



Optimizing Freight Transportation [in the Great Lakes Region]

Plenary 3: Optimizing Freight Transportation System Performance
3rd Biennial Research & Development Conference

Transportation is a Derived Demand

A



B

Sources of
Production

Markets

Q: So what does optimization mean exactly?

Optimization Means Different Things to Different People

Freight Shippers: Faster, cheaper, more reliable

Consumers: Right price, right place, right time

Carriers: Maximize utilization of assets, profits

Society: Maximize benefits, minimize impacts

Government: Enable all of the above

(With scarce resources, competing priorities)

So where do we begin to optimize freight transportation system performance?



Agenda: Optimization



Derived demand: it's about supply chains

Freight supply chains: it's about the multimodal system

Three reasons why system optimization matters

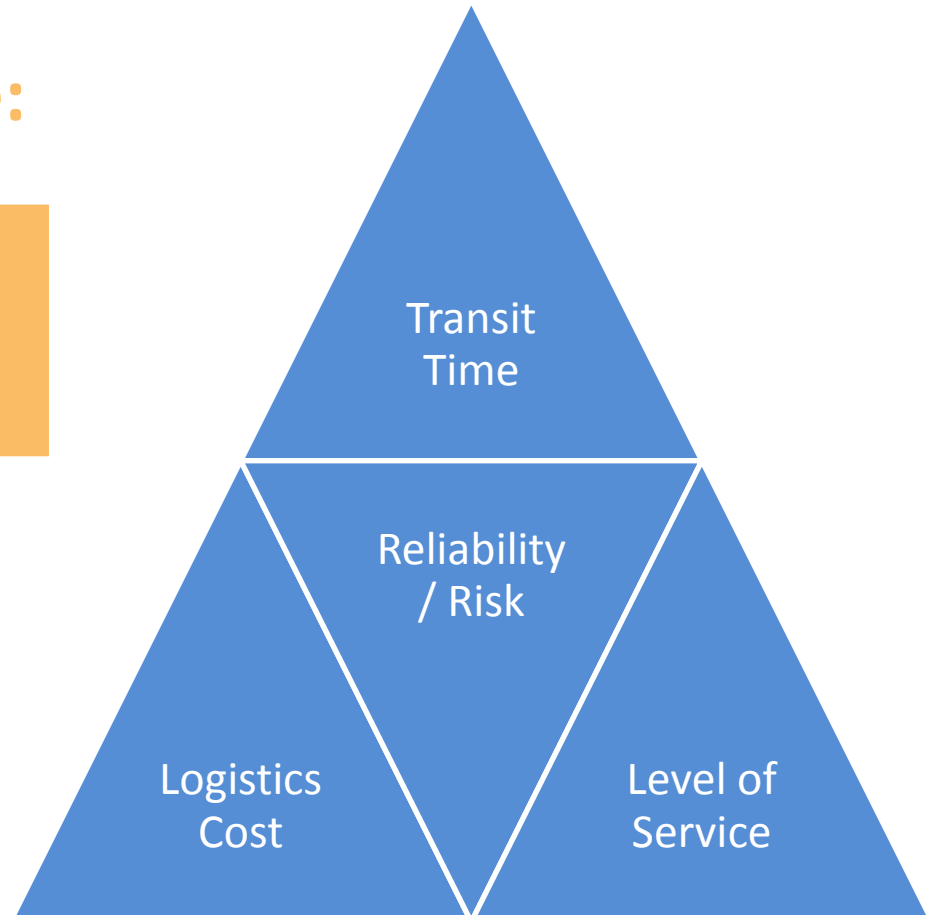
Optimizing freight system performance in the Great Lakes region

“Performance” vis-à-vis transportation requirements:

Optimization challenge:

Performance is supply chain specific

What to optimize?



Coal Supply Chains

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2 million tons from western Canada to Thunder Bay, ON

