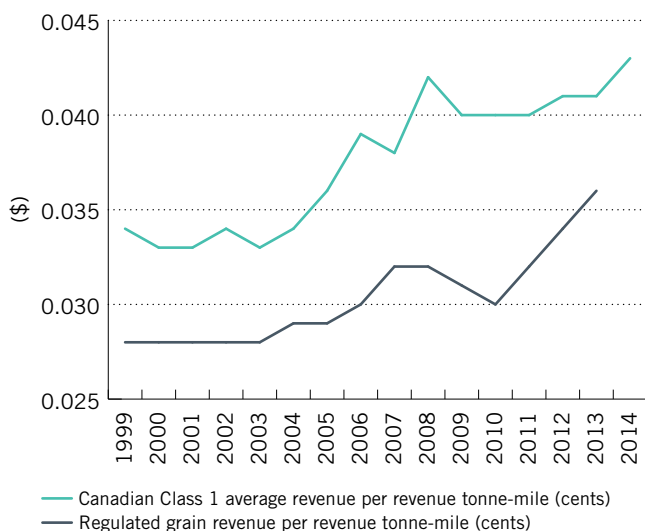
Grain producers contend that the rate under the MRE is too generous to railways because it overstates their costs and does not sufficiently share gains from increased efficiency.³⁰

Other commodity shippers say the freight rate for grain is too low. They argue higher rates are imposed on them and those amount to a cross-subsidization.³¹

Railways say the MRE acts as a disincentive for railway investment that supports grain transportation. Such foregone investment includes increasing the ability to respond to changes in demand and provide more efficient hopper cars.

→ Producers appear to be competitive in global markets, even in markets with drastically reduced prices. Exports that move primarily by rail to port grew strongly during the last decade (e.g., crop exports increased 147% from 2004-2014, while wheat volumes doubled).³²

FIGURE 8: FREIGHT REVENUES PER TONNE MILE AVERAGE, ALL RAILWAY FREIGHT AND REGULATED GRAINS, CN AND CP (1999-2013)



Source: Railway Association of Canada, Quorum Corporation

Affordability Recommendations:

01 CONTINUE WITH LOW-COST BULK TRANSPORTATION AS THE CORE FOCUS OF FREIGHT RAIL POLICY.

This approach seems to be working well relative to competitors. Care should be taken not to imperil affordability in pursuit of other interests.

02 ELIMINATE LEVEL CROSSINGS WHERE POSSIBLE THROUGH GRADE SEPARATION PROJECTS OR SYSTEM REDESIGN.

There is a strong case for both provincial and federal investment here, given the role of rail in Canada's export success. Investment would enhance safety and efficiency.

03 EXAMINE HOW BEST TO REPLACE THE AGING GOVERNMENT HOPPER CAR FLEET OWNED BY ALBERTA, SASKATCHEWAN AND CANADA.

The cost to replace the Alberta portion of hopper cars is estimated at \$68 million to \$86 million, and it takes about three years to take delivery once an order is placed. The governments of Canada, Alberta and Saskatchewan should discuss action on government-owned grain cars under the new mandate of the federal ministers of Agriculture and Transportation. Industry is reluctant to act until the government position on hopper car replacement is decided.

04 SUPPORT MUNICIPALITIES FINANCIALLY AND POLITICALLY TO ADDRESS CONCERNS ABOUT TRADE INFRASTRUCTURE.

While the private sector can and does invest directly in trade infrastructure, there are municipal safety and efficiency needs, as well. Municipalities need resources to make such investments, which can yield benefits that extend well beyond their boundaries.

ANALYSIS: RESPONSIVENESS

Responsiveness of the rail supply chain can be assessed by the extent to which producers can realize higher returns when commodity prices are high. Producers want a supply chain that is flexible and can respond quickly to changes in demand. A system can be both efficient and responsive. Beyond a certain point, however, greater efficiency can compromise responsiveness and lead to reduced service levels. Responsiveness requires flexible capacity and premium service. Efficiency is driven by consistency and keeping assets fully utilized.

Trading Off Responsiveness and Efficiency

If the system is fully responsive, then assets will be idle during the off-peak periods. Idle infrastructure drives up costs that will be passed along to shippers through higher freight rates.

In a market-driven system, railways use price signals to allocate shippers' demand for available resources. Given the high-fixed-cost nature of railways, they generally have the same amount of track capacity and rolling stock available regardless of demand. Capacity will be allocated according to shippers' willingness to pay. Under a price signaling system, grain shippers who want to ship immediately after

harvest or during peak periods would pay higher freight rates. Shippers who can wait will ship later when there is less demand on the system and freight rates are lower.

Under the MRE, there is some flexibility for grain shippers to pay higher prices to ship during peak periods but the railways are constrained by the maximum amount of revenue they can earn. Because all producers want to ship during peak times, demand can exceed the capacity of the system, thus limiting responsiveness.

Storage

The just-in-time nature of Canada's grain handling system puts pressure on the logistics system to get grain from inland farms to tidewater. Canadian farmers hold a large portion of their crops in on-farm storage facilities before releasing them into the grain handling system, giving them more control over the timing of shipments. In 2014, on-farm storage capacity in western Canada represented 88% of total storage capacity (Table 1). Several grain companies at West Coast ports have increased storage capacity to push inventory closer to the point of sale. Expansion at Port of Vancouver, however, is challenged by a shortage

TABLE 1: ON- AND OFF-FARM GRAIN STORAGE, CANADA AND THE UNITED STATES

Rail supply chain – storage facility type	WESTERN CANADA		UNITED STATES	
	2013-14 (000 Metric tonnes)	Percentage of total storage capacity	2014 (millions of bushels)	Percentage of total storage capacity
On-farm storage	72,974.0	88.2%	13,135.0	55.2%
Off-farm storage				
Country storage (elevators)	7,330.3			
Port terminal storage	2,403.0			
Total off-farm storage	9,733.3	11.8%	10,659.3	44.8%
Total on- and off-farm storage capacity	82,707.3	100.0%	23,794.3	100.0%

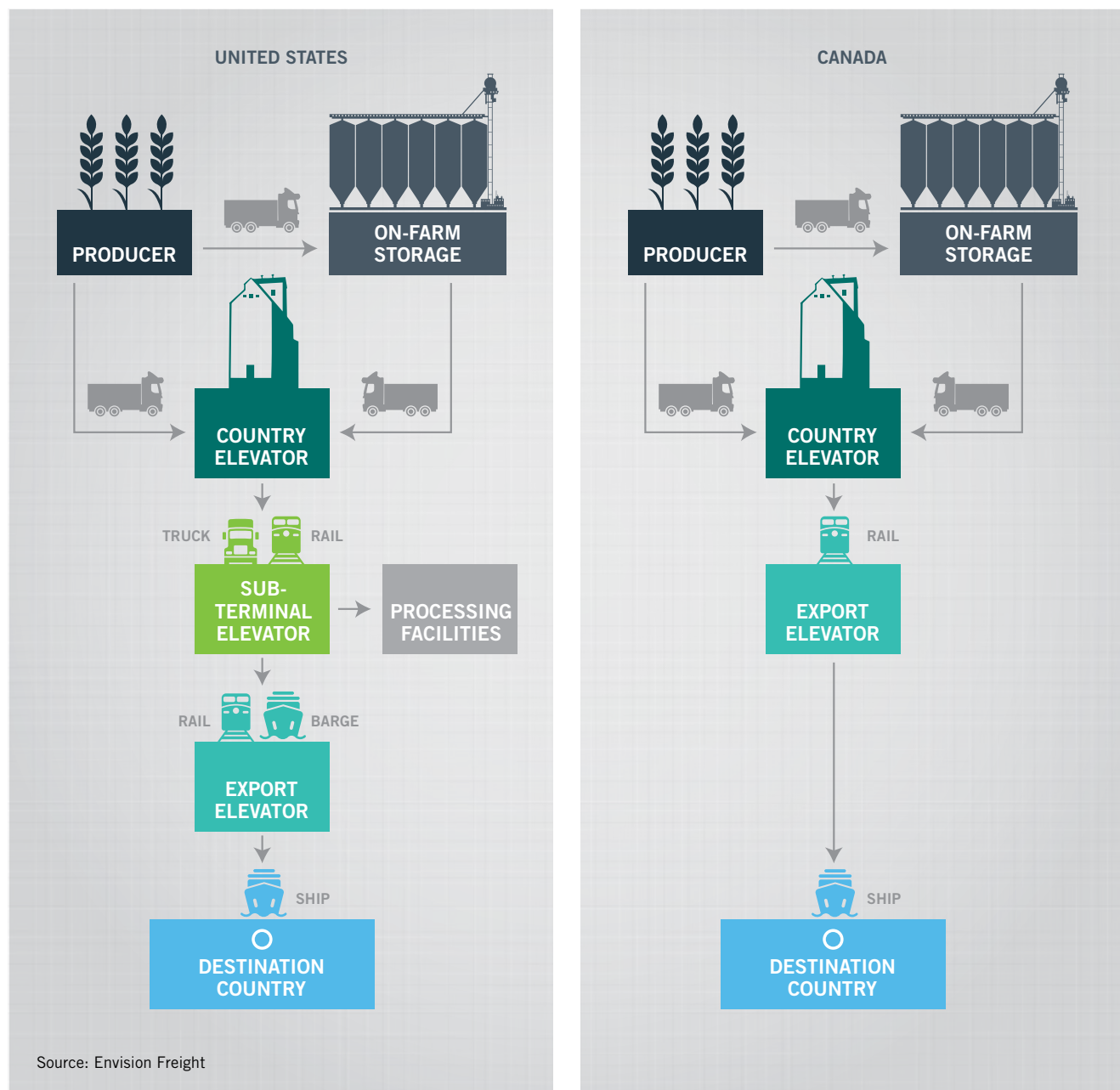
Note: Hopper car capacity in the western Canadian grain handling system represents about 765 thousand metric tonnes which can be included as part of off-farm storage capacity. It is excluded from the analysis to be comparable with the United States storage facilities for grain.

Source: Cansim 001-0010, Quorum annual report 2013-14 data tables, Government of Canada Hopper Car Fleet, 2014 annual report, Saskatchewan Grain Car Corporation, 2014 annual report, Alberta Ministry of Transportation, Statistics Canada grain storage capacity, on farm survey 2014.

of industrial land and anti-development pressure from surrounding communities. In comparison, on-farm storage for U.S. grain stocks was 55% in 2014 with the rest stored at multiple points along the supply chain before it gets to

port. Figure 9 shows the alternative modes of transportation used to ship U.S. grain to market. Wheat exports typically use a combination of truck, barge and rail to get to tidewater.³³

FIGURE 9: TYPICAL MODAL FLOW OF UNITED STATES & CANADIAN GRAIN EXPORTS



It should be noted that the U.S. system differs from the Canadian grain handling system in two important ways.

- More than 80% of U.S. grain is sold domestically to large concerns who own distributed storage facilities across the U.S. prairies (i.e. ADM, Nabisco, General Foods and others). As such, there is more advance contracting to buyers' specifications in the U.S. market.
- The U.S. country storage network has been supported by federal subsidy programs for many years. In 1949, the U.S. government introduced a Farm Storage Facility Loan Program administered by the Commodity Credit Corporation (CCC) that ran until the early 1980s when it was discontinued after sufficient storage level was reached. In 2000, it was re-established after a severe storage shortage occurred. Additionally, U.S. grain farmers have been recipients of ongoing market support programs (loan guarantee programs) where U.S. producers are guaranteed a minimum price for their grain.

