SYSTEM-WIDE PERFORMANCE MEASUREMENTS

TRANSPORT CANADA

April 2010
Agenda

1. Policy & Research Context
2. Fluidity
3. Other Related Projects
   1. Port Utilization Indicators
   2. Road Transport
   3. Air Cargo
   4. Total Logistics Costs
4. Long-Term Targeted Outcome
5. Conclusion & Next Steps
Policy & Research Context
Canada’s Gateways and Trade Corridors: System-wide Approach

Efficient, reliable and secure gateways to North America

Aligning trade & transportation

Integrated package of investments and policy aimed at enhancing Canada’s competitiveness

System-wide approach
System-Wide Approach to Gateways & Corridors: Reliability Measurement

- Looking at performance of Canadian and North American system through a Total Logistics and Global Value Chain lens.

- Objective: develop system-wide performance indicators that would allow for the periodic evaluation of Canada’s gateways and corridors’ performance and the competitiveness of our Gateways and Trade Corridors.

- Support the Department in the following ways:
  - Increase our ability to monitor major system choke points;
  - Support marketing initiatives of gateways & corridors, policy-making, environmental measures, air cargo competitiveness, Security and border crossings delays, and
  - Build a foundation/rationale to guide possible intervention/investment;

- 4 related projects:
  - Fluidity Indicator
  - Port Utilization Indicators,
  - Air cargo mapping, and
  - Total Logistics Costs Index
Integrated Research Approach

Reliability and efficiency of Canadian supply chains

Fluidity Indicator

Port Utilization Indicators

Air Cargo

$\$\$\$ Total Logistics Cost Index
Fluidity Project
Fluidity project: Project Rationale

• Objective:
  – measure total end-to-end transit times for commodities on strategic origin-destination markets
  – Develop a fluidity indicator (to avoid finger pointing and respect confidentiality)
  – Quantify variability and predictability of freight movements system-wide

• Phased approach:
  – **Phase 1: inbound Asia-Pacific gateways and corridors**
  – Phase 2: inbound Continental and Atlantic gateways and corridors
  – Phase 3: inbound North American gateways and corridors
  – Phase 4: outbound selected bulk commodities

• Project outcomes:
  – Time-series of transit times on major corridors
  – Measuring operational improvements in performance and reliability of Canadian supply chains
Project Methodology

• Partnerships
  – Industry
  – Texas Transportation Institute

• Data:
  – Ocean: Lloyd’s MIU, ocean carriers websites, Pacific Gateway Portal and (GT Nexus)
  – Ports: PUI (i.e. port authorities)
  – Trucking: Turnpike Technology and trucking fleets, (Shaw)
  – Rail: CN, (CP), (GT Nexus)
  – Air: Air Canada, (Korean Airlines), (Lufthansa), (KLM), (Cathay Pacific)

• Ultimate output:
  – Transit times per corridor
  – Aggregated fluidity index for Canada’s Gateways
## Phase 1 Corridors: Asia-Pacific

### CALGARY
- HK-CGY via PR
- HK-CGY via VAN
- SHG-CGY via PR
- SHG-CGY via VAN

### TORONTO
- HK-TOR via PR
- HK-TOR via VAN
- SHG-TOR via PR
- SHG-TOR via VAN

### MONTREAL
- HK-MTL via PR
- HK-MTL via VAN
- SHG-MTL via PR
- SHG-MTL via VAN

### CHICAGO
- HK-CHG via PR
- HK-CHG via VAN
- SHG-CHG via PR
- SHG-CHG via VAN
Pacific Gateway Fluidity
Synopsis

Shanghai / Hong Kong
Vancouver
Prince Rupert
Deltaport

Drayage to rail yard: XX

Rail transit: XX

RTD: XX

Drayage XX

DC

Chicago

Toronto

All truck transit: XX

RTD: XX

Drayage XX

DC

Shanghai / Hong Kong:
- Ocean Transit: XX

Vancouver:
- Inner-harbour CTS:
  - MTD: XX
  - Rail transit: XX
  - Rail Dwell: XX
- Deltaport:
  - MTD: XX

