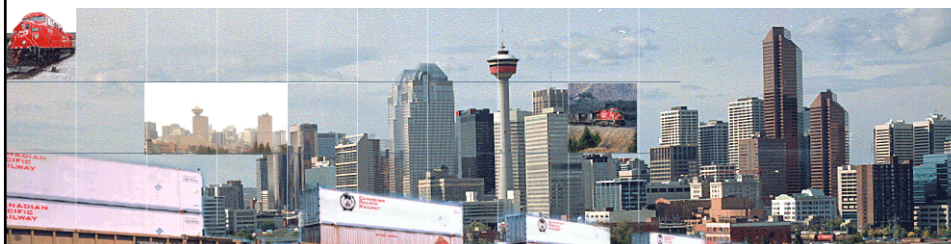


## Intermodalism What Works and What Does Not



Dr Malcolm Cairns, Director, Business Research, Canadian Pacific Railway

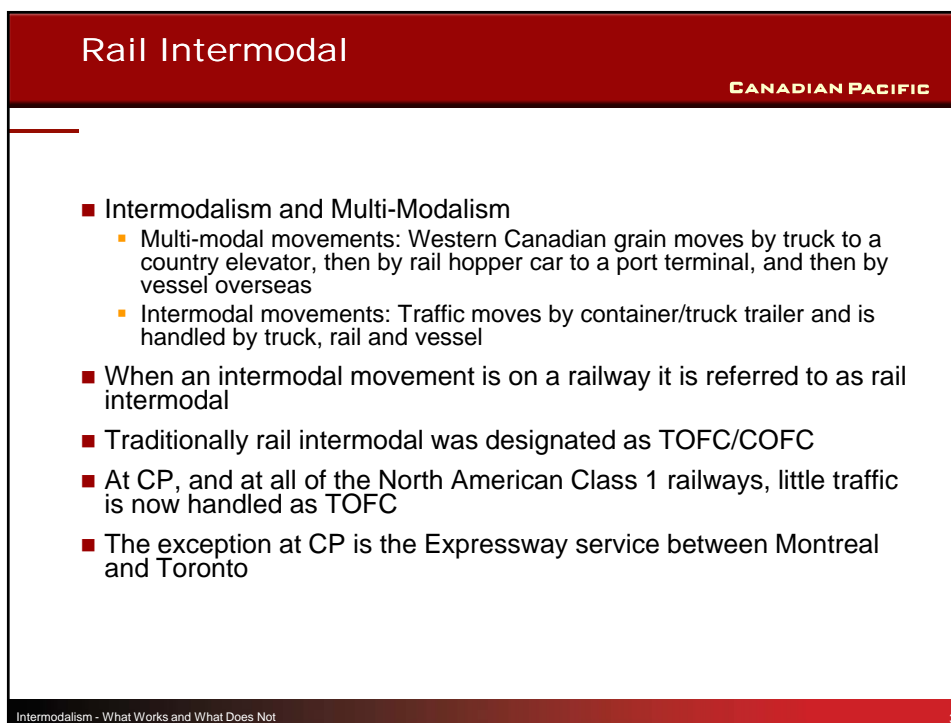
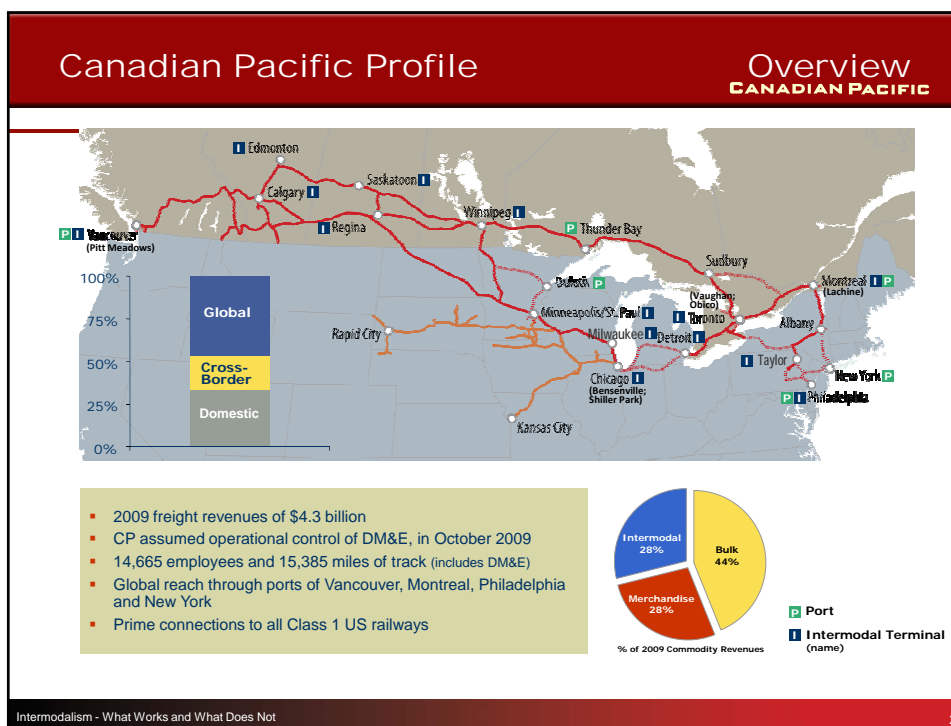
The Asia Pacific Gateway and Corridor Initiative, Toronto Workshop  
June 17-18, 2010