As long as the rail supply chain run volumes consistently, storage is not an issue.

The 2013-14 surge showed that at extreme volumes with inaccurate forecasts, the supply chain lacked the capacity to move this volume in the desired timeline. Extreme winter weather conditions further exacerbated the railways' ability to move volume to the port by forcing them to reduce train length and address concerns related to braking systems. Even with these challenges, CP and CN moved 18.8% more volume than the previous crop year in one of the most severe winters in recent years.³⁴

Cost of Lack of Responsiveness

Lack of responsiveness has direct costs and opportunity costs. Direct costs include storage. Opportunity costs include foregone revenue from the inability to deliver into peak price windows.

The challenge is to improve responsiveness to shippers' periodic requests for additional capacity while maintaining efficiency.

There are two kinds of additional capacity requests:

- **Predictable** – Referring to anticipated capacity requests in response to seasonal grain price peaks or seasonal

demands such as natural gas delivery. This anticipates regular peak demand periods.

- **Situational** – Responding to unforeseen events, such as record harvests or unanticipated commodity price peaks.

Demands for additional capacity requests need to be balanced against the available capacity in the system. System capacity fluctuates, depending on weather, availability of rolling stock and crews, demand from other shippers, and cost increases incurred when congestion occurs. There are limits to system responsiveness based on capacity constraints.

Challenges to Improving Responsiveness

- **Ability to provide more accurate forecasts of commodity volumes** so that system-wide annual planning aligns closely with volumes experienced. Adopting a reporting requirement similar to that in the United States would have Canadian producers and grain companies reporting export sales weekly to Agriculture and Agri-Food Canada. The information could then be made available for use by all supply chain partners, and especially by the railways, to estimate system demand.
- **Timing of forecasts to provide enough lead-time** for railways to plan equipment requirements. For example, if forecasts suggest low volumes, railways may want to lease their locomotives and/or rail cars to other railways to realize returns on these assets.
- **Allocation of capacity also includes arrangements made with shippers.** Better demand forecasting and information-sharing would also eliminate “phantom” orders where, in anticipation of shorted orders, shippers order more cars than they require. It would also reduce the costs of crews and equipment waiting for cars to be delivered. Events such as commodity price changes can increase or decrease capacity requests. For example, the recent discounts offered by railways to increase volumes plus the widening of the light-heavy oil price differentials can make rail transportation more economic for oil shippers, given pipeline availability issues. (Shippers sending crude by rail directly to the Gulf Coast can get a higher price on their product than shipping oil to mid-western refineries.) This scenario is, of course, subject to change.³⁵

Advance car orders should increase the railway's ability to optimize the co-ordination and utilization of their assets. However, placing orders for cars further in advance increases the likelihood the car order will be adjusted because estimates may be high. This reduces the railway's ability to co-ordinate and reduce inefficiencies. Railways operate most efficiently when they have guaranteed volumes through take-or-pay arrangements. These can work for producers with predictable volumes but are less advantageous for agricultural products that are seasonal and variable. Short car order windows can reduce the railways' ability to respond with sufficient cars but it also reduces risk of cancelled car orders, thus enhancing operating efficiencies. Short windows also avoid penalties from take-or-pay contracts.

The grain industry has proposed that Canada take a page from the U.S. grain handling system. Grain companies in the U.S. report grain company sales data on a weekly basis to the United States Department of Agriculture (USDA). As a forecast of logistical demand, it is also a warning system of potential impediments for the entire grain handling transportation system.

→ **Responsiveness is not just about the railways.**

Responsiveness requires all parts of the system to adjust to changes in demand. Railways and grain companies differ in how they perceive the grain handling system should operate to achieve maximum optimization. Railways mostly operate on a 24-hours-a-day/seven-days-a-week schedule, but given the seasonality of grain shipments, grain elevators and terminals work a more flexible schedule based on demand. Grain shippers are reluctant to take on 24/7 operations because it increases operating costs at country elevators and marine terminals without a matching increase in productivity (staff waiting for trains to arrive to load/unload). Other commodity shippers, such as potash, with less seasonality in their shipments, operate with a 24/7 schedule. While both grain companies and railways seek to optimize use of their assets and resources, without better communication between the parties and a mutual respect for each other's bottom line, it will be difficult to resolve the issue.

→ **Building for predictable peaks means product-specific assets (hopper cars) will be idle at times.** The costs of fixed assets will be figured into freight rates. If assets are overbuilt for the expected capacity, then these fixed costs will result in higher freight rates.

→ **If system-wide storage is constrained, responsiveness declines.** Availability of system-wide storage includes storage by producers, shippers and port terminals. It provides flexibility at various points in the system in response to price changes and supply fluctuations. System storage acts as the safety valve that takes the pressure off the railways and enables greater efficiency. In addition, storage gives producers choice about when they want to sell, thereby improving their ability to realize greater returns. A true just-in-time system delivers products as they are needed, thus reducing the need for storage. However, with seasonal products, like crops, storage is required somewhere in the system unless it can all be moved and sold quickly. The grain handling transportation system has its storage at the furthest point from the customer (the farm); just-in-time requests must be met with a logistics system that is responsive, efficient and reliable. This is a pretty tall order. Recent investments by the grain companies in storage capacity at Port of Vancouver will add some needed flexibility to absorb the system inadequacies and reduce time-in-port penalties paid to waiting ships. Grain companies have also been increasing storage capacity at country elevators. Since 2010-2011, storage capacity in western Canada has increased by more than 882,000 tonnes (16%) to a total of nearly 6.5 million tonnes in the 2015-2016 crop year.³⁶

Even though storage has increased system-wide, there needs to be further consideration of what the optimal capacity is for the variety of products produced.

During the 2013-14 crop year, there was inadequate storage for grain across the logistics system. With country elevators full, producers had to store the harvest on their farms, at times with makeshift facilities. This highlights the problem of who owns the storage problem and whether storage should be forecast for the entire system. Grain is a longer and more fragmented supply chain than coal, for example, with greater challenges for system co-ordination.

Cash flow is a perennial issue for farmers. Unlike other commodities that are produced more or less continuously, farm harvests are a one-time annual event. It is particularly critical when demand on the system affects farmers' ability to move enough product in time to finance next year's crop. Cash flow requirements can put pressure on some farmers to accept low prices in the fall, despite the potential for higher prices at other times.

The consequences of the Order in Council mandating responsiveness during 2013-14 created disruptions for other producers.³⁷ Potash shipments from Saskatchewan were down 9% from previous years and production was curtailed, reducing returns to others in the system.³⁸ To meet the minimum volume requirements of the Order in Council, the railways concentrated on high volume grain shipments to western ports.

Impact of the Maximum Revenue Entitlement on Grain Transportation

The Maximum Revenue Entitlement (MRE) was introduced to provide freight rate protection for grain shippers and farmers in the post-Crow Rate era. It was also intended to be a temporary measure to support the full commercialization

of grain transportation. The MRE adjusts to changes in railway input costs, average length of haul and volume annually through regulation. Such regulation is neither timely nor responsive to cyclical or short-term changes in volume requests. The MRE rules limit the ability of parties to allocate costs and benefits on a commercial basis. (For a fuller explanation of the MRE, see Appendix A.)

Its objective is to allow for flexibility in grain freight rates while also protecting farmers by limiting the total revenue the railway captures from moving grain. As demonstrated during the record harvest of 2013-14, there is not enough flexibility within the revenue cap during peak demand times to address excess demand through price signals. During peak demand, grain shippers may be more willing to incur higher freight costs. This suggests that increased freight rates may not result in a decreased demand for rail capacity, at some times.

Crow's Nest Pass Agreement

The Crow's Nest Pass Agreement, (September 6, 1897), was an agreement between the CPR (Canadian Pacific Railway) and federal government. The CPR was given a cash subsidy of \$3.3 million and title to pass into British Columbia in exchange for reducing, in perpetuity, eastbound rates on grain and flour and westbound ones on a specified list of "settlers' effects" (total rate reduction about 15%). The CPR obtained access to the valuable mining and smelting activities in the B.C. interior, and the government was able to relieve western concerns over national

transportation policies. By 1914, the lower rates had been extended to other railways serving all Prairie provinces.

The Crow Rates remained in effect until 1993, when the subsidized rates were eliminated because of their distortionary effect on the regional economy. Under the Western Grain Transition Payment Program, prairie farmers were offered a one-time financial payment, which was to provide compensation for higher shipping costs and funds so farmers could make the necessary adjustments in their operations.

Crow's Nest Past Agreement

https://www.collectionscanada.gc.ca/canadian-west/052920/05292083_e.html

<http://www.thecanadianencyclopedia.ca/en/article/crows-nest-pass-agreement/>, https://www.collectionscanada.gc.ca/canadian-west/052920/05292083_e.html

To demonstrate the difficulty of forecasting grain production and how unusual the 2013-14 crop year was, CN undertook an analysis that forecast grain production through 2040 using historic data going back to 1908. The analysis indicated that the 2013-14 crop was a once-in-100-year crop, with a less than 1% probability of occurring. The analysis also indicated that there is a 90% probability that the range of grain production would be between 58 million tonnes and 68 million tonnes in 2040, based on production volumes of 63 million tonnes in 2015-16. The analysis is intended to show stakeholders that railways understand the volatility of grain production and the need to rise to the occasion when capacity is needed.³⁹

In the era of the Canadian Wheat Board (CWB), the board paid producers an average price based on pooled revenue for individual types of grain sold during the year. The CWB also regulated producers' delivery of grain to country elevators, using quotas and contracts, co-ordinating the delivery of grain to port terminals.⁴⁰ Delivery of stable volumes over the year meant more efficient shipping across the system. Payments based on average producer prices generated by the pool evened out returns to farmers. No one did extremely well or extremely poorly, compared to other farmers. The system was designed to share the wealth among farmers and maximize efficiency for the logistics system. It was not, however, a system designed to maximize responsiveness or returns to individual farmers.

Farmers now have the choice to use grain companies to sell their wheat or sell directly to customers. If farmers sell directly to customers, they order producer cars from the railway themselves. Grain companies in Canada are large and sophisticated buyers and want to maximize efficiency in buying, transporting and selling grain.⁴¹ Seven large companies and several small operators compete for producers' business by offering an intermediate price and then taking on the risk and cost of transportation and sale to final customers.

For producers to take advantage of market opportunities, both they and government agriculture agents need to understand all the elements of grain merchandising. This will help them balance the implications of futures pricing, storage costs, cash flow and rail system capacity. Contracts to deliver product later in the product cycle may reduce pressure on the logistics system at peak harvest time. Under the MRE, there are no incentives for producers and shippers to do so.

Pushing delivery later in the season may also require expanding the amount of cash advanced to farmers under government programs.

When the MRE was introduced, moving grain by container was a relatively new way of shipping grain and the benefits were not fully explored. As such, revenue from container shipping was included as part of the MRE formula without considering that freight rates for container shipping exceeded that of bulk shipments by hopper car. In addition, it did not take into account the higher costs associated with moving grain by container relative to bulk shipment.