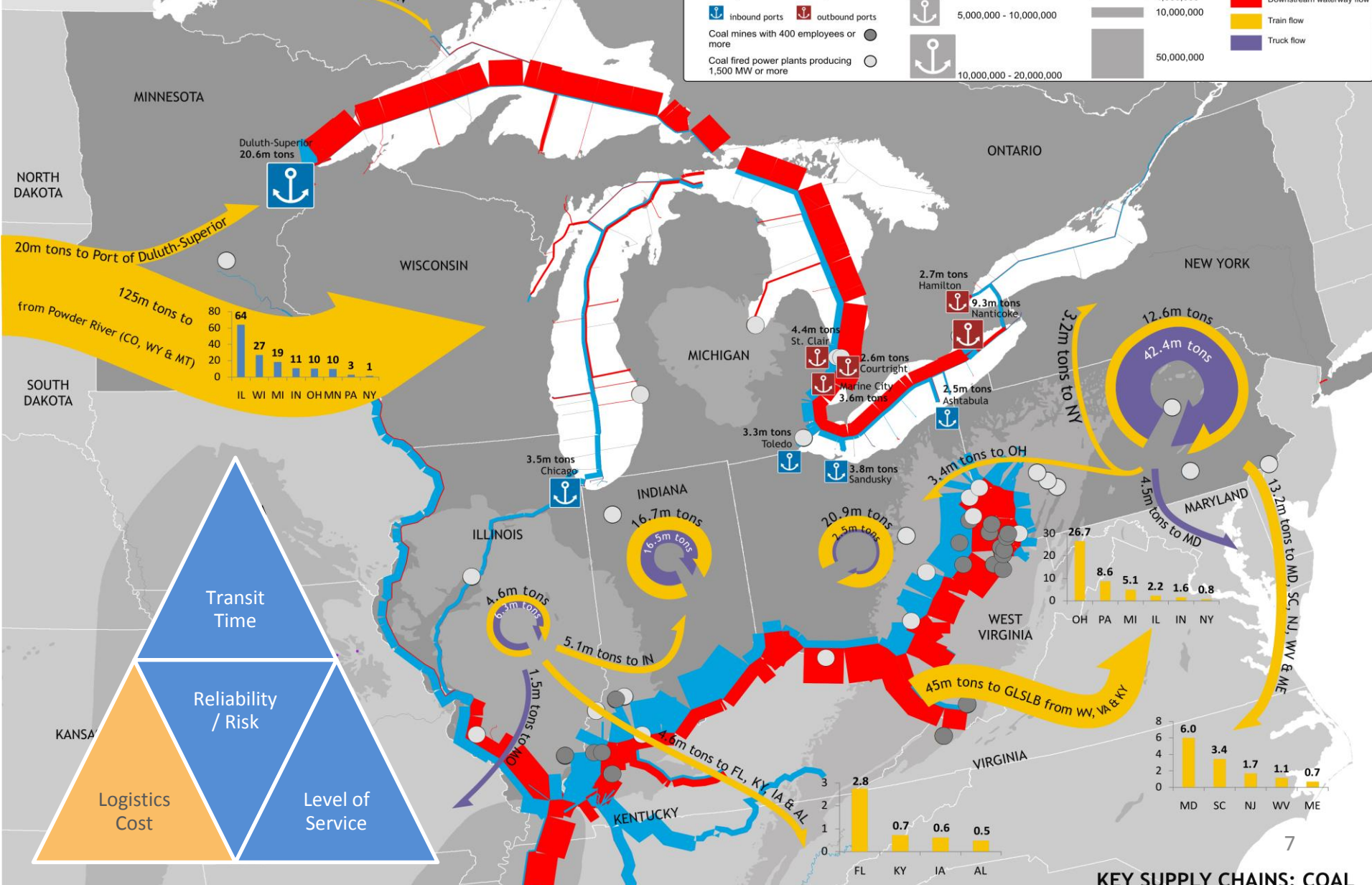
Legend

Major ports involved in coal supply chain (more than 2.5m tons)

⚓ inbound ports ⚓ outbound ports
 Coal mines with 400 employees or more ●
 Coal fired power plants producing 1,500 MW or more ○

Total Coal Flow Movement		(in US Short Tons)	
⚓	2,500,000 - 5,000,000		100,000
⚓	5,000,000 - 10,000,000		1,000,000
⚓	10,000,000 - 20,000,000		10,000,000
			50,000,000

Types of Flows	
	Upstream waterway flow
	Downstream waterway flow
	Train flow
	Truck flow



Automotive Supply Chains

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KEY SUPPLY CHAINS: AUTOMOTIVE & MACHINERY MANUFACTURING (locations with 40m or more in sales)

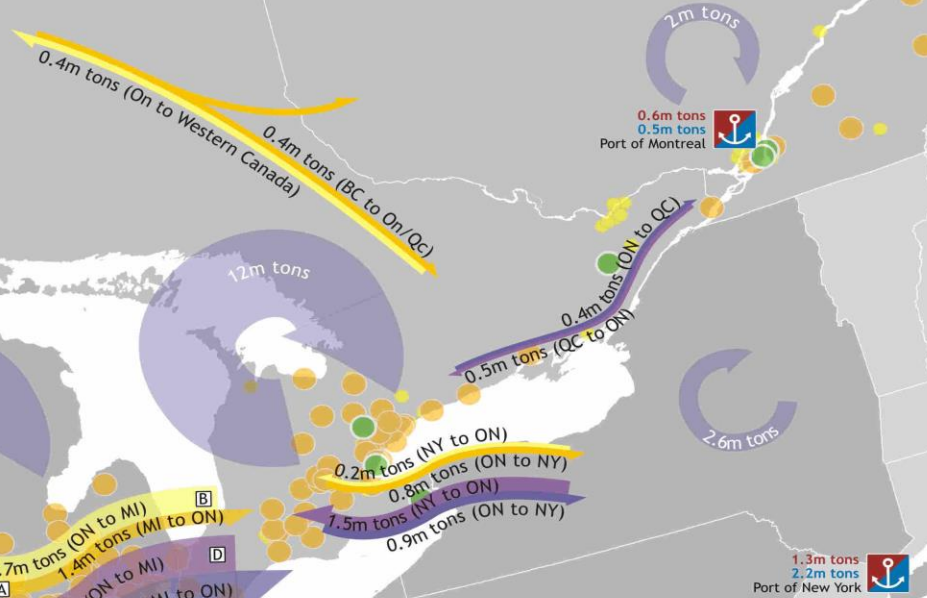
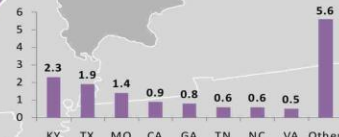
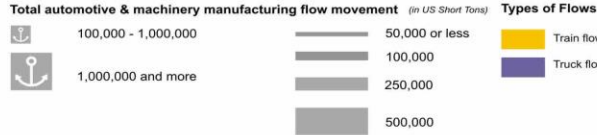
Legend

Major ports involved in automotive supply chain

inbound ports outbound ports

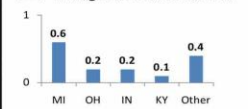
Automotive & Machinery Manufacturing Types

- Car Dealership
- Car Manufacturer
- Machinery Manufacturer

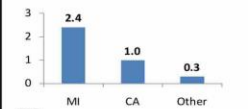


MI/ON Border Crossings

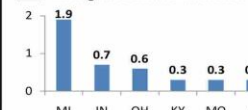
A Michigan to Ontario rail flow



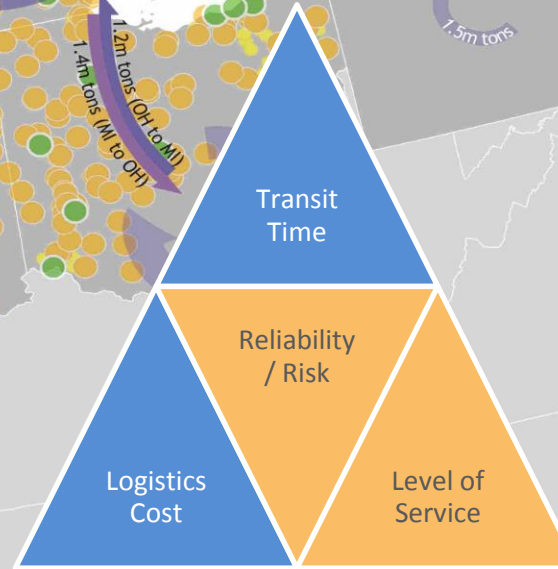
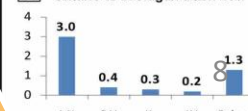
B Ontario to Michigan rail flow



