Finding interventions that align green freight goals with supply chains

Geospatial Intermodal Freight Transportation Model

Challenges in freight modeling:

1. Case study 1 compared with Case study 2 issues – both may be valid but contradictory.
   Needed: System insight at scale, robust solutions.

2. Sustainable decisions require collaboration.
   Community of Practice among modes, across networks, etc.

3. Model requirements:
   Data neutral, transparent

*Decision makers can **explore tradeoffs** among **alternative routes**, **across modes**, and **identify optimal routes** for economic, energy and environmental objectives.*

http://webgift.rit.edu/webgift/

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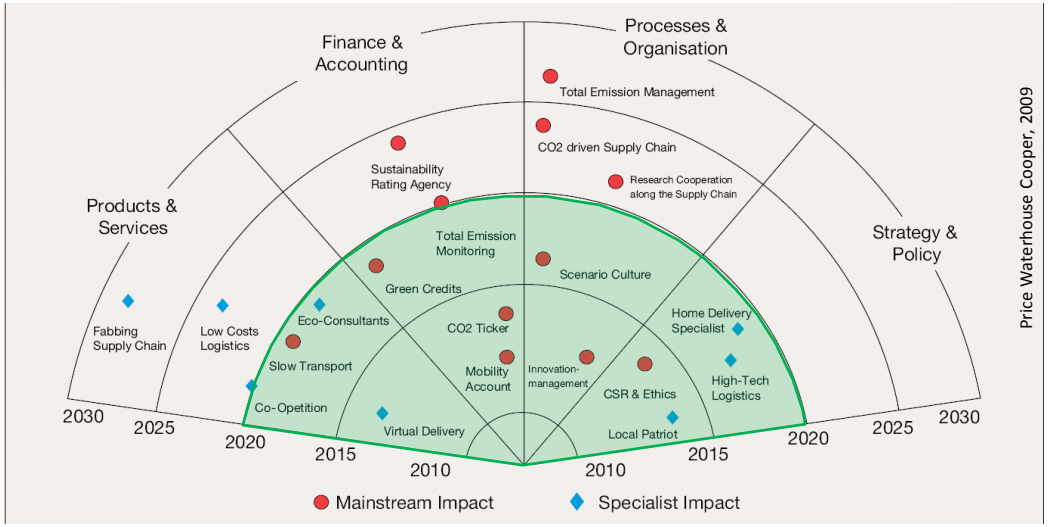
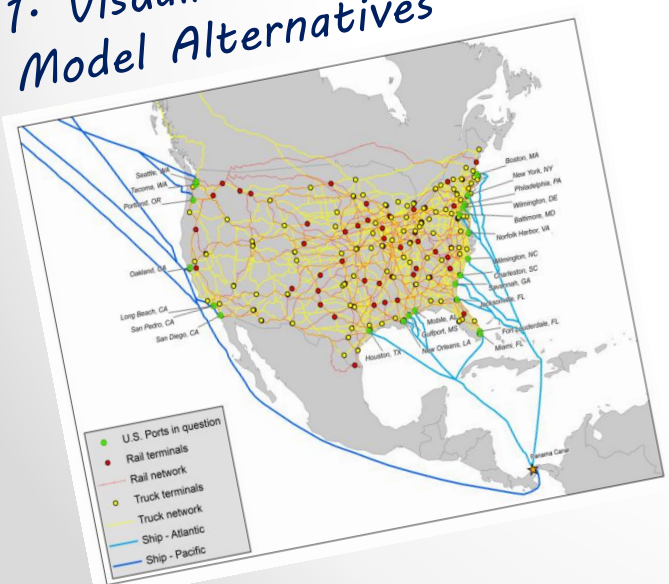
GIFT Concept: *Understand and adapt freight*

to reduce emissions, redefine service for next 100 years



1. Visualize Goals
Model Alternatives



2. Identify Useful
Levers for Action

infrastructure
fuels
technologies
operations
logistics
demand

3. Apply incentives
and signals for change

Policy Options	Intermodalism	Fuel	Technology	Operations	Logistics	Demand
	I	F	T	O	L	D
Efficiency standards	•		•		•	
Taxes	•	•	•	•	•	•
Subsidies	•	•	•			
Technology mandates		•	•			
Infrastructure investment	•			•		
R&D investment		•	•			
Alternative/LC fuels	•	•				
Size/weight restrictions	•		•			
Demand management			•	•		
Information/education	•	•	•	•	•	•

