

Sustainability in Relation to Port Infrastructure and Operations



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Importance of Goods Movement




Consumer Perception

Consumers emulate “Jane Jetson” – access the internet, press a button and your purchase appears on your doorstep




How goods get to the point of consumption is rarely understood or acknowledged

Transport and Distribution of Cargo

- ▶ US ports and waterways handle 99% of the country's overseas cargo; 2.5B tons/year
 - ▶ International trade accounts for 25% of GDP (\$729 billion); 80% in weight and 40% in value transported in ships
 - ▶ Volume of cargo will double and GDP will increase by 1/3 by 2020
 - ▶ US states rely on 13–15 ports to handle exports/imports
 - ▶ 1/3 of container traffic (\$200B) handled in Southern California; trade with China straining intermodal system
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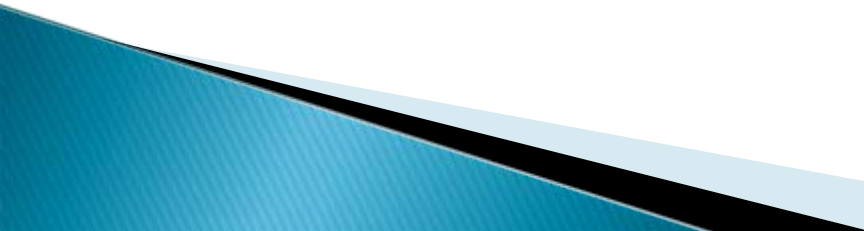
Geographic Costs versus Benefits

- ▶ Ports will spend \$10.5 billion to modernize their facilities in the next 5 years
 - ▶ Emerging issues are increase in vessel sizes (need for deeper channels), localized environmental impacts, labor shortages, aging infrastructure, at-port traffic and capacity issues
 - ▶ Most of the social and environmental costs are borne by port communities; substantial economic benefits are realized by the rest of the country
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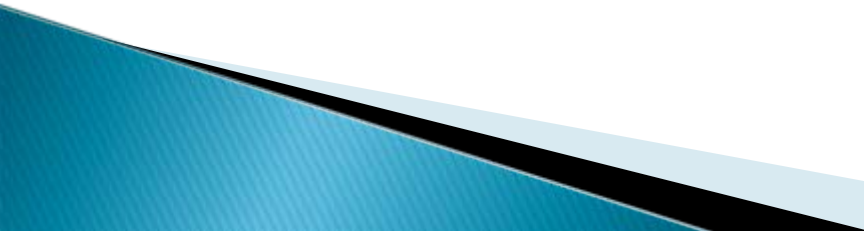
Financing Improvements in Ports Infrastructure




Ports Operation

- ▶ *User fees* – where improvements benefit cargo users and limited beneficiaries
 - ▶ *Local/state funding* – where improvements spur economic benefits to local communities
 - ▶ *Federal transportation funding* – for improvements with nation-wide benefits (highly competitive and political process with long lead times)
 - ▶ *Cargo fees* – typically based on cargo volumes; can cause shifts in transport routes
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Threats with Price Increases