C Michigan to Ontario truck flow



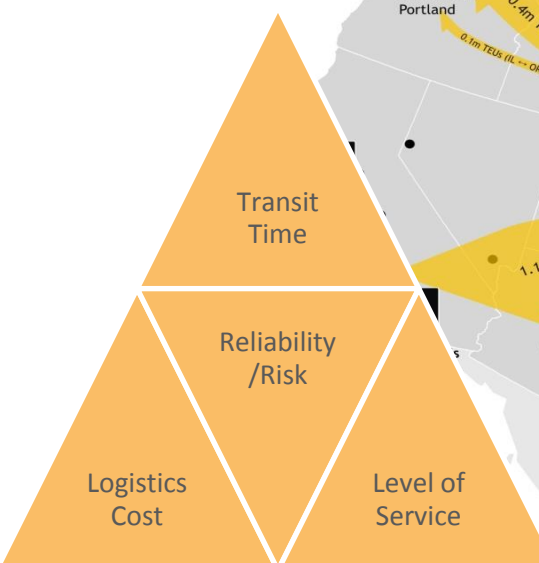
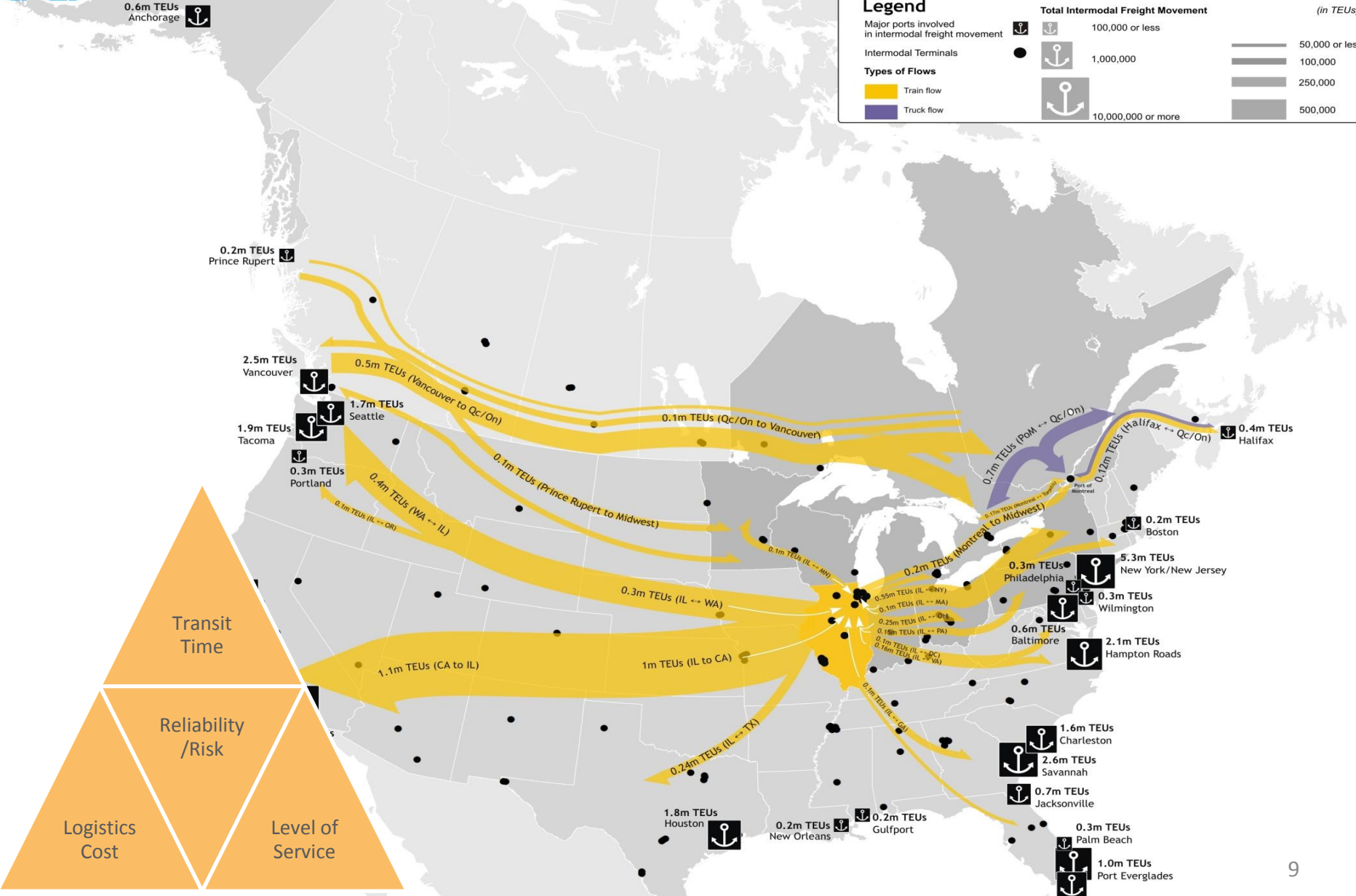
D Ontario to Michigan truck flow