Since then, containers have proven to be efficient and provide safe product handling for specialty grain products. The potential gains from using containers have not yet been fully explored. Containers are well suited to just-in-time delivery because they easily integrate into the intermodal system, increase on-farm storage flexibility and can possibly reduce some of the congestion in the grain handling system. The repositioning or staging of empty backhaul containers is a potential tool to address unexpected surges in demand. When used for specialty products, the safety and security features of the container ensure the shipper will receive the highest price for the commodity. Containers offer a solution to the challenge of shipping specialty varieties of grain in smaller volumes that are often less efficient for grain companies to move. Containerized grain shipped through Montreal and Vancouver now represents about 10 per cent of total grain exports, up from 4% to 5% in 2001.⁴²

Responsiveness Recommendations:

05 ELIMINATE THE MAXIMUM REVENUE ENTITLEMENT (MRE) FOR GRAIN SHIPPED BY CONTAINER.

Removing containerized grain from the MRE would provide an incentive for railways to promote the use of containers for specialty grains, increase shipping options for farmers and add efficiency to the supply chain. It also creates the potential for revenue from containers that might otherwise return to the port empty. Grain is heavy, however, and cannot be moved cost-effectively in the common containers used for moving consumer goods. Grain is usually moved in 20-foot equivalent (20 TEU) containers.

06 EXPLORE THE OPPORTUNITIES FOR INNOVATION AND THE CONSEQUENCES OF ALLOWING PRODUCERS AND GRAIN COMPANIES TO OPT OUT OF THE MRE.

In the same way that changes in the Crow Rate and allowing farmers to opt out of the wheat board led to innovations by farmers and investment by grain companies, the use of commercial arrangements to co-ordinate volumes and provide incentives and penalties may help spur innovation in the grain handling and transportation system.

07 ACCELERATE INTEGRATION AND AVAILABILITY OF INFORMATION IN THE LOGISTICS SYSTEM TO IMPROVE FORECASTING AND SYSTEM-WIDE LOGISTICS CO-ORDINATION.

Data collection and sharing depends upon its purpose, whether it is day-to-day decision-making, system monitoring or long-term planning. Consider, for example, the requirement for grain sellers to report weekly export sales as inputs to a logistics demand forecast. This can also act as a warning system of potential holdups for the entire grain handling transportation system.

08 IMPROVE AWARENESS OF GRAIN MERCHANDISING TOOLS FOR PRODUCERS AND GOVERNMENT AGRICULTURE AGENTS.

This will help them balance the implications of futures pricing, storage costs and cash flow. Making contracts to deliver product later in the production cycle may reduce pressure on the logistics system at peak harvest time. Delivery later in the season, however, may aggravate cash flow challenges for farmers.

09 ENSURE PROTOCOLS FOR INCREASING OPERATING HOURS AT GRAIN ELEVATORS AND PORT TERMINALS ARE IN PLACE BEFORE PEAK OR CRISIS PERIODS OCCUR.

Setting up protocols requires negotiation over triggers, union issues, 24/7 operating schedules, allocation of costs and benefits. These protocols should be established well in advance of critical moments and should be agreed to by all supply chain partners.

ANALYSIS: RELIABILITY

Delays Cost the Entire System Money

When delays occur in the supply chain, producers, shippers, railways and ports all incur costs. Poor reliability increases penalty costs, such as demurrage, storage costs, equipment operating and crew costs. They all add up to reduced affordability. When railway assets sit idle as delays and congestion builds, costs increase and efficiency decreases. Shippers also want to avoid delays. Waiting for rail cars creates problems at the country elevators in two ways: the elevators themselves do not want cars arriving when they are not ready to load; and, backups occur when producers arrive at the elevator to unload and find it is full. This is not unique to grain shippers; crude oil and other shippers face similar problems.

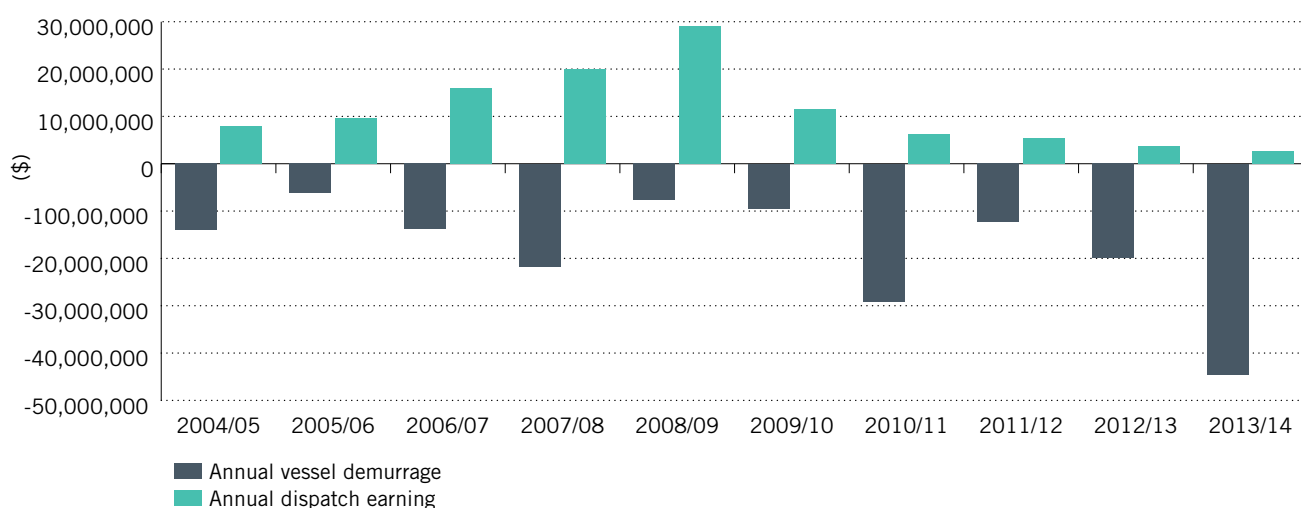
In other supply chains, such as metallurgical coal and potash, integrated information-sharing shows players where all the pieces are in real-time. This enables supply chain partners to plan for train arrivals. For example, providing access to real-time data for country elevators would allow them to schedule crews and reduce wait times along the system. Some crude transloaders (i.e. companies that load from one shipping mode to another) track shipments in real time, but do not always know when railways will pick

up shipments.⁴³ Major investments have been made in information technology within the transportation system and more players are adopting advanced information and communication technologies (ICT). The use of advanced ICT by rail transportation increased from 14.5% in 2009 to 27.7 % in 2012.⁴⁴ Railways report major ICT expenditures in their annual investment reports.

The issue is not so much a lack of ICT infrastructure as a willingness to share information across the supply chain. Railways consider performance-related information-sharing to be part of confidential commercial arrangements. The Government of Canada has regulated data-reporting for the grain handling system since 2000 but does not provide real-time data to help the system adapt to changes and improve performance.⁴⁵

As inefficiencies accumulate along the supply chain, costs to shippers for keeping ships waiting in port also grow. Over a 10-year period, there were six occasions when demurrage paid by shippers was greater than annual dispatch earnings (Figure 10).⁴⁶ For the last four years, demurrage has been consistently higher than dispatch earnings. As an indicator, demurrage reflects both system performance delays and storage capacity for specific products.

FIGURE 10: ANNUAL BONUSES (DISPATCH EARNINGS) VERSUS PENALTIES (DEMURRAGE) PAID, PACIFIC-SEABOARD (2004-05 to 2013-14)



Source: Quorum annual report, 2013-14

Shippers also raise the issue of asymmetric penalties. While railways can impose penalties on shippers for not being ready to load when the train arrives, shippers are not able to impose penalties on the railway when the train is late. The reasoning is that more parties are harmed if a shipper delays a train than if a late train delays a single shipper. It should be noted, however, that not all delays are caused by shippers.

Trains can be delayed for both preventable and non-preventable reasons. Railways are unable to avoid delays caused by such things as weather events, congestion in the network or supply chain partner actions. However, preventable accidents, such as derailments in rail yards that cause system-wide delays, are seen as being within the railways' control. Should penalties be reflective of the cause of delay?

In the Dinning process, consultations on the development of the commercial service agreement templates tried to address these penalties based on three tiers of shippers. Shippers want to include reciprocal penalties as a way to hold the railways accountable for shortfalls in railcar delivery and service delay. Railways want to have guaranteed volumes before being bound by any penalty. Dinning's three tiers addressed this trade-off by matching traffic characteristics with penalties. If a shipper is highly sensitive to service failures, then they would choose the tier that provided those guarantees.

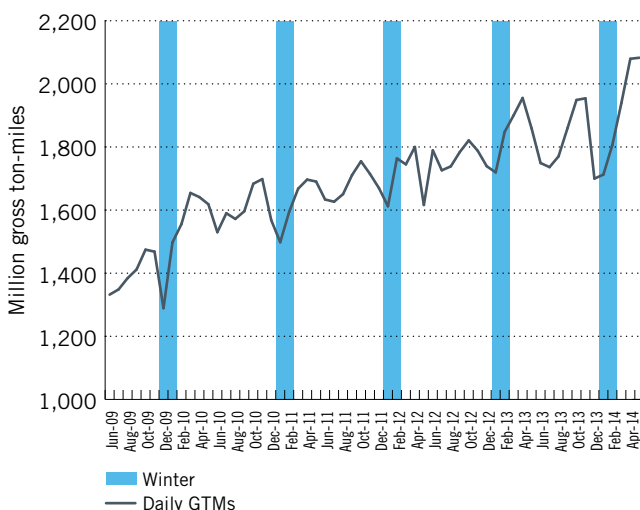
Disruptions can be Mitigated at Some Cost

Winter and other weather events that reduce rail capacity affect the entire supply chain: increased terminal congestion as trains and cars start to back up, depleted storage capacity at the terminal, delayed vessel loading and reduced availability of empty cars for loading. The overall loading and unloading capacity diminishes, which also hurts efficiency during the weather event period.

Railways report that, since 2009, they have increased the amount of traffic moved despite winter delays (Figure 11). A large capital investment on track improvements should increase their ability to recover and increase traffic movement.⁴⁷ Railways provide support for winter-focused research at the Canadian Rail Research Laboratory at the University of Alberta and other institutions.

Railways undertake initiatives with customers to increase understanding of how weather affects performance. As part of this process, the railways conduct joint planning and setting of expectations, improved forecasting, increased shared-access systems for real-time information, and shared performance metrics to drive accountability and action.⁴⁸ Each year, Port of Vancouver creates an integrated winter plan with its intermodal partners to handle extraordinary conditions. CP and CN reserve rail cars at strategic locations along the route to ensure the network can operate even in extreme weather conditions.⁴⁹ Gaps remain. Shippers (grain companies) are still calling for more real-time information from railways; railways, in turn, are asking for better information from the grain industry. Ports are working on winter weather plans to improve communication.

FIGURE 11: CANADIAN CLASS 1S – DAILY MILLION GROSS TON-MILES SYSTEM



Source: Railway Association of Canada

Figure 11 above highlights the annual pattern of rail flow throughout the year. While the number of gross ton-miles has increased over the period shown, a decrease in rail traffic consistently occurs during the months of December to February, the coldest period of the year when train lengths are shorter and move more slowly because of winter weather. As such, reliability declines as train movement becomes limited by weather conditions. Peaks occurring in March and September reflect commodity cycles.