**CANADIAN PACIFIC** Ingenuity.

### Outline

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- Canadian Pacific Profile
- Rail Intermodal
- The Demise of TOFC
- Intermodal at CP – General
- Intermodal at CP - Traffic
- What Works, What Does Not Work - Overview
  - Operations
  - Facilities
  - Investment
  - Management
- Supply Chain Developments
  - Recessionary Impacts
  - Looking to the Future
- Conclusions



## The Demise of TOFC

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- TOFC service required that the trailer be reinforced at each end to protect the goods from damage due to the horizontal forces from the slack-action between the flat cars
- This required the creation of a specialized – and more expensive fleet of trailers – and the need to manage the fleets in separate services
- These issues led to the creation of specialized rail services such as Roadrailer and Expressway
- Expressway at CP moves the trailers on specialized flat cars that are multiple lengths and have unique couplings that reduce the horizontal forces
- Expressway can safely handle any over-the-road trailer
- Nevertheless, trucking companies are the shippers on Expressway, and the low-margin economics do not make for a very profitable rail business

Intermodalism - What Works and What Does Not

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## Intermodal Profile at CP - General

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- Rail Intermodal service at CP now has two components:
  - International Intermodal: The movement of marine containers between ports and inland terminals
  - Domestic Intermodal: The movement of road containers between terminals across the continent – including ports
- Marine containers are the ribbed-strengthened TEUs and FEUs
- Road containers are the 53 foot and 48 foot containers that are not so strengthened
- From an efficiency perspective, FEUs and 53 foot containers are preferred, but circumstances still require the significant use of TEUs and 48 foot containers
- Expressway service is designated for convenience as domestic intermodal

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## Intermodal Profile at CP - Traffic

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2009 Intermodal	CP
Freight Revenues - C\$ Millions	\$1,198
Freight Revenue per RTM - Cents	5.11
Containers - Thousands	962.9
Freight Revenue per Container	\$1,244

Intermodal Containers

30% International, 70% Domestic

Intermodal Revenues

43% International, 57% Domestic

- Domestic business consists primarily of retail goods moving in containers between eastern and western Canada and to and from the U.S.
- International business handles containers of mainly retail goods between the ports of Vancouver, Montreal, New York/New Jersey, Philadelphia, and inland Canadian and U.S. locations.

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## What Works, What Does Not Work - Overview

**CANADIAN PACIFIC**

- The invention of the container was arguably the most important transportation advance of the 20<sup>th</sup> Century

	WORKS	DOES NOT WORK
<b>OPERATIONS</b>	Double stack rail flat cars, longer trains, terminal automation TTX flat car pool Shipping line ownership of marine containers - flexibility to return empty with market demands Co-production in Vancouver	Cabotage regulation - now amended Remission lists Requirements to provide equal service to low density terminals
<b>FACILITIES</b>	Integrated Logistic Centres	Uncertainty from extensive Environmental Assessment processes
<b>INVESTMENT</b>	Contributions to Gateway infrastructure - Roberts Bank Rail Corridor Financial contributions commensurate with public benefits	Pressure to invest in inland terminals without a valid business case
<b>MANAGEMENT</b>	Planning for adverse winter weather and outages	Inadequate forecasting of demand - lack of visibility of long-term plans of shipping lines - Bunching of vessel arrivals at port with no consequences