Prince Rupert:
- MTD: XX

Deltaport:
- MTD: XX

RTD:
- Rail terminal dwell

DC:
- Trucking
- Rail
- Marine

All truck transit: XX

Drayage XX

Winnipeg stop

RTD:
- Rail terminal dwell

RTD:
- Rail terminal dwell

All truck transit: XX
# Dissemination Strategy

<table>
<thead>
<tr>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>ORIGIN</td>
<td>ORIGIN</td>
<td>ORIGIN</td>
<td>ORIGIN</td>
</tr>
<tr>
<td>PUBLIC</td>
<td>PUBLIC</td>
<td>PUBLIC</td>
<td>PUBLIC</td>
</tr>
<tr>
<td>CONFIDENTIAL</td>
<td>CONFIDENTIAL</td>
<td>CONFIDENTIAL</td>
<td>CONFIDENTIAL</td>
</tr>
</tbody>
</table>

## Level 1
- End-End aggregated total

## Level 2
- Ocean transit
- ‘Gateway Dwell’
- Rail transit
- Inland destination dwell

## Level 3
- Ocean transit
- Destin. marine terminal dwell
- Port drayage / rail transit
- Rail dwell at depart. yard
- Long distance rail transit
- Rail dwell at arrival yard
- Drayage to DC

## Level 4
- Ocean transit
- Destin. marine terminal dwell
- Port drayage / rail transit
- Rail dwell at depart. yard
- Long distance rail transit
- Rail dwell at arrival yard
- Drayage to DC
### Level 1 – High Level Analysis Data

#### Table 1. Total Transit Times for Inbound Containers from Hong Kong to Toronto via B.C. ports, 2009

<table>
<thead>
<tr>
<th>Month</th>
<th>Year</th>
<th>Vancouver</th>
<th>Prince Rupert</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan</td>
<td>2009</td>
<td>24.9</td>
<td>21.7</td>
</tr>
<tr>
<td>Feb</td>
<td>2009</td>
<td>23.6</td>
<td>21.5</td>
</tr>
<tr>
<td>Mar</td>
<td>2009</td>
<td>23.1</td>
<td>22.5</td>
</tr>
<tr>
<td>Apr</td>
<td>2009</td>
<td>24.6</td>
<td>20.5</td>
</tr>
<tr>
<td>May</td>
<td>2009</td>
<td>22.4</td>
<td>19.9</td>
</tr>
<tr>
<td>June</td>
<td>2009</td>
<td>22.2</td>
<td>20.9</td>
</tr>
<tr>
<td>July</td>
<td>2009</td>
<td>22.2</td>
<td>20.6</td>
</tr>
<tr>
<td>Aug</td>
<td>2009</td>
<td>21.0</td>
<td>19.6</td>
</tr>
<tr>
<td>Sept</td>
<td>2009</td>
<td>21.8</td>
<td>21.8</td>
</tr>
<tr>
<td>Oct</td>
<td>2009</td>
<td>22.7</td>
<td>20.2</td>
</tr>
<tr>
<td>Nov</td>
<td>2009</td>
<td>21.7</td>
<td>19.9</td>
</tr>
<tr>
<td>Dec</td>
<td>2009</td>
<td>22.4</td>
<td>23.2</td>
</tr>
<tr>
<td><strong>Average 2009</strong></td>
<td></td>
<td><strong>22.7</strong></td>
<td><strong>21.0</strong></td>
</tr>
</tbody>
</table>

#### Average End-to-End Transit Time (days)
## Level 2 - Gateway Analysis Data

<table>
<thead>
<tr>
<th>Origin:</th>
<th>Hong Kong</th>
</tr>
</thead>
<tbody>
<tr>
<td>Destination:</td>
<td>Toronto</td>
</tr>
<tr>
<td>Via:</td>
<td>Port Metro Vancouver</td>
</tr>
<tr>
<td><strong>2009</strong></td>
<td><strong>A</strong></td>
</tr>
<tr>
<td>January</td>
<td>358.08</td>
</tr>
<tr>
<td>February</td>
<td>345.03</td>
</tr>
<tr>
<td>March</td>
<td>344.50</td>
</tr>
<tr>
<td>April</td>
<td>378.11</td>
</tr>
<tr>
<td>May</td>
<td>352.60</td>
</tr>
<tr>
<td>June</td>
<td>333.74</td>
</tr>
<tr>
<td>July</td>
<td>324.35</td>
</tr>
<tr>
<td>August</td>
<td>316.93</td>
</tr>
<tr>
<td>September</td>
<td>326.00</td>
</tr>
<tr>
<td>October</td>
<td>342.33</td>
</tr>
<tr>
<td>November</td>
<td>323.61</td>
</tr>
<tr>
<td>December</td>
<td>329.52</td>
</tr>
<tr>
<td>Average</td>
<td><strong>339.57</strong></td>
</tr>
<tr>
<td>% of Total</td>
<td>62.2%</td>
</tr>
</tbody>
</table>