J. Winebrake, Clean Diesel 10.

GIFT Operation

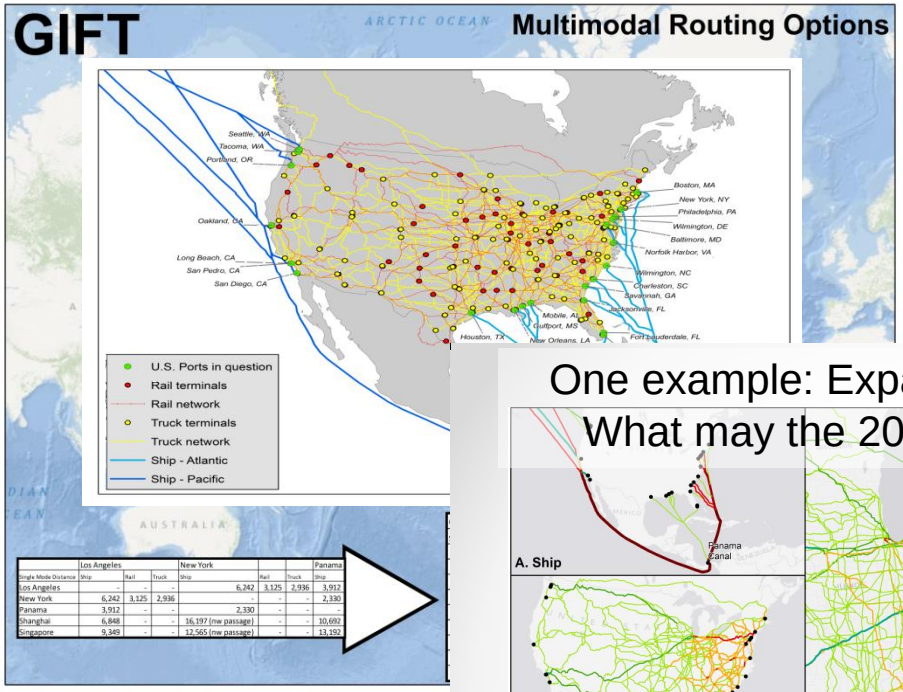
NTAD Road Maps
- Input Origin/Destination

→

Cost/Emission/Time Factor Database
- Select Evaluators and Optimization Parameters

→

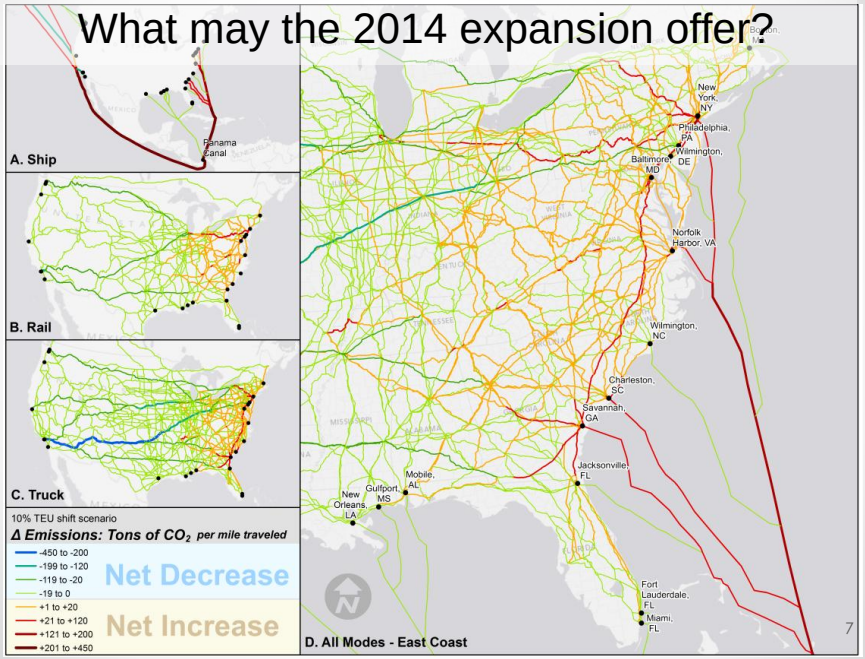
Network Analyst Optimization Algorithm
- Optimize Route for Desired Parameter