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## Operations Fluidity - 1

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- The use of double stack rail flat cars has significantly increased the throughput capacity for intermodal
  - However, rail infrastructure can sometimes limit these operations – for example, the CP Windsor-Detroit tunnel clearances
- The use of longer trains coupled with distributed power also increases the throughput capacity
  - This has required rail infrastructure enhancements – such as siding extensions and signaling on the CP western corridor
- The handling of containers at highly automated terminal facilities is another development to increase throughput capacity
  - The CP Vaughan terminal in Toronto is an excellent example

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## Operations Fluidity - 2

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- The North American rail industry has a pool of flat cars owned by TTX which is itself jointly owned by the Class 1s
  - CP uses these TTX cars for some 75% of its intermodal movements, and this pooling generates operational efficiencies
  - Car pooling is provided antitrust immunity in the US – this may be at risk from proposals to re-regulate the industry
- Generally shipping lines own the marine containers
  - Under pre-recessionary conditions, there was a traffic imbalance with the dominant demand from Asia to North America
  - The pricing was therefore higher in the eastbound direction, and shipping lines were keen to have the containers return to Asia as soon as possible to take advantage of the higher prices
  - Demands to use this empty westbound backhaul at low price from Prairie interests was contrary to the demands of the market

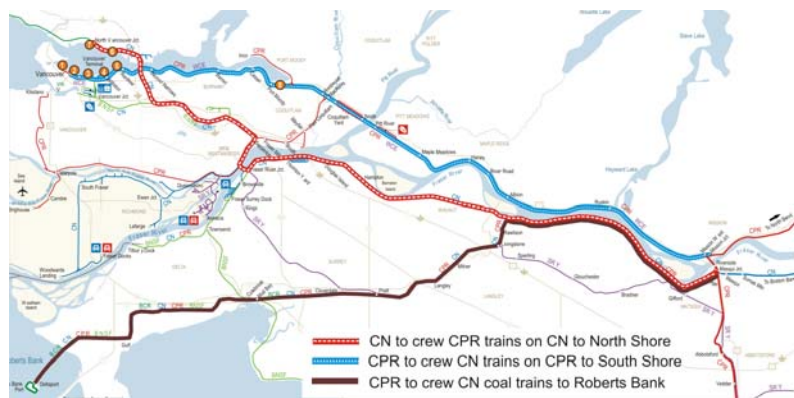
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## Operations Fluidity – Co-Production in Vancouver

CANADIAN PACIFIC

*Railways creating capacity and velocity by working together as partners*



### Operating Concept

- CP serves South Shore Terminals
- CN serves North Shore Terminals
- CP and CN service Roberts Bank and Deltaport

### Benefits

- Increased capacity and service levels by eliminating handoffs in Vancouver area

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## Operations Impediments - Cabotage

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- Canadian legislation restricted the importation of international containers to 30 duty free days and one domestic move that is "coincidental and consistent" to the direction of the import or next export movement. Under the Canadian post audit system, "pool operators" could maintain an inventory of equipment duty-free in Canada for a 180-day period provided they receive approval from the Canada Border Services Agency (CBSA)
- US legislation allows for unfettered domestic moves, utilizing international marine movements from any port of entry to any port of export for a period of 365 duty-free days. The one-year grace period can be extended up to three years
- Federal Budget 2009 announced steps to facilitate the movement of goods by improving the Customs Tariff rules respecting the treatment of temporarily imported cargo containers, by undertaking consultations with respect to further liberalizing the use of these containers in Canada
- New rules now conform with those in the US

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## Operations Impediments – Remission Lists

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- There are existing complex rules that require rail cars manufactured in the US be placed on “remission lists” when used in Canada
- CBSA has recently made new remission proposals:
  - 90 days of temporary utilization per calendar year allowed
  - The new rules oblige CP to count the days per month, and submit a B3 entry per quarter per railcar
  - The railcar’s value must be stated, even though CP would likely have no mechanism to ascertain value if the equipment is not owned by CP
  - It would be a significant capital investment to design programs to capture this data
  - Railcars utilized for longer than 90 days, would be subject to entry requirements, and unless NAFTA certification is available, duty is applicable
- These new rules would apply to part of the CP flat car fleet
- Overall, this is an onerous administrative burden that the Canadian government is placing on Canadian Railways, which serves no value-added purpose, and one which does not affect US rail carriers
- The impact if imposed would likely be to restrict car supply in Canada