**A** = Ocean Travel (Includes port dwell, drayage, rail dwell)

**B** = Gateway Dwell (At destination yard)

**C** = Rail Transit

**D** = Inland Destination Dwell

**E** = Total (in days)

**F** = Fluidity Indicator
# Level 3 – Segment Analysis Template

<table>
<thead>
<tr>
<th></th>
<th>Hong Kong</th>
<th>Toronto</th>
<th>Prince Rupert</th>
</tr>
</thead>
<tbody>
<tr>
<td>Port Metro Vancouver</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A - (Hrs)</td>
<td>B - (Hrs)</td>
<td>C - (Hrs)</td>
<td>D - (Hrs)</td>
</tr>
<tr>
<td>E - (Hrs)</td>
<td>F - (Hrs)</td>
<td>G - (Hrs)</td>
<td>H - (Hrs)</td>
</tr>
<tr>
<td>I - (Days)</td>
<td>J</td>
<td>A - (Hrs)</td>
<td>B - (Hrs)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C - (Hrs)</td>
<td>D - (Hrs)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E - (Hrs)</td>
<td>F - (Hrs)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>G - (Hrs)</td>
<td>H - (Hrs)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I - (Days)</td>
<td>J</td>
</tr>
</tbody>
</table>

A = Origin Port Dwell  
B = Ocean Travel  
C = Destination Port Dwell  
D = Port Drayage  
E = Rail Dwell @ Departure Yard  
F = Rail Travel  
G = Rail Dwell @ Arrival Yard  
H = Drayage to DC  
I = Total (In Days)  
J = Fluidity Index Indicator
Breakdown by Segment

1 = Ocean Travel
2 = Port Dwell
3 = Port Drayage
4 = Rail Dwell @ Departure Yard
5 = Rail Travel
6 = Rail Dwell @ Arrival Yard
7 = Drayage to DC
Variability in each Segment