Marine Container Supply Chains

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Legend



Agenda: Optimization

Derived demand: it's about supply chains



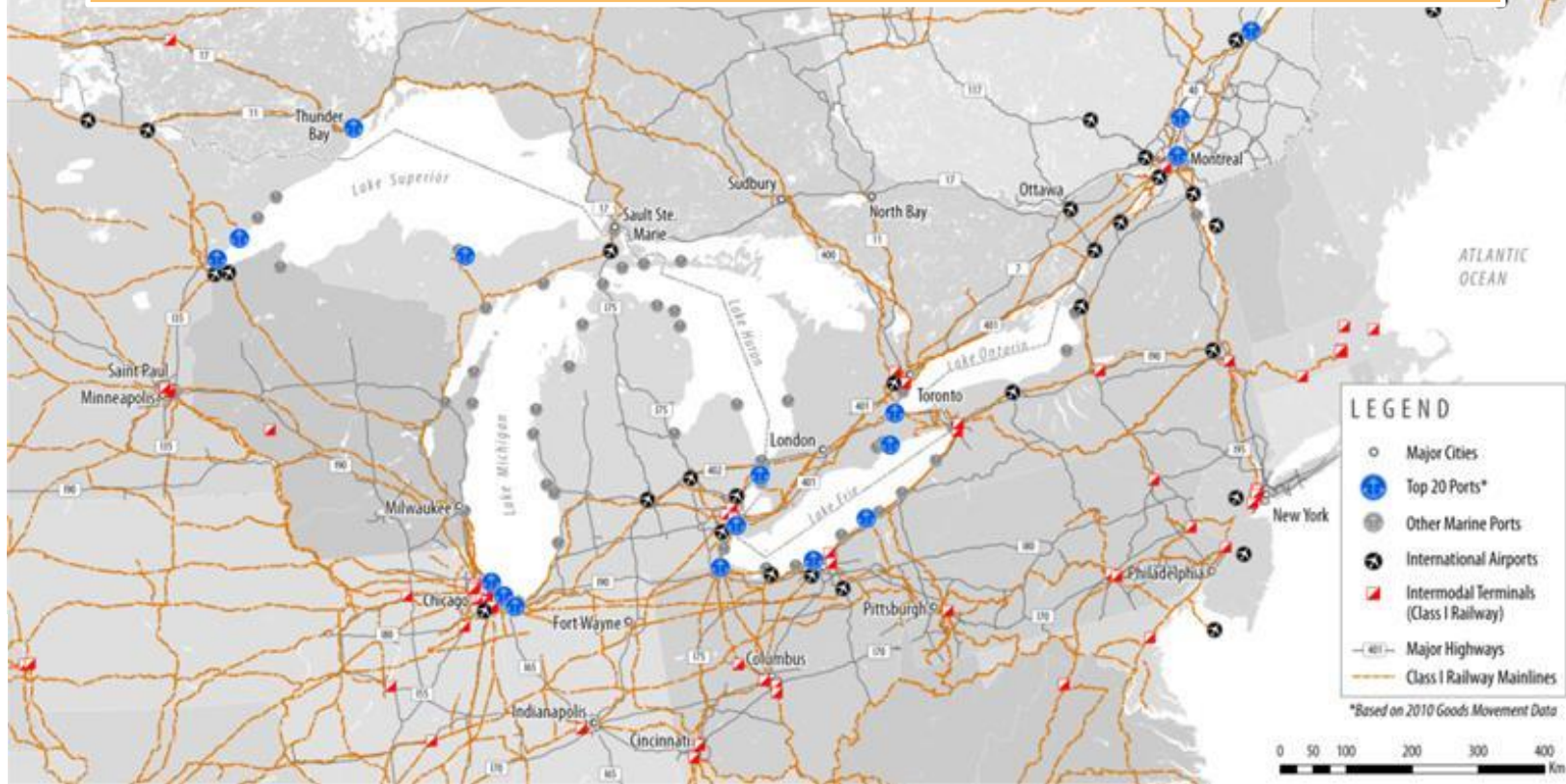
Freight supply chains: it's about the multimodal system

Three reasons why system optimization matters

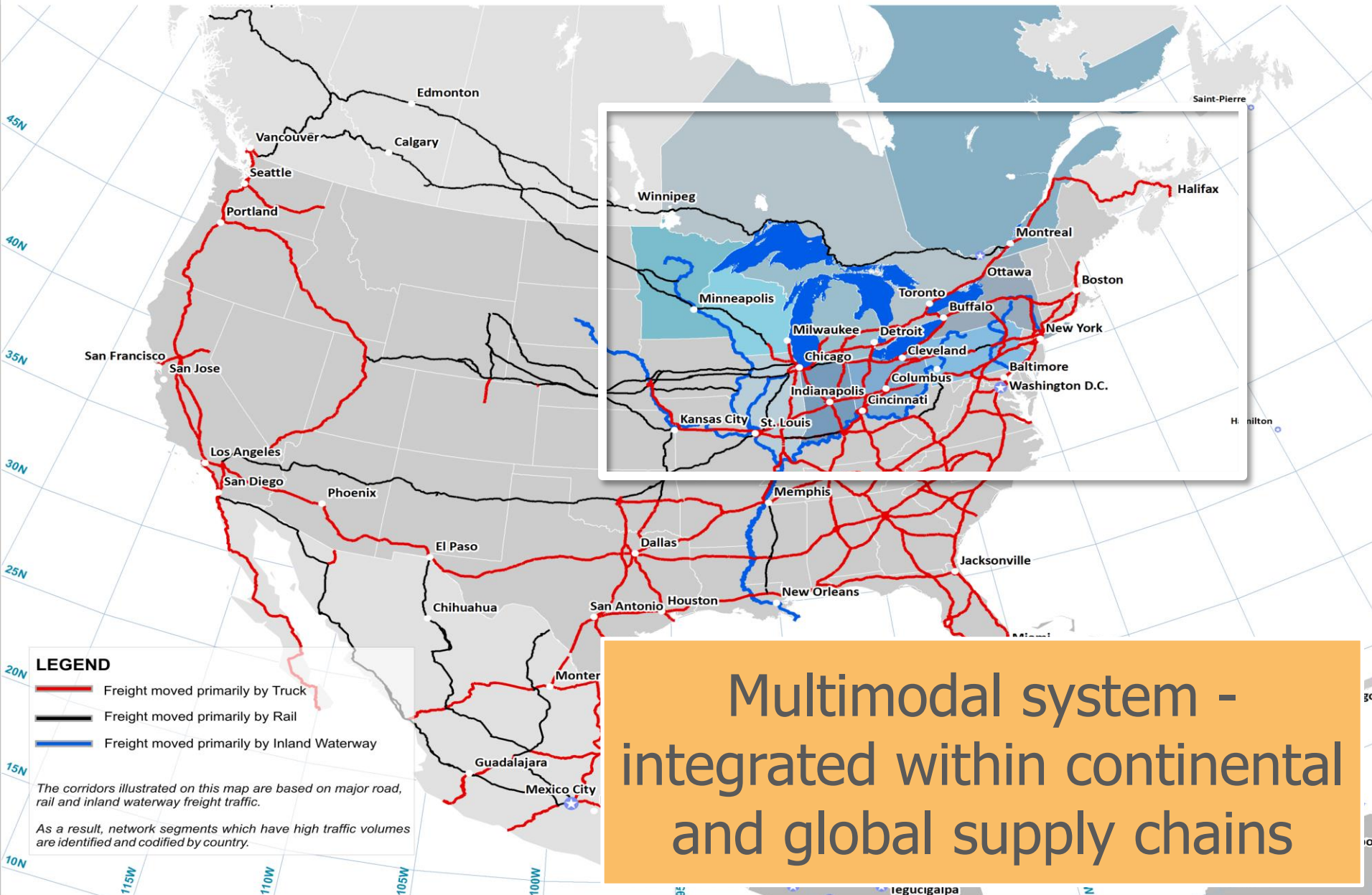
Optimizing freight system performance in the Great Lakes region