- ▶ Global economic recession has reduced profit margins; shippers need predictability, speed and reliability
 - ▶ Expansion of Prince Rupert (Canada), Punta Colonet (Mexico) and Panama Canal Expansion (Panama) create viable alternatives
 - ▶ 2002 lockout at Southern California ports sent message that diversification in trade routes reduces business risk (increasing shipper willingness to seek alternatives)
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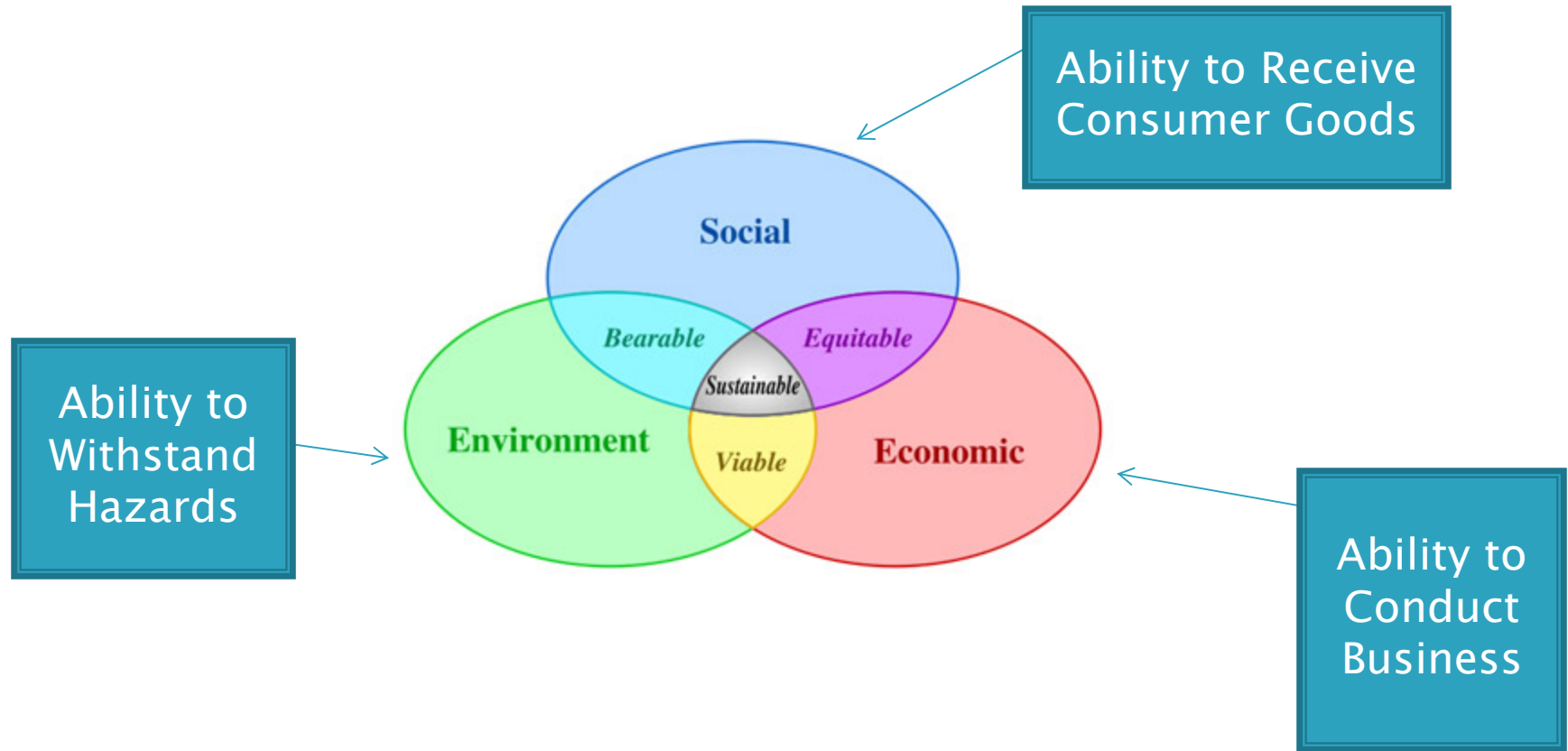
Goods Movement Infrastructure

- ▶ Must keep pace with growth in trade
 - ▶ Failure to increase capacity will hold back expansion and prosperity of the economic recovery
 - ▶ A national transportation strategy is necessary to maintain rapid and inexpensive movement of goods and our competitiveness in world markets
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Understanding Port Infrastructure Sustainability



Alternate Concept of Long-Term Port Infrastructure Sustainability



Potential Threats

- ▶ Seismic Activity
- ▶ Climate Change
- ▶ Community Opposition
- ▶ Terrorism





Seismic Activity >>

Gerald Desmond Bridge and Schuyler Heim Bridges
in Southern California require seismic retrofit

Emerging Seismic Issues

- ▶ *Northridge* quake situated on an unknown subsurface fault line (complicating calculations of recurrence intervals)
- ▶ *Seattle/Tacoma* experienced 6.8 in Richter Scale in 2008 and new studies show northwest has 13 historic quakes > 8 in last 6000 years.
- ▶ *Boston* experienced 6.3 in 1775 and its cooler rock formations would amplify future magnitude relative to California
- ▶ *New Madrid* earthquakes (8.0) along Mississippi River (10% chance of recurrence in next 50 years)