## Operations Impediments – Equal Access

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- Combined with the fact that empty containers are generally backhauled west, lower density intermodal terminals on the Prairies do not receive the same frequency of rail service as terminals in Toronto, Chicago and Vancouver
- Calls to provide “equal access” to westbound containers and trains, misunderstand the economics of rail intermodal traffic
- Premium service provided to transcontinental movements would deteriorate significantly if it were mixed more with local service. It is already hampered by fewer economies of density compared with US railroads
- CP operates a “hub and spoke” intermodal business around major centres, and this market reality needs to be recognized

## Facilities – Integrated Logistics Centres

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- To support the growing demand for rail intermodal service and optimize the efficiency of these operations, new facility types have evolved, beginning in the US. A number of advanced intermodal facilities – called integrated logistics centers ILCs – have, and are, being developed in Canada
- The ILC takes advantage of co-locating a rail intermodal terminal with distribution facilities significantly reducing logistics costs and improving service by eliminating unnecessary intermediate truck based transfers from rail to more remote distribution centers
- CP has existing ILCs and is in process of developing more
  - Vaughan in Toronto – under expansion
  - Les Cedres in Montreal – under development
  - Relocation of terminals in Edmonton and Regina
- Customers co-locating with CP include Loblaws, Sears and Canadian Tire

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## Facilities – ILC Benefits

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BENEFIT CATEGORY	BENEFIT/IMPACT METRIC	DESCRIPTION
Economic Development	Business output	Gross output, measured by the total value of purchases by intermediate and final consumers
	Value added	Net output, i.e. employee compensation and property income (interest, rent and profits)
	Employment	Number of full-time and part-time jobs by industry (warehousing, transportation, distribution, manufacturing, etc.)
	Labor income	Salaries and wages earned
	Tax revenue	Tax revenue (property tax, income tax, etc.) at the local, state and federal levels
	Redevelopment	Redevelopment of underutilized land (e.g., old military facilities)
Production Process	New businesses	Ability to retain existing businesses and attract new businesses to the area
	Number of residential properties	Change in the number of residential properties
	Residential property value	Change in the value of residential properties
	Freight volume	Increase in the volume of freight carried
Environment	Logistics cost	Decrease in logistics cost
	Transportation cost	Decrease in transportation cost (e.g., drayage cost may be entirely eliminated)
	Transportation network	Efficiency of assets associated with transportation network expansion
Congestion Relief	Synergy and market access	Better access to input and output markets
	Fuel consumption (or energy intensity)	Reduction in fuel (or energy) consumption as a result of a shift from truck to rail or technology advances reducing truck processing time at intermodal facilities
	Air quality	Reduction in emissions of pollutants (nitrogen oxides, volatile organic components, sulfur oxides, particulate matter of 10 microns or less, carbon monoxide) and greenhouse gases (carbon dioxide)
Safety	Noise and vibrations	Reduction in vibrations and noise level. The length and the timing of exposure should also be considered.
	Traffic	Reduction in truck traffic on highways
	Travel time	Reduction in delays experienced by all users of the highway network
Security	Travel time reliability	Increase in travel time reliability
	Vehicle operating cost	Reduction in cost of per-unit expenses associated with owning, operating, and maintaining a vehicle (fuel consumption, oil consumption, maintenance and repairs, etc.)
	Capital and O&M savings to governments	There is less pressure on government tax revenues to pay for road construction and maintenance
Urban Renewal	Property damage only accidents	Reduction in the number and cost of property damage only accidents
	Injury accidents	Reduction in the number and cost of injury accidents
Urban Renewal	Fatal accidents	Reduction in the number and cost of fatal accidents
	Criminal acts	Reduction in criminal acts (e.g., thefts)
Urban Renewal	Smuggling of illegal/controlled substances and materials	Interception of illegal/controlled substances and materials
	New prime land in urban centre	As new ILCs are built outside of city cores they often displace existing facilities in what are now densely populated urban areas
Urban Renewal	Reduced rail activity in urban centre	Reduction in noise pollution, grade crossings, etc in urban centres