It's About Multimodal Transport *Options*

The more options, the more competitive the system, the better for shippers



It's About Connectivity between Sources of Production and Markets



Agenda: Optimization

Derived demand: it's about supply chains

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Three reasons why system optimization matters

Optimizing freight system performance in the Great Lakes region

Why Optimization Matters: 1) The Economy

When transportation *options* are efficient and competitive, shippers benefit from lower transport costs, faster and better service, and increased reliability, which in turn contribute to their competitiveness and growth and those of the broader region.

This translates into economic growth, investment, and jobs.

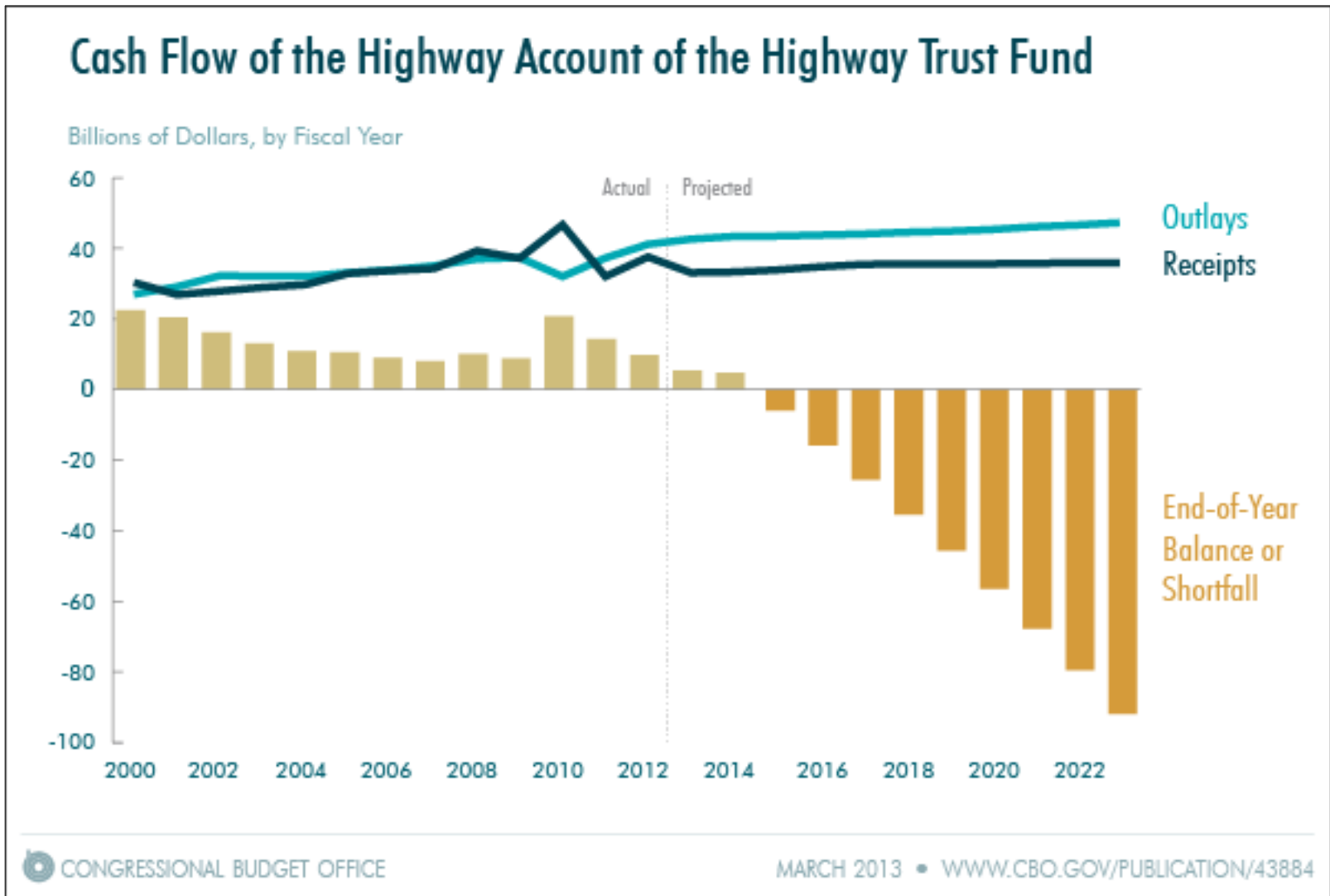
Why Optimization Matters: 2) Society & Environment