Ocean Travel Time

Port Dwell

Rail Dwell @ Arrvl Yrd

Drayage to D.C.
## Level 4 – Detailed Statistical Analysis

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Via: Port Metro Vancouver</th>
<th>2009</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Mean</td>
<td>St. Dev.</td>
<td>85%</td>
<td>Mean</td>
<td>St. Dev.</td>
<td>85%</td>
<td>Mean</td>
<td>St. Dev.</td>
<td>85%</td>
<td>Mean</td>
<td>St. Dev.</td>
<td>85%</td>
<td>Mean</td>
<td>St. Dev.</td>
<td>85%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>January</td>
<td>358.08</td>
<td>4.73</td>
<td>391.79</td>
<td>78.24</td>
<td>1.17</td>
<td>0.95</td>
<td>1.65</td>
<td>15.20</td>
<td>1.96</td>
<td>16.52</td>
<td>118.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>February</td>
<td>345.03</td>
<td>4.57</td>
<td>369.16</td>
<td>65.28</td>
<td>1.17</td>
<td>0.95</td>
<td>1.65</td>
<td>14.00</td>
<td>1.76</td>
<td>15.16</td>
<td>118.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>March</td>
<td>344.50</td>
<td>5.27</td>
<td>351.41</td>
<td>53.76</td>
<td>1.17</td>
<td>0.95</td>
<td>1.65</td>
<td>14.70</td>
<td>1.59</td>
<td>16.06</td>
<td>118.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>April</td>
<td>378.11</td>
<td>9.22</td>
<td>365.37</td>
<td>71.76</td>
<td>1.17</td>
<td>0.95</td>
<td>1.65</td>
<td>14.90</td>
<td>1.61</td>
<td>15.49</td>
<td>105.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>May</td>
<td>352.60</td>
<td>8.37</td>
<td>374.10</td>
<td>44.16</td>
<td>1.17</td>
<td>0.95</td>
<td>1.65</td>
<td>14.40</td>
<td>1.61</td>
<td>13.84</td>
<td>105.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>June</td>
<td>333.74</td>
<td>5.25</td>
<td>351.12</td>
<td>57.60</td>
<td>1.17</td>
<td>0.95</td>
<td>1.65</td>
<td>13.50</td>
<td>0.44</td>
<td>13.46</td>
<td>105.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>July</td>
<td>324.35</td>
<td>4.78</td>
<td>357.91</td>
<td>67.68</td>
<td>1.17</td>
<td>0.95</td>
<td>1.65</td>
<td>14.00</td>
<td>1.48</td>
<td>15.60</td>
<td>105.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>August</td>
<td>316.93</td>
<td>2.71</td>
<td>345.42</td>
<td>50.16</td>
<td>1.17</td>
<td>0.95</td>
<td>1.65</td>
<td>14.70</td>
<td>0.79</td>
<td>11.69</td>
<td>105.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>September</td>
<td>326.00</td>
<td>4.26</td>
<td>370.57</td>
<td>57.12</td>
<td>1.17</td>
<td>0.95</td>
<td>1.65</td>
<td>12.80</td>
<td>2.15</td>
<td>14.06</td>
<td>105.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>October</td>
<td>342.33</td>
<td>1.66</td>
<td>364.16</td>
<td>61.68</td>
<td>1.17</td>
<td>0.95</td>
<td>1.65</td>
<td>12.60</td>
<td>1.93</td>
<td>13.84</td>
<td>105.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>November</td>
<td>323.61</td>
<td>5.67</td>
<td>364.00</td>
<td>56.88</td>
<td>1.17</td>
<td>0.96</td>
<td>1.67</td>
<td>12.30</td>
<td>0.93</td>
<td>13.13</td>
<td>105.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>December</td>
<td>329.52</td>
<td>7.20</td>
<td>387.32</td>
<td>65.52</td>
<td>1.14</td>
<td>0.93</td>
<td>1.62</td>
<td>13.30</td>
<td>3.22</td>
<td>15.71</td>
<td>105.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>1 = Ocean Travel</th>
<th>2 = Port Dwell</th>
<th>3 = Port Drayage</th>
<th>4 = Rail Dwell @ Departure Yard</th>
<th>5 = Rail Travel</th>
<th>6 = Rail Dwell @ Arrival Yard</th>
<th>7 = Drayage to DC</th>
<th>8 = Total (Days)</th>
<th>9 = Fluidity Index Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>25.43</td>
<td>4.49</td>
<td>28.33</td>
<td>0.73</td>
<td>1.61</td>
<td>0.92</td>
<td>24.87</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>February</td>
<td>23.45</td>
<td>2.28</td>
<td>25.32</td>
<td>0.62</td>
<td>0.23</td>
<td>0.83</td>
<td>23.65</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>March</td>
<td>22.00</td>
<td>1.17</td>
<td>22.99</td>
<td>0.68</td>
<td>1.46</td>
<td>0.68</td>
<td>23.12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>April</td>
<td>19.30</td>
<td>0.78</td>
<td>19.96</td>
<td>0.53</td>
<td>0.25</td>
<td>0.79</td>
<td>24.62</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>May</td>
<td>20.03</td>
<td>0.68</td>
<td>20.40</td>
<td>0.52</td>
<td>0.18</td>
<td>0.60</td>
<td>22.41</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>June</td>
<td>21.75</td>
<td>0.97</td>
<td>22.58</td>
<td>0.56</td>
<td>0.17</td>
<td>0.60</td>
<td>22.22</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>July</td>
<td>19.70</td>
<td>1.43</td>
<td>21.18</td>
<td>0.56</td>
<td>0.16</td>
<td>0.65</td>
<td>22.19</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>August</td>
<td>19.18</td>
<td>0.58</td>
<td>19.58</td>
<td>0.63</td>
<td>0.68</td>
<td>0.73</td>
<td>21.01</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>September</td>
<td>19.37</td>
<td>0.57</td>
<td>19.84</td>
<td>0.57</td>
<td>0.21</td>
<td>0.74</td>
<td>21.75</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>October</td>
<td>20.96</td>
<td>0.27</td>
<td>21.18</td>
<td>0.59</td>
<td>0.21</td>
<td>0.78</td>
<td>22.68</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>November</td>
<td>21.93</td>
<td>0.46</td>
<td>22.28</td>
<td>0.57</td>
<td>0.17</td>
<td>0.66</td>
<td>21.73</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>December</td>
<td>23.50</td>
<td>1.86</td>
<td>24.92</td>
<td>0.57</td>
<td>0.26</td>
<td>0.83</td>
<td>22.44</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| 22.72 | 1.16 | 23.99 |

confidential and protected
Other Related Projects
Port Utilization Indicators
Port Utilization Indicators