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## Facilities – Uncertainty from EA Processes

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- Extensive Environmental Assessment (EA) processes increase the uncertainty and difficulty of building state-of-the-art, high efficiency facilities
- The administrative burden and the timelines can be unwieldy
  - For Les Cedres in Montreal, approval is required for the use of the land by the Commission de Protection du Territoire Agricole du Québec
  - For Wolverton in southern Ontario an extensive noise assessment was required for a site in the midst of farmland
- Interestingly, the federal government relaxed the EA rules for its recent “stimulus” projects
  - On March 19, 2009, the government published Regulations Amending the Exclusion List Regulations, 2007, (Exclusion Regulations) and the Infrastructure Projects Environmental Assessment Adaptation Regulations (Adaptation Regulations). In a nutshell, these regulations will exempt certain projects that are funded through the federal Building Canada Plan, from an environmental assessment under the Canadian Environmental Assessment Act (CEAA). The government has indicated that the combined effect of these new regulations will be to exempt up to 2,000 infrastructure projects from the requirements of CEAA over the next two years.
- A more general relaxation of the EA processes would be welcome

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## Investment – Gateway Infrastructure

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	Roberts Bank Rail Corridor	North Shore Trade Area	South Shore Trade Area	Total Partner Funding
Transport Canada	\$75	\$86	\$50	\$211
BC MOT	\$50	\$62	\$0	\$112
PMV	\$50	\$59	\$58	\$167
Municipalities	\$50	\$9	\$8	\$67
Translink	\$50	\$5	\$0	\$55
Railways	\$32	\$24	\$10	\$66
<b>TOTAL</b>	<b>\$307</b>	<b>\$245</b>	<b>\$126</b>	<b>\$678</b>

- The Roberts Bank Rail Corridor includes:
  - The provision of associated road closures/road detours/advanced warning systems/overpasses
  - Addresses the forecasted train traffic related to Roberts Bank developments to 2021, including Deltaport’s third berth and Terminal 2
  - Addresses the forecasted growth in population and employment, as well as the road transport networks and traffic to 2021
- Completion anticipated by the spring of 2014

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## Investment – Roberts Bank Corridor Grade Separations

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## Investment – Financial Contributions for Public Benefits

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- Railways need to make private investment in rail lines which will have positive externalities i.e. public benefits that cannot be internalized
- In 2003, CP faced a line capacity constraint between Toronto and Windsor and needed to invest, but the internal rate of return was inadequate
- At that time Expressway moved between Milton and Windsor, and was the lowest margin business in the corridor
- CP sought a financial contribution up to \$40 million, in line with the public benefits, which would make the project viable
- Absent a contribution, the CP Expressway service between Milton and Windsor was suspended indefinitely
- More recently governments are willing to follow an enlightened policy approach, but environmental enthusiasm for modal shift from road to rail is premature

### PART 1 : EXTERNAL BENEFITS

Marginal external 2000 costs of trucks in US cents per mile (1997 US Highway Cost Allocation Study) - converted to 2003 CDN cents per km	
- Congestion	5.41
- External accident costs	0.79
- Air pollution	3.42
- Noise	0.32
<b>Total - 2003 CDN cents per kilometre</b>	<b>9.9</b>
Kilometres between Milton and Windsor	320
Average number of trailers annually	68,000
<b>Total annual public benefits from savings in external costs</b>	<b>\$2,163,415</b>

### PART 2 : BENEFITS FROM NET REDUCTION IN HIGHWAY COSTS

Marginal highway costs - 2003 CDN cents per kilometre	12.7
Estimated reduction in truck kilometres	21,760,000
<b>Annual savings in highway costs</b>	<b>\$2,766,895</b>
Average truck fuel consumption - litres per 100km	40
Litres of fuel consumed by trucks	8,704,000
Ontario fuel tax rate - cents per litre for truck diesel	14.3
<b>Annual loss in fuel taxes paid by trucks to Ontario</b>	<b>(\$1,244,672)</b>
<b>Annual net reduction in highway costs</b>	<b>\$1,522,223</b>

