Impact and Opportunities from Global Change

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Contents

• Industry Trends
• North America West Coast Impacts
• Ship evolution and terminal size issues
• Terminal Capacity
• The Shift to Automated Terminals
• Sustainable Operations
Containerization vs. GDP

World Growth Rates

-10%  -5%  0%  5%  10%  15%  20%


GDP Growth  TEU Growth

GDP Growth  TEU Growth
World TEU Growth - GDP

The chart shows the growth rates of TEU (Twenty-Foot Equivalent Units) and GDP (Gross Domestic Product) from 1981 to 2010. The x-axis represents the years, while the y-axis shows the growth rates as percentages. The bars indicate the difference between TEU growth and GDP growth for each year, with positive values indicating TEU growth exceeded GDP growth, and negative values indicating the opposite. The years 1986 and 2008 show significant negative growth rates, indicating a worse performance in TEU growth compared to GDP.
NA West Coast Market Share by Country

Market Share of Pacific TEU

- Canada
- USA
- Mexico

Year: 1990 to 2012
Slowing Growth In Container Volume

- Mature business, most of what can be containerized, is.
- Most of what can be made overseas, is
- More likely tied to GDP
- Big growth areas (Prince Rupert) are cannibalizing traffic from elsewhere
- Bigger canal (and Polar routes?) will further increase options for shippers to reach the East Coast
Pacific Region Comparison

- TEU per Acre
- TEU per 1000' Wharf

BC: TEU per Acre ~ 9,000
WA: TEU per Acre ~ 3,000
CA: TEU per Acre ~ 4,000

- TEU per 1000' Wharf

BC: ~ 40,000
WA: ~ 1,000
CA: ~ 160,000
Why Rail Connections Matter

• Canadian RRds go into the US, but not vice versa
• Not all terminals have on-terminal rail
  – Extra dray cost
  – Lack of “branding”
• Higher volume ports (LA/LB) make it easier to build unit trains on terminal
CN System Map
Ship Size Evolution
Mean Newbuild Vessel Size vs. Year of Build
Dot Chart of TEU vs. Length at Berth
a 2000’ wharf is no longer a two berth terminal!

Current Panamax

New Panamax
DPW Centerm, Vancouver

2100’
Terminals That Can Handle At Least Two New Panamax Ships at the Same Time

- Rupert
- Vancouver
- Seattle
- Tacoma
- Oakland
- POLA
- POLB

Number of "Big" Terminals
Capacity Constraints

- BC is near capacity
- USWC (and USEC) is not
- Outside of BC, projects are done to
  - Reduce cost
  - Reduce environmental impact
  - Replace old, obsolete terminals
- Manual operations can be high density, all electric, and highly productive
- USWC terminal labor is most expensive in the world, but USWC terminals are not the most productive
Vessel Productivity (mv/hr) at Top World Ports – JOC Data
Why Are US Containers Stored on Wheels?

- Legacy of Malcolm McLean’s trucking heritage
- Very convenient for gate service
- No cost for yard equipment
Pier T July 2007
Pier T May 2009

Image USDA Farm Service Agency

Imagery Date: 5/24/2009 33°45'23.61" N 118°14'10.81" W elev 15 ft eye alt 2937 ft
What’s Bad About Wheeled Operations

• Very land intensive
• Cost, complexity, and liability of managing large chassis fleets
• Technically difficult for dock crane driver to discharge to street chassis vs. terminal chassis
• Long distance from CY to crane means many terminal tractors required
Chassis Corner Pins are Very Hard to Hit from Over 100’ in the Air
Pier 300, Port of Los Angeles
Pier 400, Port of Los Angeles
Last of the Manual, Wheeled, Mega-fill Projects
Pier 400, Port of Los Angeles
Last of the Manual, Wheeled, Mega-fill Projects
Change in Oil Price vs. Inflation Since 1990

RBT2 is being planned here

Big terminals at POLA/LB were planned here

Oil CPI

29
US Longshore Benefit Costs
(These do not include wages!)
Source: PMA 2012 Annual Report
Terminal Automation

Process Automation
• OCR data capture
• RFID equipment tracking
• Terminal equipment position detection
• Container inventory
• Truck appointment systems

Machine Automation
• Driver assist
  – RTG gantry
  – Dock crane “autopilot”
• Robotic vehicles
  – AGVs
  – Straddles
  – RMGs
• Remote operation of dock cranes
Euromax Rotterdam – a typical “fully automated” Terminal
RBT2 - Rendering of Final Conceptual Layout

Proposed Roberts Bank Terminal 2

Existing Roberts Bank Terminals
Automated Stacking Cranes (ASCs) served by shuttle carriers
The Social License to Operate

• POLA lost lawsuit to NRDC over China Shipping in 2001 that changed the industry
• Public realizes impacts from Port operation
• Freight doesn’t vote
• Big, verifiable reductions have been made at POLA/LB (see next slide)
POLA has Achieved Massive Reductions in Emissions Since 2005
source: POLA Website

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Review of Greenest Terminal Features

- Electric power for vessels at berth
- Electric dock cranes
- Electric transport vehicles
- End-loaded electric yard cranes
- On-terminal IY served by electric rail cranes
- Street trucks turn off engines while awaiting service
- Gate appointments minimize wait time for street trucks
- Automated mooring to reduce vessel idle

Gate appointments minimize wait time for street trucks.
Electric Cranes can Regenerate Power when Lowering Containers
data from TSI Deltaport

Negative values indicate power re-generation

**13.6 KW Average**
Ports as Renewable Power Stations
Final Thoughts

• Most North American ports have plenty of surplus capacity, but not those in BC
• Radical new technology will change the way terminals operate
• North American cargo growth will be slow and competition will be fierce
• Even the best terminals will be opposed by some people
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