- Intermodal Indicators (4 ports reporting):
  1. Average Vessel Turnaround Time (1) [sec./TEU]
  2. Average Vessel Turnaround Time (2) [Hours]
  3. Berth Utilization [TEU /m]
  4. Average Truck Turnaround Time [Min.]
  5. Gate Congestion Indicator [Min.]
  6. Average Container Dwell Time [Hr]
  7. Gross Port Productivity [TEU/Gross Ha]
  8. Crane Productivity [TEU/STS crane]

- Bulk Indicators (5 ports reporting):
  9. Berth Occupancy Rate [%]
  10. Gross Berth Productivity [Tonnes / berth-hr]
  11. Average Vessel Turnaround Time [Hours]
# Port Utilization Indicators for British Columbia Container Ports 2009

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Jan 09</th>
<th>Feb 09</th>
<th>Mar 09</th>
<th>Apr 09</th>
<th>May 09</th>
<th>Jun 09</th>
<th>Jul 09</th>
<th>Aug 09</th>
<th>Sept 09</th>
<th>Oct 09</th>
<th>Nov 09</th>
<th>Dec 09</th>
<th>AVG 09</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Gate Fluidity - Minutes¹</td>
<td>N/A</td>
<td>N/A</td>
<td>12.8</td>
<td>13.8</td>
<td>13.5</td>
<td>12.4</td>
<td>12.2</td>
<td>17.0</td>
<td>N/A</td>
<td>11.1</td>
<td>11.8</td>
<td>11.1</td>
<td>12.9</td>
</tr>
<tr>
<td>2 Avg. Truck Turnaround Time - Minutes</td>
<td>N/A</td>
<td>21.9</td>
<td>22.1</td>
<td>22.3</td>
<td>20.4</td>
<td>21.0</td>
<td>20.1</td>
<td>19.4</td>
<td>22.1</td>
<td>19.7</td>
<td>23.5</td>
<td>22.6</td>
<td>21.4</td>
</tr>
<tr>
<td>3 Berth Utilization - TEU/Meter</td>
<td>61.1</td>
<td>53.4</td>
<td>66.0</td>
<td>65.8</td>
<td>70.5</td>
<td>67.1</td>
<td>71.2</td>
<td>71.4</td>
<td>71.3</td>
<td>69.9</td>
<td>70.1</td>
<td>70.8</td>
<td>67.4</td>
</tr>
<tr>
<td>4 Vessel Turnaround Time (1) - Seconds/TEU²</td>
<td>51</td>
<td>46</td>
<td>45</td>
<td>42</td>
<td>40</td>
<td>41</td>
<td>36</td>
<td>34</td>
<td>41</td>
<td>37</td>
<td>39</td>
<td>36</td>
<td>41</td>
</tr>
<tr>
<td>5 Vessel Turnaround Time (2) - Hours/Vessel Call²</td>
<td>N/A</td>
<td>31.7</td>
<td>33.2</td>
<td>30.0</td>
<td>30.9</td>
<td>33.4</td>
<td>31.6</td>
<td>31.5</td>
<td>36.8</td>
<td>35.3</td>
<td>36.4</td>
<td>36.6</td>
<td>33.4</td>
</tr>
<tr>
<td>6 Avg. Container Dwell - Days³</td>
<td>3.2</td>
<td>2.7</td>
<td>2.3</td>
<td>3.0</td>
<td>1.8</td>
<td>2.5</td>
<td>2.8</td>
<td>2.0</td>
<td>2.5</td>
<td>2.5</td>
<td>2.3</td>
<td>2.9</td>
<td>2.5</td>
</tr>
<tr>
<td>7 Port Productivity - TEU/gross ha</td>
<td>1,286</td>
<td>1,119</td>
<td>1,386</td>
<td>1,375</td>
<td>1,470</td>
<td>1,396</td>
<td>1,465</td>
<td>1,487</td>
<td>1,450</td>
<td>1,432</td>
<td>1,438</td>
<td>1,431</td>
<td>1,395</td>
</tr>
<tr>
<td>8 Crane Productivity - TEU/STS crane</td>
<td>6,757</td>
<td>5,909</td>
<td>7,292</td>
<td>7,290</td>
<td>7,809</td>
<td>7,435</td>
<td>7,908</td>
<td>7,953</td>
<td>7,945</td>
<td>7,876</td>
<td>7,800</td>
<td>7,887</td>
<td>7,488</td>
</tr>
</tbody>
</table>

| Container Throughput - TEU                    | 179,742| 158,305| 194,455| 195,935| 210,095| 200,331| 213,455| 218,717| 218,570| 211,032| 210,010| 211,743| 201,866|

**Notes:**

All figures are weighted averages of the two B.C. ports. They represent the 5 container terminals in Vancouver and Prince Rupert.