Single Mode Distance	Los Angeles Ship	Los Angeles Rail	Los Angeles Truck	New York Ship	New York Rail	New York Truck	Panama Ship
Los Angeles	-	-	-	6,242	3,125	2,936	3,912
New York	6,242	3,125	2,936	-	-	-	2,330
Panama	3,912	-	-	2,330	-	-	-
Shanghai	6,848	-	-	16,197 (nw passage)	-	-	10,692
Singapore	9,349	-	-	12,565 (nw passage)	-	-	13,192

Corbett, J. J.; Deans, E.; Silberman, J.; Morehouse, E.; Craft, E.; Norsworthy, M., Panama Canal expansion: emission changes from possible US west coast modal shift. Carbon Management 2012, 3, (6), 569-588.

One example: Expanded Panama Canal
What may the 2014 expansion offer?



How are we using GIFT?

Intermodal freight network optimization model to evaluate objective tradeoffs.

- Table-top exercises with leaders in transportation
  - Modal experts and industry decision makers
  - Public infrastructure planners at regional and national levels
  - Environmental, energy interests in public and private sectors
- Evaluates performance against *benchmarks* and optimizes with respect to possible ***targets***
- Web-version in development.

Example Questions GIFT addresses:

- Given **current or new infrastructure**, choose origin-destination pairs
- Consider **current or future fuels**
- Compare **emerging technologies**
- Input **best practice operations**
- Interact with the model results to **visualize supply chain logistics**
- Consider environmental, energy targets to **meet economic demand**

Thank you; discussion welcome

The GIFT model helps the user analyze potential costs and benefits of intermodal routes and freight transportation policies for 21st Century innovation

- Selected GIFT references

1. Corbett, J. J.; Ghosh, A.; Hawker, J. S.; Korfmacher, K.; Lee, E. E.; Silberman, J.; Winebrake, J. J. Infrastructure Performance Improvement to Reduce Corridor Delays for Freight Flows: Application of Geospatial Intermodal Freight Transportation Model, Study Design Memorandum: Milestone for Task I – Assess System Performance Measures; University of Delaware and Rochester Institute of Technology: Newark, DE, 3 November 2010, 2010.
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4. Comer, B.; Corbett, J. J.; Hawker, J. S.; Korfmacher, K.; Lee, E. E.; Prokop, C.; Winebrake, J. J., Marine vessels as substitutes for heavy-duty trucks in great lakes freight transportation. Journal of the Air and Waste Management Association 2010, 60, (7), 884-890.
5. Corbett, J. J. Improved Geospatial Scenarios for Commercial Marine Vessels; California Air Resources Board: Sacramento, CA, March 2010, 2010.
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8. Winebrake, J. J.; Corbett, J. J.; Falzarano, A.; Hawker, J. S.; Korfmacher, K.; Ketha, S.; Zilora, S., Assessing energy, environmental, and economic tradeoffs in intermodal freight transportation. Journal of the Air and Waste Management Association 2008, 58, (8), 1004-1013.

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