Labour Issues

Labour disputes can also disrupt supply chain operations. Although union contract negotiations are predictable and occur on a regular cycle, several notable disputes have occurred in recent years. Since 2007, CN's locomotive engineers were on strike for 15 days and several railway unions threatened strike action as contract negotiations dragged on. The Harper government responded quickly to minimize time lost to labour disruptions by indicating it would legislate back-to-work orders. That has led to fewer strikes. In 2015, the engineers and conductors at CP ended a two-day strike before a back-to-work order was announced.⁵⁰ The cost of delay to the national economy can be large. The CP strike in May 2012 lasted for 11 days before then-federal Labour Minister Lisa Raitt ordered the union back to work. The cost to the Canadian economy was estimated at \$540 million per week.⁵¹

It is not clear with the new Liberal government in Ottawa how the balance between labour rights and economic costs will be struck. The use of back-to-work orders suggests a level of dysfunction between labour and employers. Relations between labour and the railways can be contentious, with long, drawn-out contract negotiations.

Other labour issues involve a lack of co-ordination of working schedules across the system. A train that misses the end-of-day deadline at a shipper's loading facility can be just as big a disruption for the rest of the supply chain as a snowstorm. It has been a long-standing source of friction in the system that some shippers do not match the working schedules of railways, which operate 24/7. The weekly report from the AG Transportation Coalition also measures "out-of-car" time, which is the percentage of time that bulk grain terminals do not have rail cars available for unloading. For Week 34 of the 2015-16 crop year (the year starts August 1), out-of-car time averaged 16% at the Vancouver North Shore and 18% at South Shore terminals.⁵² This indicates productivity losses.

More research is required to determine the extent of this problem. At present, 40% of performance information collected on the grain handling transportation system is rail-centric. To be useful, data collection needs to expand to include performance measurements of other system participants. In any case, information systems that inform participants that a delay can be expected would go part way to improving their ability to respond.

Delays Can Threaten the Alberta Brand

Missing delivery deadlines may increase the risk to the Alberta brand as a reliable supplier leading to lost or discounted sales. All the events mentioned above can delay deliveries and affect the perception of Alberta's brand in the buyer's mind.

Notably, after the 2013-14 surge, comments were made regarding the threat of Japanese contract cancellations. Saskatchewan Premier Brad Wall spoke at a New West Partnership transportation meeting in November 2014 of the frustration buyers have with inefficiencies in the Canadian transportation system.

Such failures come with consequences, Wall said: Japan pulled out of wheat sale agreements and Malaysian mills would not order from Saskatchewan in November or December because they knew the goods would not arrive.⁵³ According to other anecdotal reports, there have been some missed delivery deadlines for overseas customers with respect to Alberta exports as well.

Reliability Recommendations:

10 MAINTAIN FOCUS ON WINTER PREPAREDNESS.

Through ongoing public and private investments, railways are making incremental gains to improve performance during extreme winter weather periods.

11 IMPLEMENT MORE OPEN AND INTEGRATED INFORMATION-SHARING.

As recommended under responsiveness, this will also reduce delays and their impact on the system.

12 INVESTIGATE BARRIERS TO MORE FLEXIBLE LABOUR ARRANGEMENTS THROUGHOUT THE SYSTEM, ESPECIALLY DURING PEAK AND SURGE PERIODS.

Improved labour relations at both the railways and terminals is fundamental to achieving greater flexibility and avoiding potential strikes that disrupt supply chain operations.

ANALYSIS: CAPACITY

Capacity is adequate. However, projections for the next 10-25 years forecast increases in volume, as consumers in China, India, Brazil and the Asia Pacific demand more and better food, energy and housing.⁵⁴ We can move product efficiently, but if we are unable to move enough of it, we are at risk of losing market access and economic growth.

Will the System Have Sufficient Capacity in 2024, 2050?

Railway capacity includes infrastructure capacity (track structures, sidings, signaling yards) equipment capacity (rolling stock, training for crews), operational practices (scheduling, consistency of delivery, reduced dwell times, crew availability) and supply chain partner capacities (terminal capacity for loading/unloading, total system storage from producers to ships, hours of operation and communication). The inability of any one of these to meet demand will cause bottlenecks that affect the entire system. The whole system needs to work together.

Figure 5 shows the Class 1 railways have invested more than \$17 billion on new capital equipment and rail infrastructure over the past 10 years. To undertake large rail infrastructure projects that would increase capacity, railways work with their customers to ensure the volume commitments are there to support investment.

Rail capacity is also enhanced by initiatives such as: changes in speed and velocity; protection of rail corridors from development and other encroachments; limiting the number of new crossings; and, pursuing best practices along the supply chain.

As rail volumes grow, the question of rail capacity becomes more urgent, especially along already congested corridors. The southern rail corridor through B.C.'s Fraser Valley between Kamloops and Vancouver could become a choke point if forecast rail volumes meet expectations by 2024. In 2013, CP and CN rail traffic on this route was about 64% of corridor capacity. Projections for rail traffic show an increase of as much as 21% by 2024. This would push capacity over 80%, creating the likelihood of increased road-rail conflicts along the route.⁵⁵ The railways report having significant rail capacity to handle current volume and room to grow the

railway network. However, this projection assumes ongoing growth in commodities will result in increased volume commitments by producers that eventually lead to capacity constraints. Regardless of the ability of the railways to increase their operating capacity, governments, industry and railways need to be aware that major infrastructure investment (such as expanded transportation corridors, relocating track through urban areas) may take years to move through the approvals and permitting process.

Growth of Alberta industry sectors could put pressure on existing capacity and erode responsiveness:

- Alberta's current focus on economic diversification includes enhancing the value of its forestry sector. With 85% of product volume shipped by rail, the forest products sector in Alberta is highly dependent on the rail system to get its goods to market. In 2014, three million tonnes of wood and wood products were shipped by rail.⁵⁶ Forestry industry shippers will sometimes arrange for take-or-pay agreements with the railways to ensure they can get their products to market when rail car supply is in high demand or markets are down. Most major forest products companies load and ship 24/7 every day of the year.
- With the recent decline in oil prices, exports of crude by rail have decreased from December 2014's high of 175,654 barrels per day (b/d) to 106,704 b/d in December 2015, a 39% drop.⁵⁷ Even so, Canadian oil production is forecast to increase from 3.7 million b/d in 2014 to 5.3 million b/d in 2030, although at a slower rate of growth than previous forecasts.⁵⁸ With new pipeline capacity delayed by political and environmental reviews (Kinder Morgan, Energy East), crude by rail remains an important alternative for producers and could see demand for rail capacity increase past 2018. Even with discounted freight rates, the price of oil will have to increase from its present price to make the economics of shipping oil by rail economical for producers. Estimates for shipping Western Canadian Select crude oil by rail to B.C.'s coast range from \$10 to \$15 per barrel for companies without their own rail loading/unloading facilities. Shipping by pipeline costs \$3 per barrel.⁵⁹

→ Albert's critical transportation infrastructure challenge is the ability to ship petrochemical and other liquids offshore. Pipeline capacity to handle this growth is limited. A number of world-scale companies are looking to invest in the province, including some petrochemical producers. To encourage such investment, the province needs to be sure the railway system can offer a competitive and safe transportation alternative to pipelines.

Greater supply chain complexity means the system is more difficult to co-ordinate, creating bigger problems as interdependency increases. The problems of co-ordination multiply when all sectors are considered.

→ Regulated grain is a complex supply chain. Grain is characterized by: many producers; seven major grain companies; multiple markets; combination of truck, rail and ship; railcars owned by railways, grain companies, and governments; government-regulated rail freight rates and volume; many competing producers globally; seasonal production; fluctuations in supply locally and abroad; and, price fluctuations.

→ As the largest producer of metallurgical coal in Canada, Teck Resources ships coal by rail from its mines in Alberta and British Columbia to three West Coast ports as part of an integrated logistics system. Teck has commercial agreements in place with both CP and CN, which focus on improving rail service to improve supply chain efficiency. The Cardinal River mine in Alberta is served by CN, which transports coal primarily to the West Coast ports of Ridley Terminals near Prince Rupert and Neptune Bulk Terminals and Westshore Terminals in Metro Vancouver. Teck's 2011 agreement with CN (expiring this year) accommodates future growth in product volume at Cardinal River and Quintette, should that mine open. Teck's 10-year agreement with CP (as of April 2011) provides for increased rail capacity to support coal expansion in the Elk Valley, B.C. area. When CP committed to increase its capacity to transport coal, there was an increase in westbound trains. They now run at 152 cars in length, compared with an average of 126 cars before the investment. Also included in the agreement was the development of an integrated scorecard to measure throughput from the mine site to West Coast coal terminals.⁶⁰

→ Current rail loading capacity for crude oil in western Canada is around 776,000 b/d of which three-quarters is located in Alberta. Because of market conditions, construction of new and expansion projects originally proposed to be in service by the end of 2015 have been deferred. However, with low capital requirements of \$30-\$50 million for construction and five-year capital payout, rail terminals for unit trains can be built in about 12 months. The crude-by-rail supply chain includes oil moving by pipeline or truck from production facilities to a loading site then shipped by rail to be unloaded at either a production facility or marine terminal.

Shippers, receivers or marketers of crude oil tend to own and/or control their own rail car fleets. This enables them to better manage surges in production volumes. They also use rail track they own at their facilities to store unused cars during periods of low demand.

With producers recognizing rail as an alternative to pipelines, the rail supply chain is moving from a manifest system (trains make multiple stops to pick up and deliver different products) to a unit system, in which trains go directly from the loading site to unloading site. Large scale facilities that can load a unit train typically move heavy oil, dilbit (70% bitumen, 30% diluent), railbit (88% bitumen, 12% diluent) or raw (undiluted bitumen). As more producers look to rail to transport crude using unit trains, there will be greater competition for locomotives throughout the rail network.

→ Another example of how industry investment in concert with the railway industry can create an integrated supply chain solution is potash, a non-seasonal export from Saskatchewan. With three large producers, the only shipper and marketer (Canpotex) owns its own storage, rail cars, terminals and even railcar maintenance facility. They ship almost exclusively via rail to West Coast ports. The product has its own challenges because it is fairly complex to store. With 20 different grades of potash, each grade needs to be kept segregated. Adding to the storage challenge, the product is water soluble and must be kept dry. Potash is typically sold based on annual contracts, supporting relatively stable shipping volumes.

Development of Forecasts: How Much Capacity Will Be Needed?⁶¹

There are many players within sectors and there are many sectors. With a broad range of potential scenarios for production capacity and for global demand, forecasting is an onerous task. The assumptions and models of future volumes and conditions (e.g., input costs, environmental objectives and community objectives) will differ by forecaster. However, efforts have been made.

- The New West Partnership provinces (B.C., Alberta and Saskatchewan) undertook a forecasting exercise for the transportation summit in 2014. It received input from the three provinces across 11 key sectors for 2013-2024. A discussion paper prepared for the New West Partnership Transportation Summit based on data from the Pacific Gateway Alliance (November 2014) projected an increase in export volumes from 2012 to 2024 through the Pacific Gateway of 63% for bulk traffic and 72% for containers. The projected growth in petroleum and LNG export volumes was forecast to be more than all exports in 2012. However, decreased demand and low commodity prices may force these forecasts to be revisited.
- The Government of Saskatchewan's aggressive growth plan for 2020 forecast a 27% increase in rail volumes from that province alone.⁶²
- Port of Vancouver produced a plan to 2050 with four scenarios – two demand growth options and two limited-capacity options. Surprisingly, the biggest challenge was not forecasting global demand but local response to the need to expand capacity.

Agreement on Action: How Will Capacity Be Created?

The investments required to meet even the most conservative forecasts will be enormous. For example, the Pacific Gateway Alliance estimated a need for port capacity investments of more than \$3.8 billion.⁶³ A mix of private and public investments will be involved. These will require co-ordination in setting priorities, funding requirements and timing.