Seismic Concerns

- ▶ Surface faulting
- ▶ Tectonic subsidence and uplift
- ▶ Liquefaction (particularly on silt/sediments – Port of Kobe in 1995)
- ▶ Tsunamis – hundreds of meters inland





Climate Change >>

NOAA predicts most US Ports will be affected by sea level rise and storm surges

Climate Adaptation Strategies



Resistance (not
enough)



Resilience
(new normal)

Retreat
(last resort)



- ▶ Build sea walls
- ▶ Floating foundations/
land use management
- ▶ Move to higher ground

“Fight or Flight”

Depends on the Scenario

The Port of LA/Rand Study

Approached by Rand as part of an NSF grant

Objectives:

- Initial analysis of vulnerability
- Application of robust decision methods
- Evaluate effectiveness compared to other approaches

Threats analyzed: (very moderate scenario according to NOAA)

- Base sea level rise of 16 inches by 2050
- Extreme events (more frequent, more powerful storms)

INFRASTRUCTURE	SEA LEVEL RISE	EXTREME STORMS	ADAPTATION
Jetties/Breakwaters	–	Damage	Reinforce/Raise
Warfinger Pier	–	Damage	Reinforce/Raise
Navigation Channels	Blockage Loss of Nav Markers	Blockage/Loss of Nav Markers	??
Bridges	Reduced Clearance	Reduced Clearance	Raise
Highways/Railways	Submersion	Submersion	Raise
Gantry Crane (electric)	Splash zone in utility trench	Splash zone in utility trench	Raise
Contamination	Spread	Spread	Create barriers/clean
Storm water/Sewers	Infiltration and Submersion	Infiltration and Submersion	Relocate/Raise
Buildings	–	Damage	Reinforce
Protected Habitat (Eel Grass)	Submersion	Submersion/ Damage	??



Community Opposition >>

Trade growth can only be achieved with improvement in local quality of life

Emerging Community Issues

- ▶ Major issue is air pollution – not just cancer and mortality but chronic issues such as asthma, cardiac function and resistance to disease
- ▶ SoCal port redevelopment “log jammed” by community activism for multiple years
- ▶ CEQA documents are again being approved due to success of San Pedro Ports Clean Air Action Plan and Community Mitigation Agreement
- ▶ Similar public concerns are emerging at East Coast Ports (will rapidly become a national issue)
- ▶ Green jobs are definitely attractive to communities



Terrorism >>

Small craft intrusion barrier at Mare Island Naval Shipyard

Emerging Terrorism Vulnerability Issues

Relatively easy access to our ports



Vessels moving through vital waterways close
proximity to dense populations

Sealift – 90% of war fighting materials moved
by sea


USCG's Maritime Security Risk Analysis Model (MSRAM)

Threat Attack Probability			X Scenario Consequence									X Vulnerability				Risk		
			Primary Consequence +						Secondary Economic Impact									
Intentions & Confidence	Capability & Confidence	Geographic Threat	Death Injury	Primary Economic Impact	Symbolic Effect	National Security	Environment Impact	Response - Owner/Operator	Response - Local 1st Responder	Response - USCG	Recoverability	Redundancy	Secondary Economic Impact	Achievability	System Security - Owner/Operator	System Security - LEA	System Security - USCG	Target Hardness

Research Needs



Systematic Vulnerability Assessment of National Goods Movement Infrastructure

- ▶ Understanding the multiple threats to our infrastructure is an important first step
 - ▶ Utilizing consequence analysis results (including national impact on trade) is a way of prioritizing funding for needed improvements
 - ▶ Community improvements are an important part of the budget
 - ▶ A “systems” versus project approach to funding is highly warranted
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Prudent Approaches in a Recessionary Economy



Strive for projects with multiple benefits

Combine funding sources

Create partnerships

Example: Joint TSA/Climate Adaptation Projects

- ▶ Marine vessel barriers installed with TSA grants for security purposes can also be used as climate adaptation strategy for wave attenuation



Example: Climate Change/Energy and Diesel Risk Reduction

- ▶ PACE/CARE funding used to retrofit port community residential HVAC systems for energy efficiency, GHG and diesel reduction (with HEPA filters)



Port/Tenant Greening

- ▶ Sustainability efforts can be successfully leveraged through public-private partnering on voluntary green initiatives



QUESTIONS?