TEU: twenty-foot equivalent unit, a standard measurement of container activity.

1: A measure of truck wait times at terminal gates. Year 2009 is pilot data based on 15 truck sample and primary gate waiting areas (excluding all staging areas). 2010 data to include staging areas.

2: For fully cellular container ships only. Excludes ro-ro and mixed cargo ships.

3: Dwell time is defined as the time a container spends within a gated marine terminal facility. Dwell times are for import to rail movements only. Note that dwell time calculation differs at the two ports. In Vancouver, dwell time is from the time a vessel docks to the time containers are ramped up on rail car, while in Prince Rupert dwell time begins when the container is offloaded the vessel and lands on the dock to the time it is ramped to rail car.

**TOTAL TEU 2009 = 2,422,390**
**Bulk PUIs for Selected Commodities, 2009**

### Iron Ore

<table>
<thead>
<tr>
<th>Measure</th>
<th>Jan-09</th>
<th>Feb-09</th>
<th>Mar-09</th>
<th>Apr-09</th>
<th>May-09</th>
<th>Jun-09</th>
<th>Jul-09</th>
<th>Aug-09</th>
<th>Sep-09</th>
<th>Oct-09</th>
<th>Nov-09</th>
<th>Dec-09</th>
<th>AVG 2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Vessel Turnaround Time - Hours</td>
<td>38.2</td>
<td>38.0</td>
<td>34.6</td>
<td>24.7</td>
<td>22.6</td>
<td>20.5</td>
<td>20.3</td>
<td>17.4</td>
<td>24.4</td>
<td>22.1</td>
<td>21.7</td>
<td>24.4</td>
<td>25.7</td>
</tr>
<tr>
<td>2 Vessel Dwell in Port Waters - Hours</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>3 Berth Occupancy Rate - %</td>
<td>26%</td>
<td>28%</td>
<td>23%</td>
<td>51%</td>
<td>58%</td>
<td>40%</td>
<td>35%</td>
<td>25%</td>
<td>51%</td>
<td>56%</td>
<td>72%</td>
<td>43%</td>
<td>42%</td>
</tr>
</tbody>
</table>

Number of vessel calls: 5, 5, 5, 15, 19, 14, 13, 12, 15, 17, 24, 13

Throughput - Tonnes: 493,394, 686,310, 571,903, 1,614,172, 1,951,031, 840,737, 1,042,028, 816,673, 1,328,064, 1,470,140, 1,927,883, 1,225,322, 1,163,971

### Coal

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Jan-09</th>
<th>Feb-09</th>
<th>Mar-09</th>
<th>Apr-09</th>
<th>May-09</th>
<th>Jun-09</th>
<th>Jul-09</th>
<th>Aug-09</th>
<th>Sep-09</th>
<th>Oct-09</th>
<th>Nov-09</th>
<th>Dec-09</th>
<th>AVG 2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Vessel Turnaround Time - Hours</td>
<td>298.5</td>
<td>N/A</td>
<td>100.8</td>
<td>16.5</td>
<td>24.0</td>
<td>24.9</td>
<td>N/A</td>
<td>26.8</td>
<td>42.3</td>
<td>35.8</td>
<td>43.1</td>
<td>28.1</td>
<td>64.1</td>
</tr>
<tr>
<td>2 Vessel Dwell in Port Waters - Hours</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>3 Berth Occupancy Rate - %</td>
<td>41%</td>
<td>0%</td>
<td>30%</td>
<td>2%</td>
<td>10%</td>
<td>13%</td>
<td>0%</td>
<td>11%</td>
<td>12%</td>
<td>14%</td>
<td>12%</td>
<td>8%</td>
<td>13%</td>
</tr>
<tr>
<td>4 Gross Berth Productivity - Tonnes/Berth-hour</td>
<td>217</td>
<td>N/A</td>
<td>631</td>
<td>1,580</td>
<td>1,701</td>
<td>1,535</td>
<td>N/A</td>
<td>1,551</td>
<td>1,064</td>
<td>1,119</td>
<td>1,037</td>
<td>1,601</td>
<td>1,204</td>
</tr>
</tbody>
</table>

Number of vessel calls: 1, 0, 2, 1, 3, 4, 0, 3, 2, 3, 2, 2, 1.9

Throughput - Tonnes: 64,806, 0, 126,868, 26,072, 122,454, 152,728, 0, 124,871, 90,207, 120,316, 89,459, 90,072, 83,988