Increased capacity will also result from all rail supply chain partners making investments. Canada's railways have been making investments to their infrastructure each year averaging about \$1.6 billion across their Canadian network between 2005 and 2014. In the grain handling transportation system, the producers have been investing in on-farm storage facilities and grain companies have increased storage capacity at marine terminals. These efforts help to reduce network congestion and free up existing supply chain capacity. Other commodity producers, such as coal and petroleum products, are investing in loading and unloading facilities to improve capacity.

The Canada West Foundation is engaging with both public and private sector participants to establish a process to set strategic infrastructure priorities that increase competitiveness. The pipeline of infrastructure projects will be prioritized based on the project's return on investment, supply and production chain optimization and other factors.

Private sector investment will need assurances that other parties will meet their obligations and that their investments will be rewarded for the risk involved. Legislation like the MRE reduces incentives for railways to invest in capacity for grain transportation. The nearly continuous process of rail service reviews by government increases uncertainty for investors. Deregulation has been counterbalanced by legislative action to limit railway market power. To mitigate legislative and regulatory surprises to the private sector, changes to federal legislation/regulation have involved consultations with stakeholders.

Risks associated with capacity investments are substantial because of the size of investments involved. Long-term forecasts of volatile global commodity markets challenges every producer, especially over the longer terms associated with major infrastructure. Higher risk requires higher returns or potentially expensive guarantees. Further risk arises from the lead time required. The timeframe to expand permanent capacity can be substantial. Lead times depend on:

- Time for design/construction/production. (This varies from less than a year to 5-10 years.)
- Time required for training. It will be necessary to develop the skills and increase the competencies of the workforce to work effectively with new capacity (infrastructure/equipment).
- Time for approvals by multiple regulators at multiple levels of government for larger infrastructure projects. As the pipeline experience has shown, these processes are taking ever longer.

The Port of Vancouver planning exercise for 2050 envisioned a potential scenario where lack of support for infrastructure development in the Vancouver Lower Mainland choked off growth at a critical point in the Pacific Gateway.⁶⁴ It is vital to avoid this scenario.

Capacity Recommendations:

13 PROVIDE SUPPLY CHAIN FORECASTING. Planning exercises like those run by Port of Vancouver and the provinces for the New West Partnership Transportation Summit provide long-term supply chain forecasts indicating industry growth and future demand on supply chain capacity. To be accepted and used by all supply chain partners, forecast providers need to be independent, third-party actors who can provide forecasts without direct financial interest. The Pacific Gateway Alliance has taken on some of this task and increasingly reflects a pan-western perspective.

14 PRIORITIZE STRATEGIC INFRASTRUCTURE

REQUIREMENTS. Supply chain, stakeholder and community alignment are required to set the priorities for large and small infrastructure investments. Leadership from the western provinces needs to step up the pace. Prioritizing strategic infrastructure projects that support export competitiveness for federal/provincial funding is critical. The western premiers should provide these priorities quickly as the federal government makes infrastructure funding decisions.

15 PROVIDE POLITICAL LEADERSHIP TO ADDRESS COMMUNITY SUPPORT FOR TRADE INFRASTRUCTURE.

Lack of support at a critical chokepoint (e.g. Port of Vancouver) can restrict total system capacity.

16 RECOGNIZE THE IMPACT OF GOVERNMENT ACTION ON INCENTIVES FOR PRIVATE INVESTMENT.

Political actors should avoid hiding behind regulators. Risk-adjusted rates of return need to consider not just direct system risks (e.g., future volumes) but also political risks associated with changes to the regulation, especially in the grain transportation system and infrastructure project approvals. Actions that reduce political risk will reduce the total cost of capacity improvements. Significant investments will be needed to meet the growth in exports that are anticipated by the Saskatchewan Plan for Growth, the Port of Vancouver Port 2050 scenarios and the Pacific Gateway Alliance, among others. Investors at every point in the supply chain need assurances that the dollars they put at risk will be rewarded.

ANALYSIS: FAIRNESS

While affordability is the key driver of returns to Alberta producers, how do we know the system is fair and that the railways do not use their market power to disadvantage shippers? It is not an easy question to answer.

Perceptions of unfairness are as old as the railway itself. Railways are natural monopolies. Limited competition, in combination with the size disparity between the railways and some shippers, means that there are concerns about the ability of shippers and railways to negotiate fair price and service levels. It should be noted, however, that some railways customers are in fact larger than the railways and have sophisticated logistics operations.

There is a difference between intermodal supply chains, where healthy competition exists, and the grain and other commodity supply chains in Alberta. Choices for shippers are often limited to one railway – a situation that restricts competition as a driver for “fair” freight rates and service. For example, the grain supply chain is largely reliant on either CN or CP to ship their products. According to Quorum Corporation, about 90% of the grain volumes in western Canada are captive to one of the two railways.⁶⁵

Under the *Canada Transportation Act*, recognition is given to the importance of the railways connection to Canada’s interests in moving goods within Canada and for export. Among these interests are “lowest total cost ... essential to serve the needs of its users, and enable competitiveness and economic growth”⁶⁶ To achieve these interests, the act attempts to balance regulation with commercial arrangements. Grain receives additional attention in the Act, specifically the MRE. In addition, regulations specific to grain have been introduced notably the Orders in Council to manage excess grain volume for the crop year 2013-14.

Every five years, the *Canada Transportation Act* requires a review of the operation of the act and associated regulations. The most recent review, led by the Honourable David Emerson, was released to the public as this report was being finalized. Its recommendations are generally consistent with this report.

Focus Has Been on Grievance, Not Improved Operations

Reviews of Canadian railway service are as quintessentially Canadian as hockey. The grain handling system in particular has been under panel or legislative review almost continuously for the past two decades. Complaints from shippers about poor service and lack of reliability resulting from “aggressive asset utilization” are common. Fundamentally, shippers use the reviews and their political clout to lobby government to address the perceived lack of competition and imbalance of negotiating power with the railways. Reviews have been a relatively successful tool – especially for grain farmers – and they are reluctant to give it up.

The 2011 federal review of freight rail service sought to address service issues and make recommendations, both commercial and regulatory. The panel considered competitive concerns, supply chain service agreements, dispute mechanisms, complexity of the rail supply chain and performance. It recognized the market power imbalance and recommended a modified commercial approach to relations between shippers and the railways. The government’s response included the *Fair Rail Freight Service Act*, which provided shippers with the right to request a service level agreement from the railways. If shippers are unable to come to terms on a SLA with the railway, the shippers have the right to turn to the Canadian Transportation Agency to have a binding contractual agreement imposed through arbitration.

Performance Reporting

We referred elsewhere in this paper to the measurement and reporting of grain handling performance by the government. In addition to annual and quarterly reports, the Grain Monitor (Quorum Corporation) provides weekly information on rail and port performance for volumes, wait times, time in process, vessel lineups and other indicators. It was introduced in October 2013 to inform the federal government of the status of the system during the surge period. Since then, some stakeholders have used the weekly report to inform decisions on the timing of deliveries and sales. It appears this report is filling an information gap for the industry because it can identify changes over time. As the mandate of the Grain Monitoring Program explicitly

precludes providing forecasts, information presented in the weekly reports cannot change behaviour in real time. In the absence of other data, it provides a work-around for decision-making by all supply chain partners.

The Grain Monitor has recommended to the federal government that it set up a system similar to the U.S. to collect grain company sales data on a weekly basis. This system would provide a forecast of logistical demand, as well as a warning system of potential impediments for all parties of the grain handling transportation system.

Availability of information has enabled supply chain partners to use it as evidence to support complaints and feed into the next review process. It primarily supports shippers' power through threat of regulation.

Other commodity sectors have expressed interest in similar reporting because they want greater system transparency. The rationale for reporting includes having information for negotiation purposes and to improve decision-making, which will in turn improve performance.

To ensure information truly supports performance improvement, it should be transparent, considered valid by all parties and involve integration of information technology. This is the way many supply chains operate. It also requires trust among the participants. Sadly, the current reporting situation reflects a lack of trust.

2011 Service Agreement and Dispute Resolution Facilitation

The other action arising from the 2011 review was the appointment of Jim Dinning to facilitate the creation of a service agreement template and address the details of a dispute-resolution mechanism.

The template proposed tiers of shippers based on volume forecasts and commitments. The service template differed across these tiers. Shippers who were willing to forecast and commit to volumes (take-or-pay contracts) would negotiate service agreements with more elements, including service levels, penalties for non-performance, alternative dispute settlement mechanisms and recovery plans.

The facilitation process failed to achieve its goals. Despite progress on some elements, the railways and shippers failed to reach agreement on major items.⁶⁷

Shippers rejected the tiered approach to service levels that was fundamental to the facilitator's proposal. Shippers wanted mandatory service levels to redress the imbalance in the relationship with the railways and they wanted arbitration to establish the service agreements if parties failed to agree. The purpose of arbitration for the initial contract, not just post-contractual failures, goes to the heart of shippers' concerns about negotiating power imbalance. Although the tiers in the proposal recognized that there were fundamental differences among shippers, the facilitation process dealt with shippers as a group.

In some sectors, shippers are willing to accept commercial take-or-pay contracts to obtain lower prices, negotiate additional services and even invest in rolling stock. Typically, large producers in the mineral sector, for example, have consistent production volumes during the year, with some cyclical market variability in volumes contracts, so their resistance to take-or-pay commercial arrangements is lower than other shippers. They use the arbitration service provided by the *Canada Transportation Act* but see it as expensive, time consuming and slow to resolve issues.

Alberta shippers who experience greater variability in volume production are not inclined to guarantee volumes. Agriculture and forest products experience variations seasonally, as a result of crop and forest conditions. There are producers of varying size in the agriculture and forestry sectors' supply chain; smaller producers are among the most disadvantaged in negotiating with the railways. Alberta's grain producers benefit from federal regulation that limits the amount of revenue railways can earn from transporting grain. That regulation, however, affects how railways respond to service demands. Most large forest products producers will see some seasonal variation in their harvesting operations but will accumulate fibre in locations to maintain production and minimize seasonality. Large forest product mills will ship 24/7 every day of the year, with arrangements for the railways to move product on the same schedule.

As railways operate under a common carrier obligation, they are obliged to serve low-volume and/or high-variability customers. Determining a commercial arrangement and dispute settlement mechanism that satisfies both the railways' need for volume and customers' need for flexibility is a work in progress.

Railways were in favour of using the service agreement template developed during the Dinning facilitation process as a guide to bilateral negotiations. However, they disagreed with the shippers' request for mandated elements within the service agreement. They indicated they would be open to discussing each element as part of bilateral agreements. On the matter of arbitration, railways did not want initial service agreements to be determined using this process.

Through the facilitation process, some shippers sought a solution to the imbalance in negotiating power. However, the facilitator's proposed solution (service level agreement template and proposed commercial dispute resolution process) did not provide enough incentive to move from the status quo. Shippers felt the proposals weakened their position with the railways rather than put them on a

level playing field. For both the railways and the shippers, the perceived risks to the parties of "giving the template agreements a try" were clearly greater than the perceived risks of the current system, which are considerable.