Sub-optimal is bad (and costly) for everyone

- Lost productivity
- Emissions, health issues
- Noise
- Accidents, etc.
- Wear and tear on roads

Flickr: PhilipC

Why Optimization Matters: 3) Scarce Public Funding



Agenda: Optimization

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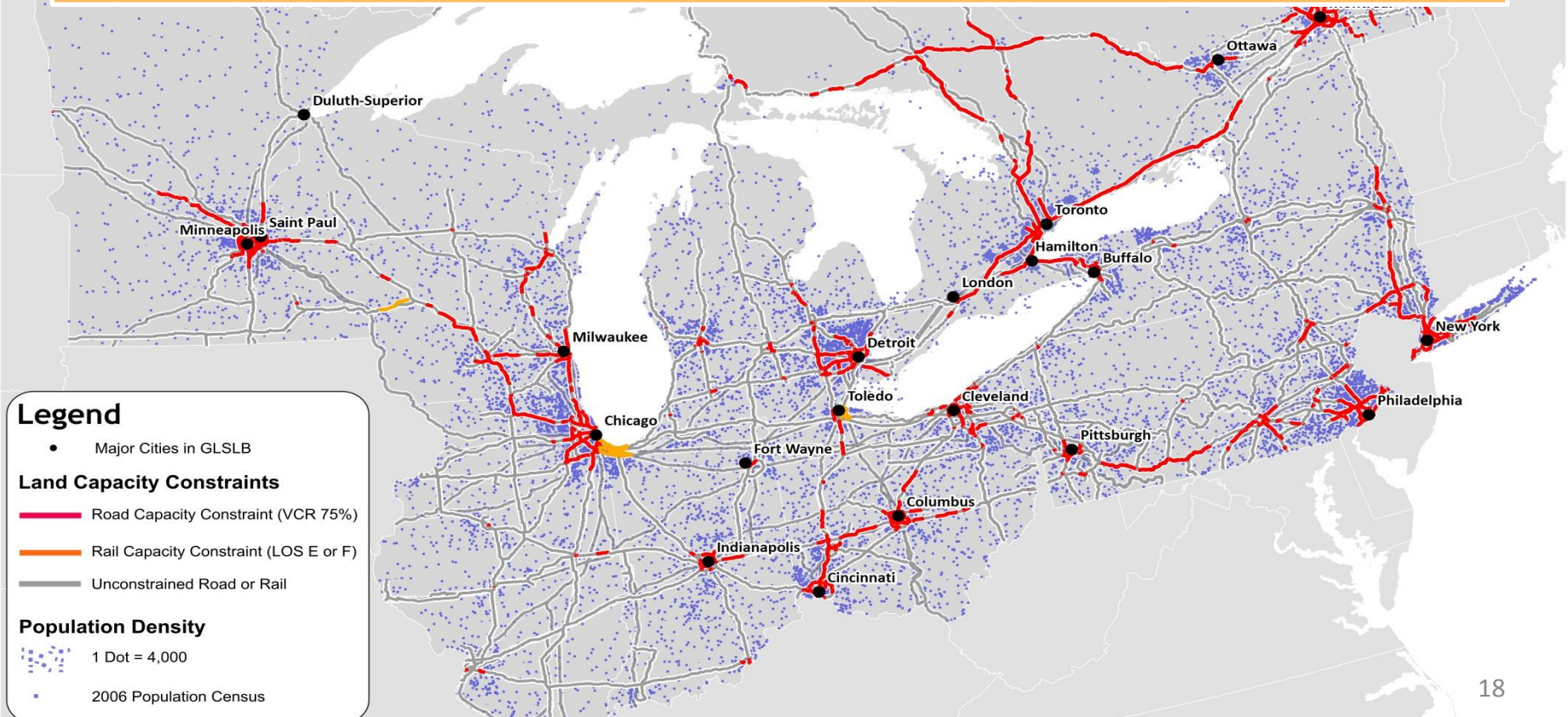
Three reasons why system optimization matters



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System (Land) Capacity Constraints

But the marine mode is underutilized, and has significant excess capacity...



...Is this the future (2040)?