### Potash

<table>
<thead>
<tr>
<th>Measure</th>
<th>Jan-09</th>
<th>Feb-09</th>
<th>Mar-09</th>
<th>Apr-09</th>
<th>May-09</th>
<th>Jun-09</th>
<th>Jul-09</th>
<th>Aug-09</th>
<th>Sep-09</th>
<th>Oct-09</th>
<th>Nov-09</th>
<th>Dec-09</th>
<th>AVG 2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Vessel Turnaround Time - Hours</td>
<td>12.0</td>
<td>n.a.</td>
<td>n.a.</td>
<td>36.5</td>
<td>24.0</td>
<td>38.5</td>
<td>32.4</td>
<td>36.5</td>
<td>26.5</td>
<td>44.5</td>
<td>35.0</td>
<td>22.8</td>
<td>30.9</td>
</tr>
<tr>
<td>2 Vessel Dwell in Port Waters - Hours</td>
<td>N/A</td>
<td>n.a.</td>
<td>n.a.</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>3 Berth Occupancy Rate - %</td>
<td>16%</td>
<td>0%</td>
<td>0%</td>
<td>10%</td>
<td>7%</td>
<td>11%</td>
<td>46%</td>
<td>10%</td>
<td>7%</td>
<td>12%</td>
<td>5%</td>
<td>6%</td>
<td>11%</td>
</tr>
<tr>
<td>4 Gross Berth Productivity - Tonnes/Berth-hour</td>
<td>516.7</td>
<td>n.a.</td>
<td>n.a.</td>
<td>171.2</td>
<td>520.8</td>
<td>120.0</td>
<td>344.7</td>
<td>439.7</td>
<td>434.0</td>
<td>510.7</td>
<td>124.4</td>
<td>450.3</td>
<td>363.3</td>
</tr>
</tbody>
</table>

Number of vessel calls: 1, 0, 0, 2, 2, 2, 5, 2, 2, 2, 1, 1, 1.8

Throughput - Tonnes: 6,200, 0, 0, 12,500, 12,500, 9,240, 55,490, 32,100, 23,000, 45,452, 4,355, 15,293, 18,011

### Multi-Cargo

<table>
<thead>
<tr>
<th>Measure</th>
<th>Jan-09</th>
<th>Feb-09</th>
<th>Mar-09</th>
<th>Apr-09</th>
<th>May-09</th>
<th>Jun-09</th>
<th>Jul-09</th>
<th>Aug-09</th>
<th>Sep-09</th>
<th>Oct-09</th>
<th>Nov-09</th>
<th>Dec-09</th>
<th>AVG 2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Vessel Turnaround Time - Hours</td>
<td>69.7</td>
<td>53.0</td>
<td>107.1</td>
<td>75.8</td>
<td>50.8</td>
<td>50.9</td>
<td>28.1</td>
<td>37.0</td>
<td>33.7</td>
<td>100.7</td>
<td>77.7</td>
<td>64.5</td>
<td>62.4</td>
</tr>
<tr>
<td>2 Vessel Dwell in Port Waters - Hours</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>3 Berth Occupancy Rate - %</td>
<td>16%</td>
<td>16%</td>
<td>18%</td>
<td>24%</td>
<td>23%</td>
<td>23%</td>
<td>13%</td>
<td>9%</td>
<td>11%</td>
<td>35%</td>
<td>24%</td>
<td>34%</td>
<td>21%</td>
</tr>
<tr>
<td>4 Gross Berth Productivity - Tonnes/Berth-hour</td>
<td>265.1</td>
<td>315.8</td>
<td>242.4</td>
<td>397.5</td>
<td>369.6</td>
<td>374.5</td>
<td>569.4</td>
<td>386.9</td>
<td>432.8</td>
<td>135.0</td>
<td>271.1</td>
<td>203.8</td>
<td>330.3</td>
</tr>
</tbody>
</table>

Number of vessel calls: 7, 8, 5, 9, 13, 13, 13, 7, 9, 10, 9, 15, 9.8


Confidential & Protected
Gate Fluidity Indicator
Example: Centerm, Vancouver, B.C.