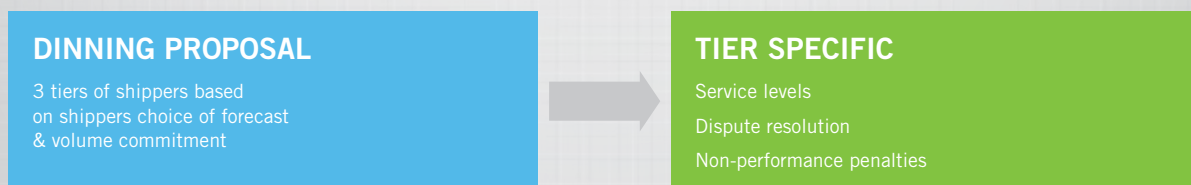
Under the status quo, there are no penalties or incentives for supply chain partners to adopt service level agreements if they believe that service guarantees can be achieved by lobbying government. Trust that a process can achieve its intended goals is undermined if participants know the government will step in, responding to industry lobbying.

Figure 12 provides a high-level outline of the fundamental elements that affect the balance of power between the shippers and railways. The inability to match up the elements from either side leads to the mutual perception of unfairness.

FIGURE 12: ELEMENTS OF IMPORTANCE TO THE FAIRNESS DISCUSSION IN THE RAIL SUPPLY CHAIN



SERVICE AGREEMENT TEMPLATE & COMMERCIAL DISPUTE RESOLUTION PROCESS – DINNING FACILITATION



Solutions to redress imbalances in market power, reduce friction in the system

The Dinning process moved shippers and railways closer to commercial arrangements. Yet the results highlight the challenges to achieving a solution that is both considered fair by all parties and serves Alberta's interests. There are several options on the way forward:

- Partners in the rail supply chain can try again to find a commercial arrangement solution – keep trying to do what we have been doing – with the threat of regulation as a lever. This status quo, however, would leave all parties dissatisfied and the operational problems unsolved.
- Partners can try a completely unregulated alternative. The market power equation, however, has the potential to squeeze shippers.
- Partners can increase regulations and step back from trying to develop commercial solutions. Greater regulation in the context of a series of policy statements supporting more commercial relations over the past 50 years, however, would be seen by the railways' shareholders as a broken promise. Lower levels of private investment could result, ultimately reducing the performance of the system.
- Partners can focus on operations – both day-to-day and long-term system needs – and shift the conversation (and effort) away from “solving” the market-power issue to improving operation of the system. If threat of regulation is reduced, then it could force the parties to pay attention to how the entire system performs.

If partners find that the current system is efficient, relatively affordable and encourages investment, despite ongoing complaints, perhaps focusing on improving the system would achieve positive results and build trust among the supply chain participants. It is critical to protect the trend in the Canadian rail supply chain of constant improvement in efficiency and affordability.

Is it Fair?

After many panel reviews, legislative debates, and the ongoing efforts of the CTA, there is little agreement on whether the rail system is fair. While deregulation has enhanced efficiency and innovation, tension remains around service levels, freight rates and dispute resolution. Finding the sweet-spot between allowing market mechanisms to balance supply and demand for services and the need for regulation to address imbalances in power has been vexing. It seems unlikely that all supply chain participants will ever agree on fair returns among members of a complex system with such a long history of mistrust.

Three options are available as a framework for the rail supply chain:

- 01 Retain the status quo.** Existing grievances will remain and the supply chain partners will be unhappy with the results.
- 02 Make the commercial arrangements and dispute resolution settlement process work** by getting behind the Dinning process. However, elements of this proposal have been rejected by shippers and railways as unworkable.
- 03 Acknowledge imperfections in the Dinning process and make significant efforts to strengthen the protection of commercial arrangements** by ensuring the arbitration process for shippers of all sizes is easy, timely and cheap.

Fairness Recommendations:

17 RECOGNIZE THE INHERENT DIFFERENCES

AMONG SHIPPERS. Reasonable service levels can be negotiated under commercial arrangements. Where parties cannot agree, third-party intervention (mediation or arbitration) that recognizes the inherent differences among shippers and their products may be required. This leaves the problem of the definition of reasonableness under the common carrier obligations of railways. Common carrier obligations should represent the minimum obligations required, not aspirational levels of service.

18 REDUCE UNCERTAINTY IN HOW THE GRAIN

HANDLING SYSTEM IS REGULATED. Ongoing reviews and a history of successful lobbying creates uncertainty for all parties, and the spectre of regulatory change looms. Higher uncertainty leads to higher risk adjustments and higher costs. Shifting the focus to improving supply chain operations could improve results and build trust among the partners.

19 SUPPORT COMMERCIAL ARRANGEMENTS,

WHENEVER POSSIBLE. In non-regulated sectors challenged by low commodity prices, the railways have responded by negotiating lower rates to maintain volumes that enable the system to operate efficiently overall. Shippers have also responded by investing in cars and storage to reduce their reliance on the railways' capacity and mitigate service deficiencies.

20 GIVE THE SERVICE AGREEMENT AND COMMERCIAL DISPUTE RESOLUTION PROCESS THAT CAME OUT OF THE DINNING FACILITATION A CHANCE TO

OPERATE. The system of incentives and penalties generally works for most shippers. Although there was disagreement on how reciprocal financial penalties in the service level agreements (SLA) should work, the results of the facilitation provided a starting point for further discussion. Effort should be made to improve the dispute resolution and arbitration process so that it serves all shippers and is easy to use, timely and cheap.

21 SUPPORT INFORMATION SHARING EFFORTS

AMONG ALL SYSTEM PARTICIPANTS TO PROVIDE INFORMATION THAT WILL INCREASE TRANSPARENCY AND SUPPORT BETTER SERVICE.

All players would benefit from better information integration and transparency, including those with commercial arrangements. Trust would increase if railways would open and integrate their information systems with the rest of the supply chain. The railways, on the other hand, would be more inclined to trust other stakeholders with information if they could see value in it beyond its use in ongoing disputes heard at the Canadian Transportation Agency (CTA).

Data collection from supply partners involves three levels of useful information:

- a) **Day-to-day** – Micro-data collected from all supply chain partners can be used to adjust operations in real time to improve service by all partners.
- b) **Monitoring** – Data is used to identify problems and work with partners to achieve solutions. The data collected to monitor the Grain Handling and Transportation System (GHTS) does not provide a complete view of the supply chain and some supply chain partners do not agree on the methodology of some of the measures. Data from other sectors is limited and does not drive solutions to supply chain issues.
- c) **Long-term capacity** – This is data that drives decisions about long-term capacity planning and investment.

ANALYSIS: SAFETY & ENVIRONMENT

Safety is critical. It also needs to keep up with improved efficiency without affecting affordability. The perception of the ability of the rail system to safely handle the goods it transports and minimize impacts on the communities it passes through is critical to gaining public support.

Some investments can improve both safety and efficiency. Examples include improving, relocating or closing grade level crossings and moving tracks out of cities to reduce points of contact between railway operations and residents. Some of these are at the level of strategic infrastructure investments that involve the railways and federal and provincial governments; others have a more localized impact and would involve the railways, the province municipalities.

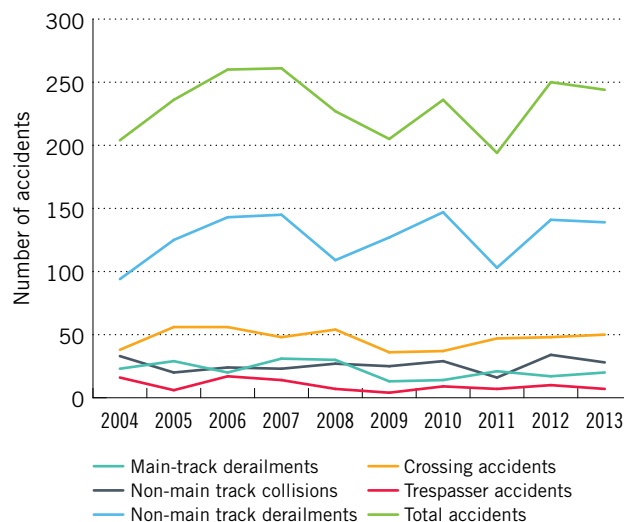
Other investments that improve safety also improve reliability and responsiveness. Investments in information technology can include government (including local governments) to assist with disaster preparedness, prevention and response co-ordination.

Grade Separation

Grade separations allow rail and road traffic to cross each other at different elevations. Removing the need for a train to slow down or stop at a level crossing decreases the amount of time it takes to operate a route. There are 2,767 public crossings in Alberta that fall under federal jurisdiction.⁶⁸ Upgrading all would be a massively expensive undertaking; investments should be prioritized to address the crossings with the poorest safety record first.

Figure 13 reflects incidents reported to the Transportation Safety Board that occur on federally regulated track. Incidents occurring on provincial track by either provincial operators or federal service providers (CN and CP) are not included.

FIGURE 13: RAILWAY ACCIDENTS IN ALBERTA ON FEDERALLY REGULATED TRACK, BY TYPE (2004-2013)



Source: Transportation Safety Board

The biggest barrier to replacing level crossings with grade separations is cost. In March 2015, the City of Airdrie endorsed an application for funding to cover the cost of constructing a CP grade separation at Yankee Valley Boulevard, including widening the road, estimated at \$22 million.⁶⁹

The Canadian Transportation Agency (CTA) decides what portion each jurisdiction must pay for grade separation projects. Where both road and railway development contribute to the need for grade separation, it suggests costs be split 50-50 between the railway company and the road authority. Where grade separation resulted from primarily railway development, the CTA suggests an 85-15 split, with the railway company paying the larger portion. Where grade separation is needed primarily because of road development, the cost splitting should be 85-15 with the road authority paying the majority.

The province can contribute to improving safety and efficiency by ensuring the road authorities (Alberta Transportation and municipalities) have funding for their portions of the investment in grade separation projects.

Moving Tracks

After the Lac-Mégantic, Que., disaster, many municipalities with rail running through highly populated and urban areas are considering rail relocation. This could become a higher priority item for Alberta municipalities and would require provincial leadership to determine the viability of moving tracks.

The Government of Manitoba recently announced its intention to remove Winnipeg's rail tracks because the rail park at CentrePort – an inland port – is developing an alternative to trains running through the capital city. The Government of Manitoba and City of Winnipeg have appointed Jean Charest, former premier of Quebec, to lead the rail relocation task force. With costs in Winnipeg estimated at \$1.5 billion, the viability of moving rail track will be assessed by the rail relocation task force.

Dangerous Goods Transloading Sites

There are 132 dangerous goods transloading sites in Alberta associated with industrial rail lines, and about 25 involve crude oil.^{70,71} Since transporting crude oil by rail is a relatively new practice, there were no relevant provincial regulatory requirements. To address this gap, Alberta Transportation issued two circulars (guidelines) for all new dangerous goods transload sites. It is important that new regulations do not restrict the benefits of new approaches. For example, while the permanent crude transloader model is the only one with an automatic shut-off, the mobile transloader allows the system to be flexible. When demand to move crude by rail increases, mobile transloaders can be moved to the area with demand and get the product on the line much quicker than if a permanent structure had to be constructed.

Figure 14 shows that the number of incidents involving dangerous goods has declined over the past decade and remained fairly steady since 2010. This occurred despite a 17% increase in dangerous goods carloads during the same period (nationally, 2004-2013).⁷²

FIGURE 14: RAIL ACCIDENTS & INCIDENTS INVOLVING DANGEROUS GOODS CARS IN ALBERTA (2004-2014)



Source: Transportation Safety Board

Technology

According to the Railway Association of Canada, railways have been making efforts to improve rail safety by employing new technologies, such as the use of LED lights and retro-reflective material at railway crossings to increase the visibility. It is too soon to tell how well these are working. In the U.S., the Federal Railroad Administration recently announced Google maps would incorporate its data to create audio and visual alerts for drivers approaching rail crossings.