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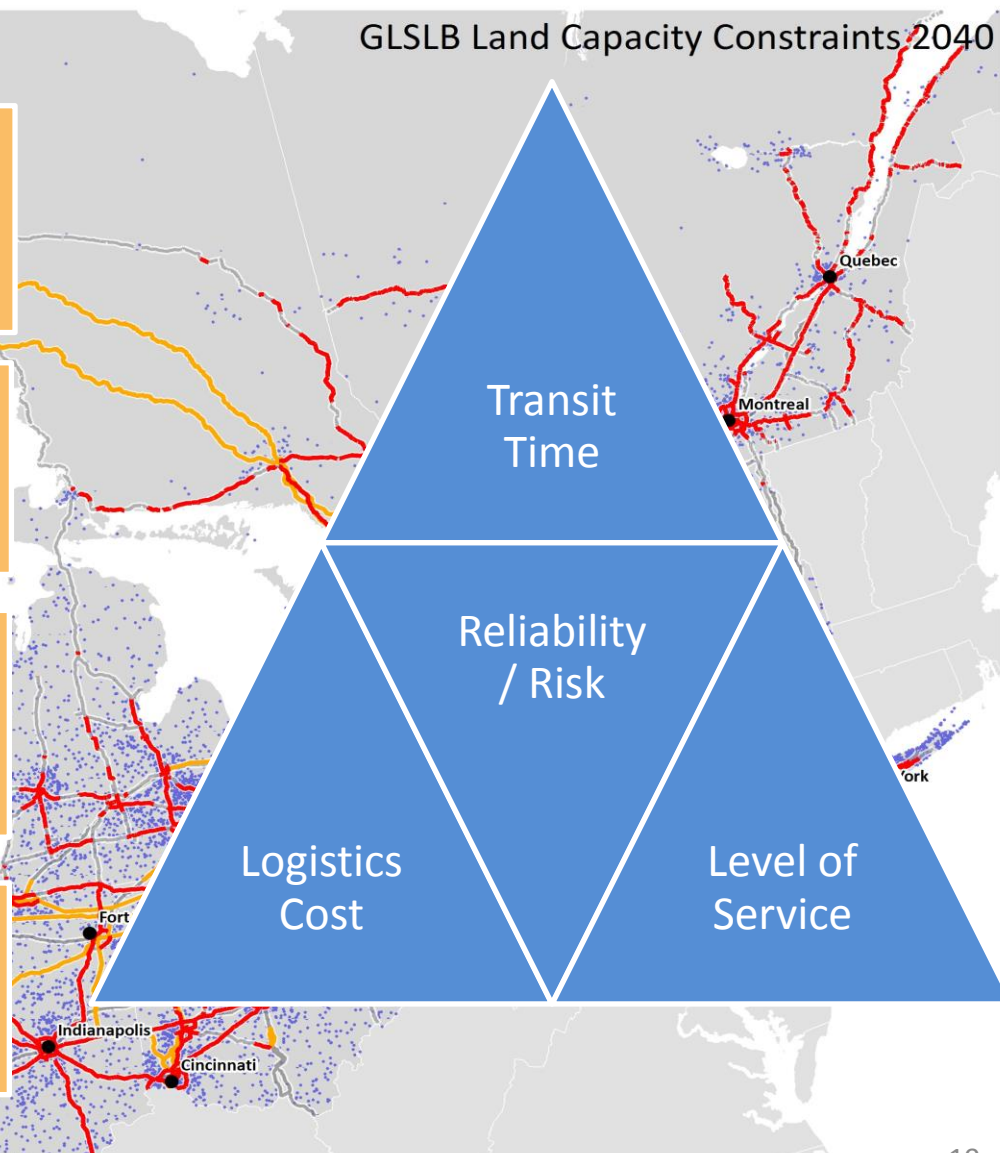
GLSLB Land Capacity Constraints 2040

What does this mean for system performance?

What does this mean for the economy?

What does this mean for the environment?

What does this mean for government spending?



Legend

Population Density

1 Dot = 4,000

2006 Population Census

One thing is certain –
the solution is not to build more road capacity...



What's Up With That: Building Bigger Roads Actually Makes Traffic Worse

BY ADAM MANN 06.17.14 | 6:30 AM | PERMALINK

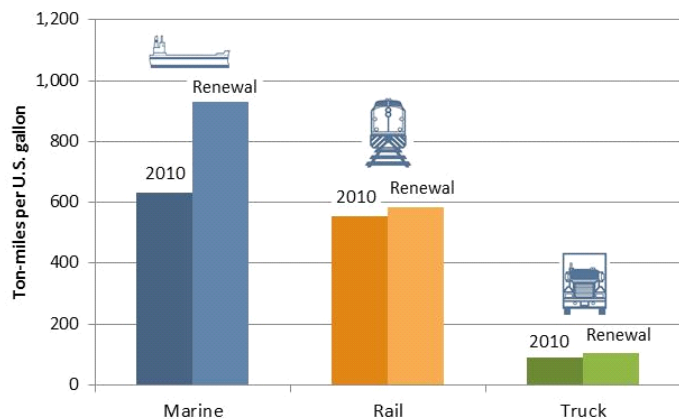
Study shows “**perfect one-to-one relationship**” ...
In cities that expanded road capacity by 10%, miles driven went up by 10%. In cities that expanded road capacity by 11%, miles driven went up by 11%.

Source: www.wired.com/2014/06/wuwt-traffic-induced-demand/

Making the marine mode a more competitive *option* could go some way in optimizing the regional transportation system

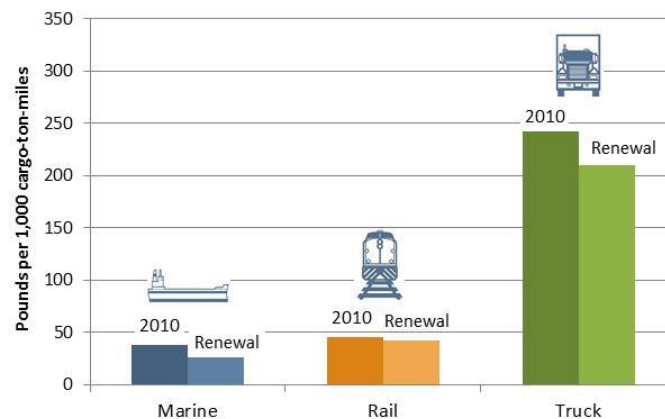
- **Cost:** Most economic mode on a per ton basis
- **Capacity:** Opportunity to alleviate congested land transportation system / reduce wear tear on roads
- **Competition:** Keep pressure on rail – compelled rates
- **Safety:** Lower rate of accidents relative to other modes
- **Environment:** More energy efficient than rail and truck

Modal Energy Comparison



Source : RTG analyses of confidential marine carrier data, reformatted by CPCS

Modal GHG Comparisons



Source : RTG analyses of confidential marine carrier data, reformatted by CPCS

How to do this?

Recognize roles and interests

- **Shippers choose (derived demand!)**
- **Carriers offer services (when profitable)**
- **Governments enable**

It is not for governments to favor the marine mode over others... but it can enable a more competitive marine transportation system (the market can do the rest).