Calculating average wait times of trucks at terminal gates

GPS technology

‘Geofencing’
Road Transport
Road Movements – Dispatch Data
## Major Border Crossings – 2009

<table>
<thead>
<tr>
<th>Border Crossing</th>
<th>Destination</th>
<th>Observations</th>
<th>Mean</th>
<th>S.D.</th>
<th>Variance</th>
<th>90th</th>
<th>Min</th>
<th>Max</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambassador</td>
<td>Windsor</td>
<td>Northbound</td>
<td>16,383</td>
<td>7.7</td>
<td>10.6</td>
<td>111.8</td>
<td>13.2</td>
<td>1.7</td>
<td>619.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Southbound</td>
<td>35,888</td>
<td>11.8</td>
<td>8.8</td>
<td>78.1</td>
<td>21.3</td>
<td>2.0</td>
<td>234.0</td>
</tr>
<tr>
<td>Peace Bridge</td>
<td>Fort Erie</td>
<td>Northbound</td>
<td>16,370</td>
<td>13.1</td>
<td>23.7</td>
<td>559.3</td>
<td>23.0</td>
<td>1.1</td>
<td>707.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Southbound</td>
<td>9,158</td>
<td>14.4</td>
<td>17.1</td>
<td>293.2</td>
<td>31.3</td>
<td>1.1</td>
<td>453.3</td>
</tr>
<tr>
<td>Queenston - Lewiston</td>
<td>Niagara Falls</td>
<td>Northbound</td>
<td>4,087</td>
<td>18.8</td>
<td>24.8</td>
<td>614.2</td>
<td>33.4</td>
<td>2.0</td>
<td>199.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Southbound</td>
<td>26,362</td>
<td>10.0</td>
<td>13.4</td>
<td>179.4</td>
<td>23.4</td>
<td>1.0</td>
<td>217.5</td>
</tr>
<tr>
<td>Blue Water</td>
<td>Sarnia</td>
<td>Northbound</td>
<td>10,731</td>
<td>11.4</td>
<td>13.5</td>
<td>182.5</td>
<td>22.9</td>
<td>1.1</td>
<td>462.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Southbound</td>
<td>9,745</td>
<td>16.6</td>
<td>20.0</td>
<td>401.3</td>
<td>33.7</td>
<td>1.0</td>
<td>288.6</td>
</tr>
</tbody>
</table>
Air Cargo
Air Cargo Data: Based on IATA Cargo 2000

Data collected from air carriers
Complex logistics options – air/truck or ocean/air/truck or air/truck (cross-border)
Total Logistics Costs
Total Logistics Costs: Objective

- To measure the sum of the costs for the movement of a commodity shipped to/from Canada and the impact of transport variability
  - transport variability extracted from the fluidity project
  - transportation costs and commodity value
  - in transit inventory costs
  - cost of holding cycle and safety stock inventories
  - stock out costs or marked down costs (penalties for shortages and emergency shipping costs due to variability)
  - loss and damage claims and losses

- Costs for inbound cargo and for outbound cargo.
Total Logistics Costs: Preliminary Output

TLC as % of sales: 12.7%

Canadian food products / exports to Asia

1% + 4% = $5 million Annually

Total Logistics Costs May 2009

- Transportation cost
- Carrying Cost of In-Transit Inventory
- Carrying Cost of Standing Inventory
- Cost of Holding Safety Stock
- Stockout Cost

Canadian food products / exports to Asia: 86%

1% + 4% = $5 million Annually
Long-Term Targeted Output
North America Gateways and Trade Corridors

Hong Kong / Shanghai

Rotterdam / Antwerp

Panama Canal 2014
Conclusion

• Project benefits:
  – Support policy of Gateways
  – Answer reliability question from a system point of view
  – Benchmark performance of Canadian supply chains
  – Marketing value

• Project challenges:
  – Data intensiveness
  – Integration of fluidity data in Total Logistics Costs Project
  – Shipper’s participation in Total Logistics Costs Project
  – Address air cargo fluidity
  – Obtain data on U.S. trade lanes

• Project risks
  – Data are non-regulatory based
  – Some of the data are proprietary
Next Steps

• Implement Fluidity work for other Gateways and Trade Corridors
• Investigate the implementation of Carbon Footprint measurement for all the major trade lanes
• Finalize fluidity indicator with Texas Transportation Institute
• Minimize the efforts for shippers by leveraging the fluidity work for the Total Logistics Costs index
• Enroll a few shippers willing to work with us to validate our Total Logistics Cost Project
• Obtain data to populate our North American competitiveness mapping
THANK YOU/MERCI !

Louis-Paul Tardif
Director, Economic Analysis & Research
Louis-paul.tardif@tc.gc.ca
613-991-6982