### PART 3 : OTHER BENEFITS

Average litres per 100 trailer kilometre	28
Litres of fuel consumed by CPR Milton-Windsor	6,177,741
Ontario fuel tax rate - cents per litre for rail diesel	4.5
<b>Additional fuel taxes paid by CPR to Ontario</b>	<b>\$277,998</b>
<b>TOTAL ANNUAL PUBLIC BENEFITS</b>	<b>\$3,963,636</b>
<b>NPV AT 10% DISCOUNT RATE</b>	<b>\$39,636,362</b>

## Investment – Inland Terminals Need a Business Case

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- CP will invest in inland container terminals with a valid business case
- However, there are interests that would like inland container terminals scattered throughout a region – serving a multitude of small such terminals would reduce the efficiency of long haul service and would not be appropriate
- CP is developing the inland container terminal in Regina to serve Saskatchewan interests
  - Saskcan Pulse Trading is considering co-locating a transload facility
  - Pulses would be loaded into TEUs when available
  - Otherwise loaded into hoppers/box cars for shipment to west coast and subsequent re-loading into TEUs
  - Loblaws is also considering co-locating at the Regina terminal

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## Management – Winter Contingencies and Related Changes

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- CP develops annual winter plans as a contingency against adverse weather and outages
- Proactive Planning
  - Avalanche Zone monitoring
  - Ice removal programs
  - Cold slow movement program to reduce risks
  - Recovery contractors and equipment in place 24/7
  - Strategically place Intermodal cars close to Vancouver to mitigate disruption in car supply
- Capacity Creation
  - Ongoing line capacity expansion in the western corridor – enhanced sidings, multi-track, signals
  - Intermodal trains have increased lengths to 9,500 feet
  - Increasing density on Intermodal trains by adjusting the mix of 53' platform cars and 40' platforms
- Operations
  - Operating longer Intermodal trains in winter with distributed power



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## Management – Inadequate Demand Forecasts

CANADIAN PACIFIC

- This is a challenging issue. Accurate forecasts are required to avoid the inefficiency of supplying high-costs assets for only periodic use
- Domestic Intermodal
  - Shippers do not generally provide good forecasts – an exception is Canadian Tire
  - Room for improvement: traffic tends to arrive WTF – more off-peak arrivals would improve flow
- International Intermodal
  - 1-week vessel forecasts are accurate, 2-week forecasts are 80-90% accurate, longer-term forecasts unreliable
  - CP wants a more longer-term view 4-8 weeks out
  - The supply chain needs confidence that assets will be utilized: rail, trucking and labour pools
  - For example, additional rail crews must be contracted for 30 days, not just for a 4-day peak

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## Supply Chain Developments - Recessionary Impacts

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- Shipping lines extra slow steaming on key liner trade routes
  - Has absorbed additional container capacity
  - However, it has resulted in vessel bunching
  - At Deltaport, lines were persuaded to redesign their schedules
  - At Centerm, inability to adjust led to back-to-back arrivals
  - The supply chain needs a relatively balanced flow, with a spread in vessel arrivals, in order to provide superior performance
- Rail Retrenchment
  - When volumes declined significantly, CP parked cars and locomotives and furloughed train crews
  - This resulted in less fluidity during some periods
  - CP has now restored the assets
- Overall, the supply chain needs to evolve to handle variability better

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## Supply Chain Developments – Looking to the Future

CANADIAN PACIFIC

- CP is developing MOUs with terminals in Vancouver to improve supply chain performance
  - More consistency of service
  - Encourage block stowing/block loading to minimize handling
  - Improvements in EDI
  - Joint optimization of productivity improvements – modifying demand peaks benefits all stakeholders
- Supply chain participants are all being encouraged to operate 24/7
- Greater transparency
  - Sharing of a wider range of timely, accurate, metrics
  - Developed by all the stakeholders
- Improved Communication and Coordination
  - Regular coordination meetings
  - Will enable all participants – including CP – to react more quickly and effectively to changes in demand

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## Conclusions

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- Intermodalism is an enabler of globalization and is here to stay
- Rail plays a significant role and continues to evolve
- Commercial developments best serve the needs of the supply chain, government regulation tends to restrict such developments
- Private investment is a critical element, but there is a role for public financial contributions
- Increased transparency and improved communication and coordination will enhance supply chain performance

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