Public Safety

Canada and the U.S. both have national organizations that work to prevent train-vehicle collisions by raising public awareness. CN and CP run active sustainability programs and provide annual reporting that is available on their corporate websites. Both railways operate a police force, which protects the public from direct interaction with railway equipment by preventing access to rail corridors and rail yards. A public outreach program supported by both railways is rail safety week and Canada's Operation Lifesaver, jointly funded by the Railway Association of Canada and Transport Canada. The Canada West Foundation has not assessed the efficacy of these programs.

In November 2013, after the disaster at Lac-Mégantic, Que., the federal Minister of Transport called for a review of the “Canadian transportation safety regime for the safe transportation of dangerous goods and the role of safety management system (SMSs) across all modes of transportation.” That review led to the implementation of many policy and regulatory changes intended to improve and strengthen the transportation system in Canada.⁷³

Transport Canada released new Grade Crossings Regulations in December 2014 that outline regulations related to the space needed for vehicles to safely queue at grade crossings during railway operations. The minimum storage distance is the amount of space required between a provincial highway/road and the nearest rail track to adequately store queued vehicles under various train and vehicle volumes and different types of highway/road intersection traffic controls.

The regulations specify two requirements:

- 01** Jurisdictions must ensure all applicable grade crossings comply with the new regulation within seven years of the regulations coming into force (approximately December 2021).
- 02** Road authorities and rail authorities must meet information-sharing requirements within two years of the regulations coming into force (approximately December 2016).

Some crossings in Alberta have insufficient storage distances to meet the minimum standards under these regulations.

Environment

Transporting commodities by rail can play a role in minimizing Alberta’s transportation emissions. Rail is environmentally friendly from a greenhouse gas perspective compared to alternatives. One tonne of freight is moved 198 kilometres on a single litre of fuel.⁷⁴

Capital investment in new locomotive engines will provide opportunities to reduce emissions further. In 2015, locomotive engine manufacturers introduced a new series of engine that meets the US EPA Tier 4 locomotive emissions

standards, which came into effect on Jan. 1, 2015. The Tier 4 engines are reported to reduce NOx (nitrogen oxide) and particulate emissions by at least 70% from Tier 3 standards without using after-treatment.⁷⁵

Safety & Environment Recommendations:

22 INVEST IN SAFETY AND EFFICIENCY

IMPROVEMENTS. The province should identify high-risk/high-traffic grade separation projects and develop a long-term infrastructure investment plan to improve the safety at rail crossings. The province could also look at cost-sharing mechanisms to assist municipalities in undertaking these infrastructure investments.

- 23 SUPPORT INNOVATION.** The province could support technology innovation to improve rail safety by allowing pilot projects to be tested in the province.

- 24 RAISE PUBLIC AWARENESS.** Alberta might consider launching its own rail safety campaign, with online ads and infographics shared on social media. Alberta Education could ensure teachers are aware of resources for students available through Operation Lifesaver, especially in districts with higher incidents of crossing accidents.

25 VEHICLE STORAGE DISTANCE AT GRADE CROSSINGS.

Some rail crossings in Alberta have insufficient vehicle storage to meet the new federal Grade Crossings Regulations minimum standards. (The minimum storage distance is the amount of space required between a provincial highway/road and the nearest rail track to adequately store queued vehicles safely.) Although some crossings can be grandfathered, adjustments will be needed once there is a change in road traffic, rail operation at the crossing or developments in the area. Modifying the storage distance to meet minimum standards will improve safety.



APPENDIX A

Maximum Revenue Entitlement

The Maximum Revenue Entitlement (MRE) was introduced in 2000 to transition grain farmers from the previous fixed-freight rate for grain to a market rate. It remains in place.

The MRE formula determines the maximum revenue the railways can generate from moving regulated grain for each grain year.⁷⁶ Revenue earned on grain shipped to the ports of Vancouver, B.C., Prince Rupert, B.C., and Thunder Bay, Ont., is counted in the MRE formula, but grain shipped to the United States is exempt. The formula is recalibrated annually using an inflation rate set by the *Canada Transportation Act* (CTA) – the Volume Related Composite Price Index (VRCPI). It adjusts the revenue limit to accommodate increased volumes and distances. While the intent is not to limit shipments, once the railway has reached the maximum rate yield, it has to pay penalties. The railways have exceeded the cap 11 times over the past 15 years coming within plus or minus 1% almost every year.⁷⁷ In the early years of the MRE, improvements in efficiency helped the railways keep below the limit. As railways approach limits to how much they can improve efficiency, the MRE will present an increasing problem for the railways.

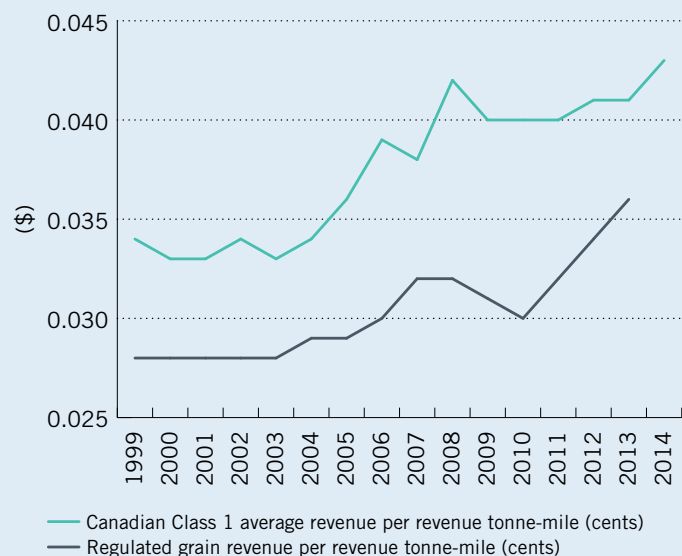
Excess funds and penalties paid by the railways since the MRE was introduced has totalled an estimated \$91.6 million.⁷⁸ (It should be noted that more than \$70 million was attributable to a recalculation of maintenance expenses, correcting a miscalculation going back to the beginning of the program.) Funds in excess of maximum revenue and penalties are paid into the Western Grains Research Foundation (WGRF) Endowment Fund, which supports crop research in western Canada.⁷⁹

The rate of inflation (VRCPI) is set on the previous year's cost base and is not amended to reflect updates to current year forecasts. The revenue cap for a crop year varies with the volume moved in that crop year. For each crop year, the MRE fixes the maximum average price for all regulated traffic – essentially a maximum revenue per tonne. In practice, the railways can only use price to signal changes in demand and supply up to the maximum average revenue tonne measured over a crop year.

At issue for the railways is the fact that the MRE makes it impossible to use pricing to signal a more efficient seasonal demand pattern. This is because additional revenues in one period must be offset by equivalent reductions at other times. Railways are discouraged from making investments to accommodate surge capacity for unexpected peak seasons or years, as revenue is capped in each year by the actual volume moved. Railways cannot keep excess revenues and yet shortfalls are unrecoverable.

Figure A1 shows a gap exists between the revenue tonne per mile earned by the railways for moving grain and that of the total freight rate. The differential between the two rates shows the railways are receiving less for moving grain than they get for moving all freight. It should be noted these are average freight rates and do not take into account the distance travelled or number of tonnes transported per load for each commodity. Also, freight rates for commercial grain sit in the same bandwidth as rates for regulated grain.

**FIGURE A1: GRAIN FREIGHT REVENUES PER TONNE MILE,
ALL RAILWAY FREIGHT AND REGULATED GRAINS (1999-2013)**



Source: Railway Association of Canada, Quorum Corporation

The regulated grain rate has increased 29% from 1999-2013 while the rate of inflation over the same time period has increased by 34%. Over the same period, the average revenue per tonne-mile for all freight has increased by 23%.

The MRE acts as a deterrent to efficient operations in the grain supply chain. It provides for differential pricing subject to a revenue ceiling. A market rate for grain could eliminate the resistance of railways to invest in more efficient hopper cars as the current fleet retires. In its submission to the CTA Review Secretariat, the Alberta Ministry of Agriculture and Forestry recommended a comprehensive review of the MRE methodology to remove disincentives to investment in rail capacity.

APPENDIX B

Government-owned hopper cars need replacement

Of the estimated 22,500 hopper cars in the grain handling system, about 10,200 government-owned hopper cars are leased to CP and CN. The railways use them to haul regulated grain (Table B1). This is down from the 15,500 hopper cars owned by governments in the 1970s and 1980s.⁸⁰ About one-third of the government-owned cars have been retired from service because they are old and in poor mechanical condition.

The federal government owns about 8,400 of the cars and the governments of Saskatchewan and Alberta each own 900 hopper cars. Under each government's respective car-lease arrangements with CP and CN, hopper cars are available at no charge to the railways to ship statutory grains to western ports. CP and CN are expected to pay a leasing fee if the hoppers cars are used to haul non-statutory grains and for shipment of grains to destinations other than the western ports, such as eastern Canada and the U.S. Under the leasing agreement, the railways are responsible for maintenance and refurbishment of the cars. In 2014, the federal government received \$13 million in revenue from leases and \$4 million from salvage operations involving damaged and destroyed cars. The Saskatchewan Grain Car Corporation received about \$2 million in revenue from leases.

Alberta's operating agreement with the railways is administered through the Ministry of Agriculture and Forestry. The lease with the railways generates about \$1 million annually for the province. The cars, which were purchased in 1980 and 1981, are expected to be retired in 2030-2031.

Background on hopper car ownership

In 2002, the Farmer Rail Car Coalition (FRCC) proposed to purchase the federal government rail car fleet for \$205 million, plus other considerations. The FRCC included western grain producer groups, agricultural associations and rural government organizations. The Saskatchewan government was prepared to provide the FRCC with up to \$450,000 in funding and in-kind technical support to develop a business plan to buy the federal government's hopper car fleet. A purchase agreement was not concluded and the government subsequently decided to retain ownership and negotiate an agreement on behalf of the farmers and grain companies with CN and CP.

TABLE B1: NUMBER OF HOPPER CARS IN CANADA'S RAILWAY SYSTEM

DESCRIPTION	2013
Total freight cars, mainline railways	53,302
Total hopper cars, mainline railways	21,447
Percentage of hopper cars of total freight cars, mainline railways	40.2%
Total freight cars, regional rail lines	2,578
Estimated number of hopper cars, regional rail lines	1,037
Estimated total number of hopper cars, mainlines and regional rail lines	22,484
Number of government-owned cars (leased to mainline and regional railways)	10,213
Estimated percentage of government-owned hopper cars to total hopper cars in rail system	45.4%

Source: Statistics Canada, Cansim Table 404-0017 and 404-0018, Canada West Foundation

The grain industry and railways have discussed for years how hopper cars are to be replaced. The maximum service life for government hopper cars is 50 years for Canada and Saskatchewan, and 40 years for Alberta. Provincially owned hopper cars, built in 1980 and 1981, will be retired in 16 years, at the latest. All Alberta hopper cars will be retired by 2020 or 2021.⁸²

Most of the 8,400 cars owned by the Canadian government were built between 1974 and 1985 (only a few cars were built after 1985, using a scrapped cars fund). The expected latest retirement year for Canada's cars will be between 2024 and 2035, given their maximum life of 50 years.