- **Marine transportation charges (not incurred by other modes)**
 - Harbor Maintenance Tax, Seaway tolls (Can), pilotage, etc.
- **Underinvestment in the system**
 - Navigational channels (dredging)
 - Landside infrastructure, locks
 - Aging US Great Lakes fleet
- **Regulatory barriers and uncertainty**
 - Cabotage regulations
 - Ballast water regulations
 - Air emissions regulations
 - US advance notice of arrival requirements

For these reasons among others, the marine system in the Great Lakes has been slow to optimized

- Over the last 40 years, the truck and rail sectors have made huge advances in efficiency and productivity.
- By comparison, the marine mode in the Great Lakes system has not.



Source: www.railroadheritage.org



Source: <http://photos1.blogger.com/blogger/2454/1663/1600/Fitzblucollect.1.jpg>

Optimization is about recognizing everyone's interests...

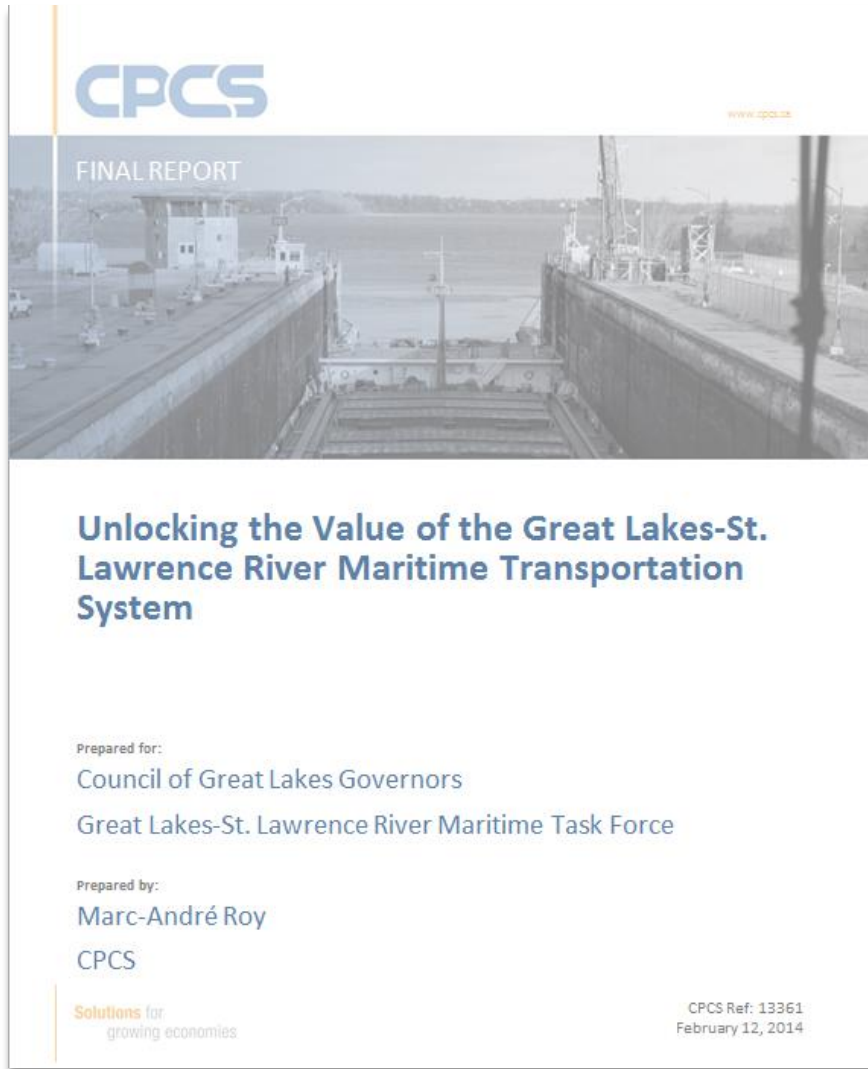
- **Shippers** need to see and understand value of marine for their supply chains
- **Carriers** need appropriate incentives to provide service
- **Governments** need to coordinate actions to address barriers, reflect full potential of marine in multimodal freight plans.

This jives with directions in MAP-21

Specific areas where *objective* research is needed

- The *net* economic impact of marine cabotage regulations (Jones Act, Coasting Trade Act)
- Options and implications for reforming the governance of pilotage
- Continued research on feasibility, benefits, costs and case for public support for fleet investments
- Reviewing the full public cost of transport – for all modes – to inform future public policy discussions with respect to public investment and support for the transport system.

Some other ongoing initiatives....



- Government
 - Council of Great Lakes Governors Marine Initiatives
 - Federal initiatives (Strong Ports, Marine Highways)
- Academia, TRB, Think tanks
- Industry
 - Highway H2O
 - Cleveland Express
 - Think tanks

Summary of key takeaways

- Shippers drive use of the multimodal system – optimization starts with freight supply chains
- Optimization boils down to enabling competitive transport *options*
- Options are dependant on a competitive *multimodal* system
- The *marine mode* in the Great Lakes is not as competitive as it could or should be
- More *objective research* is needed to get beyond anecdotes and politics

Questions and Discussions



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Global management consulting firm (formerly consulting arm of CP (est. 1969))

- Focused on transportation sector - freight and passenger
- Strategy, economic analysis and policy
- Multimodal

CPCS Countries of Work Experience (shaded) and Offices

Recent North American project experience:

NCHRP 08-97: OSOW Transportation
NCRRP 07-01: Rail Funding & Finance
NCFRP 43: Chassis Supply Models Study
NCFRP 35: Great Lakes Multimodal Study
Gateway and corridor studies (multimodal)
Market and competitiveness studies



Summary of Recent CPCS Experience



Freight Rail

100+ Strategy mandates

8 Transactions

\$3+ billion in deals

Port & Terminals

35+ Strategy mandates

30+ Transactions

\$5+ billion in deals

Multi-modal Transport

30+ Strategy mandates

Passenger & Transit

10+ Strategy mandates

3 transactions

\$3 billion in deals