Replacement of the existing hopper cars by either grain shippers or the railways has centred on the MRE. The railways insist the MRE does not allow for sufficient revenues to justify replacing the hopper cars. Newer designs offer increased capacity with shorter loading and unloading times. More grain could be shipped using longer trains with the more efficiently designed cars, increasing the efficiency of delivery.

Solutions

If the Government of Alberta chooses not to replace its hopper car fleet, alternative financing and ownership arrangements should be considered. The railways and some

economists argue that removing the MRE and replacing the revenue cap with a competitive railway rate structure for grain would open the way for increased investment of new hopper cars.⁸³ The MRE could be replaced by a competitive railway rate structure to include a variable rate and a contribution towards fixed costs. The fixed cost portion would be available to replace the retiring hopper cars.

The Alberta government could encourage shippers to buy new hopper cars by providing an investment tax credit. Another option is to try an accelerated capital cost allowance to farmers and grain shippers to purchase replacement hopper cars that would end after the existing provincial government hopper cars have been replaced.

Alternatively, the federal government and western provinces, or Alberta, could establish a standalone corporation to own and operate hopper cars for the GHTS. Canpotex is one possible model; another is a joint-ownership model, such as the one used for flatbed railcars that carry transport containers. A similar model could be established with joint-ownership of the hopper car fleet. Such a model could include a mandate to set up operating agreements with the railways and re-invest earnings into upkeep of existing equipment and purchase of new equipment.

TABLE B2: GOVERNMENT-OWNED HOPPER CAR INVENTORY, 2015

GOVERNMENT	NUMBER OF HOPPER CARS IN SERVICE	YEAR PURCHASED	EXPECTED RETIREMENT YEAR	ESTIMATED COST OF REPLACEMENT (\$ MILLIONS)
Canadian Grain Commission	8,410	1974, 1975	2014, 2025	\$630 – \$800
Saskatchewan ⁸¹	902	1981	2030	\$68 – \$86
Alberta	900	1980, 1981	2030, 2031	\$68 – \$86
Total hopper cars	10,213			\$765 – \$969

Source: Canadian Grain Commission Annual Report, Saskatchewan Crown Corp Annual Report, Alberta Ministry of Agriculture

ENDNOTES

- ¹ Intermodal shippers can use a combination of train, truck and ocean vessel to transport goods. The benefits of using containers to ship is that it can reduce the amount of material handling needed saving on product damage, reduces security issues, cost-effective over long-distances, reduces the transportation carbon footprint, and makes it possible for shippers to provide door-to-door service.
- ² Dr. Peter White, Dr. Chris Carter and Prof. Ross Kingwell, "The puck stops here! Canada challenges Australia's grain supply chains," *Australian Export Grains Innovation Centre*, 2015, 18.
- ³ Class 1 railways operate on main lines and are defined as having an annual revenue exceeding \$250 million for two consecutive years. Canada has two Class 1 railways – CN and CP, both of which operate in Alberta.
- ⁴ State of logistics: the Canadian report 2008, Industry Canada.
- ⁵ Intersection, John Kaliski et al, Site Selection, March 2010.
- ⁶ CIAC Competitiveness Scorecard – Chemical Sector, Alberta 2015-2016
- ⁷ Penalty charges assessed against a shipper for a delay in loading or unloading of a shipping vessel (usually after 72 hours).
- ⁸ <http://www.bloomberg.com/news/articles/2014-02-06/japan-turns-to-u-s-wheat-amid-delays-in-shipments-from-canada>
- ⁹ Japan-Alberta Relations, Government of Alberta, October 2015.
- ¹⁰ Consolidated traffic projections and network needs assessment, British Columbia Ministry of Transportation and Infrastructure, October 2014.
- ¹¹ There are 2,767 public crossings in Alberta that fall under federal jurisdiction.
- ¹² Transportation Safety Board.
- ¹³ National Energy Board, Crude oil and petroleum products, <https://www.neb-one.gc.ca/nrg/ststsc/crdlndptlmpdct/index-eng.html>
- ¹⁴ Transportation Safety Board of Canada, Railway investigation report number R05E0059.
- ¹⁵ Emergency Directive 33 Pursuant to Section 33 of the *Railway Safety Act* Rail Transportation of Dangerous Goods.
- ¹⁶ Canada – National inventory report 1990-2013 – Part 3, Table A10-18, 1990-2013 GHG emission summary for Alberta.
- ¹⁷ Quorum, *Railway Capacity Background & Overview*, 10/12/05, <http://www.quorumcorp.net/Downloads/Papers/RailwayCapacityOverview.pdf>
- ¹⁸ Freedom in western grain movement, Dr. Barry Prentice and Dr. Graham Parsons, January 2015.
- ¹⁹ Prentice and Parsons, January 2015.
- ²⁰ The railways do not recognize the methodology and presentation of information provided in the AG Transport Coalition weekly reports.
- ²¹ 21 mph is CP's 2015 YTD average train speed, reported in its 2015 third quarter update.
- ²² CN, "Train Velocity and Dwell Report," November 11, 2015.
- ²³ Canadian Energy Research Institute, "Ribbons of steel: linking Canada's economic future," 2015.
- ²⁴ Discussion Paper: *Canada Transportation Act* Review, The Honourable David Emerson, October 2014.
- ²⁵ Dr. Peter White, Dr. Chris Carter and Prof. Ross Kingwell, "The puck stops here! Canada challenges Australia's grain supply chains," *Australian Export Grains Innovation Centre*, 2015, 4.
- ²⁶ Association of American Railroads, "Background Paper: Railroads and Grain," July 2015.
- ²⁷ Dr. Peter White, Dr. Chris Carter and Prof. Ross Kingwell, "The puck stops here! Canada challenges Australia's grain supply chains," *Australian Export Grains Innovation Centre*, 2015.
- ²⁸ Rail service is on the right track, Financial Post, August 9, 2012.
- ²⁹ Association of American Railroads, "Background Paper: Railroads and Grain," July 2015.
- ³⁰ Research undertaken by Travacon Research Ltd., suggests that for the crop year 2013-14, the railways earned a contribution from the movement of statutory grain that covered 61% of their volume-related variable costs. This is well over the 20% contribution deemed fair and adequate under the Western Grain Transportation Act.
- ³¹ Mining's message to policymakers: don't drop the ball, Pierre Gratton's speech to the Economic Club of Canada, May 27, 2015.
- ³² Alberta's international exports by industry, a 10-year review, 2004-2014, Alberta Government, 2015.
- ³³ Grain Stocks, USDA National Agricultural Statistics Service (NASS), January 12, 2016.
- ³⁴ CP under and CN over western grain revenue entitlements for crop year 2013-14, Canadian Transportation Agency, December 18, 2014.
- ³⁵ Wider differentials bump crude-by-rail shipments to 116,000 bpd in Q3, Dan Healing, Calgary Herald, November 25, 2015.
- ³⁶ Quorum Monthly Report, October 2015 Data Tables, Table 3A-1 Q.

- 37 Orders specifying the minimum amount of grain to be moved, SOR/2014-189 August 1, 2014, *Canada Transportation Act*.
- 38 The impact of rail access on Saskatchewan's export potential, The Conference Board of Canada, March 2015.
- 39 Perspective on supply chain monitoring, CN for the Pacific Gateway Alliance/New West Partnership, Regina, November 2, 2015.
- 40 Canadian Wheat Board, <http://www.thecanadianencyclopedia.ca/en/article/canadian-wheat-board/>
- 41 Seven Canadian grain companies: Cargill, Louis Dreyfus, Parrish & Heimbecker, Paterson Global Foods, Richardson International, Viterra (Glencore), G3 Global Grain Group.
- 42 Shipping containers popular for exports, Brian Cross, The Western Producer, June 4, 2015.
- 43 Confidential interview conducted with an Alberta exporter – Alberta Ministry of Energy.
- 44 Survey of innovation and business strategy, advanced technology use, by North American Industry Classification System (NAICS), Statistics Canada cited in, Discussion Paper: *Canada Transportation Act* Review October 2014, Honourable David Emerson.
- 45 The Government of Canada selected Quorum Corporation to serve as the Monitor of Canada's Grain Handling and Transportation System (GHTS) in June 2001. Under this mandate, Quorum Corporation provides the government with a series of regular reports relating to the system's overall performance (available publicly).
- 46 Dispatch earnings are bonuses paid to shippers for early fulfillment.
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- 65 There are 370 primary and process facilities in the grain-handling sector. In western Canada, only 18 of these facilities are dual served or capable of interswitching (150 facilities are capable of interswitching under the extended parameters set to sunset on August 1, 2016). These 18 facilities represent around 10% of total grain handling system capacity leaving 90% of system capacity captive to one railway. Source: PGA working group meeting on performance and market access: grain monitoring program overview, Quorum Corporation, Regina, SK, August 18, 2015.
- 66 *Canada Transportation Act*, Section 5, National Transportation Policy.
- 67 Facilitator's final report - service agreement template and commercial dispute resolution process, Appendix D, <https://www.tc.gc.ca/eng/policy/acg-acgb-menu-3011.htm#ab>
- 68 Data obtained from the Transportation Safety Board.
- 69 City requests funding for infrastructure projects, Dawn Smith, <http://www.airdrieecho.com/2015/03/31/city-requests-funding-for-infrastructure-projects>
- 70 A trans-loading site is where a shipment is moved from one form of transportation mode to another.

- ⁷¹ Industrial rail lines are partly or wholly operated within the confines of an industrial site and only transport goods or commodities related to the site. There are 326 industrial railways in Alberta, totaling about 838km of track (eight per cent of total track in the province). The province regulates industrial lines.
- ⁷² Statistics from the Transportation Safety Board for dangerous goods do not cover incidents on a provincial track due to a provincial operator.
- ⁷³ Review of the Canadian transportation safety regime: transportation of dangerous goods and safety management systems, Report of the Standing Committee on Transport, Infrastructure and Communities, Larry Miller, Chair, 41st Parliament, Second Session, March 2015.
- ⁷⁴ Rail freight greenhouse gas calculator, Railway Association of Canada, <http://www.railcan.ca/environment/calculator>
- ⁷⁵ GE Transportation completes testing of Tier 4 engine, 10 Apr 2015, EMD unveils its first Tier 4 diesel locomotive, Railway Gazette, October 2015.
- ⁷⁶ A review of the Maximum Revenue Entitlement, Quorum Corporation, <http://grainmonitor.ca/Downloads/Papers/MaximumRevenueEntitlementFactandMyth.pdf>
- ⁷⁷ Prentice and Parsons, January 2015.
- ⁷⁸ Penalties levied against the railways for the crop year 2013-14 and 2014-15 were estimated by CWF based on historic averages using data from the Canadian Transportation Agency and Western Grains Research Foundation.
- ⁷⁹ Western Grains Research Foundation, Endowment Fund Overview, <http://westerngrains.com/endowment-fund/overview/>
- ⁸⁰ Of the 15,500 hopper cars, number of cars purchased by governments: Canada – 13,500; Saskatchewan – 1,000; and, Alberta – 1,000. Transport Canada annual report, 2014.
- ⁸¹ Hopper cars in Saskatchewan are administered by the Saskatchewan Grain Car Corporation (SGCC) a crown corporation, using commercial leasing agreements.
- ⁸² Information on hopper car service life provided by CN, email to Canada West Foundation, March 7, 2016.
- ⁸³ Prentice and Parsons, January 2015.

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