

Achieving Emissions Reductions in the Freight Sector: Understanding Freight Flows and Exploring Reduction Options

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Talking Freight Seminar:
Freight and the Environment Part I

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Acknowledgments

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- For more information about TCI see:
<http://www.georgetownclimate.org/state-action/transportation-and-climate-initiative>
- I am also grateful to Dr. James Corbett (UD), Dr. Scott Hawker (RIT), and Dr. Karl Korfmacher (RIT) for contributions related to the GIFT model.

Overview

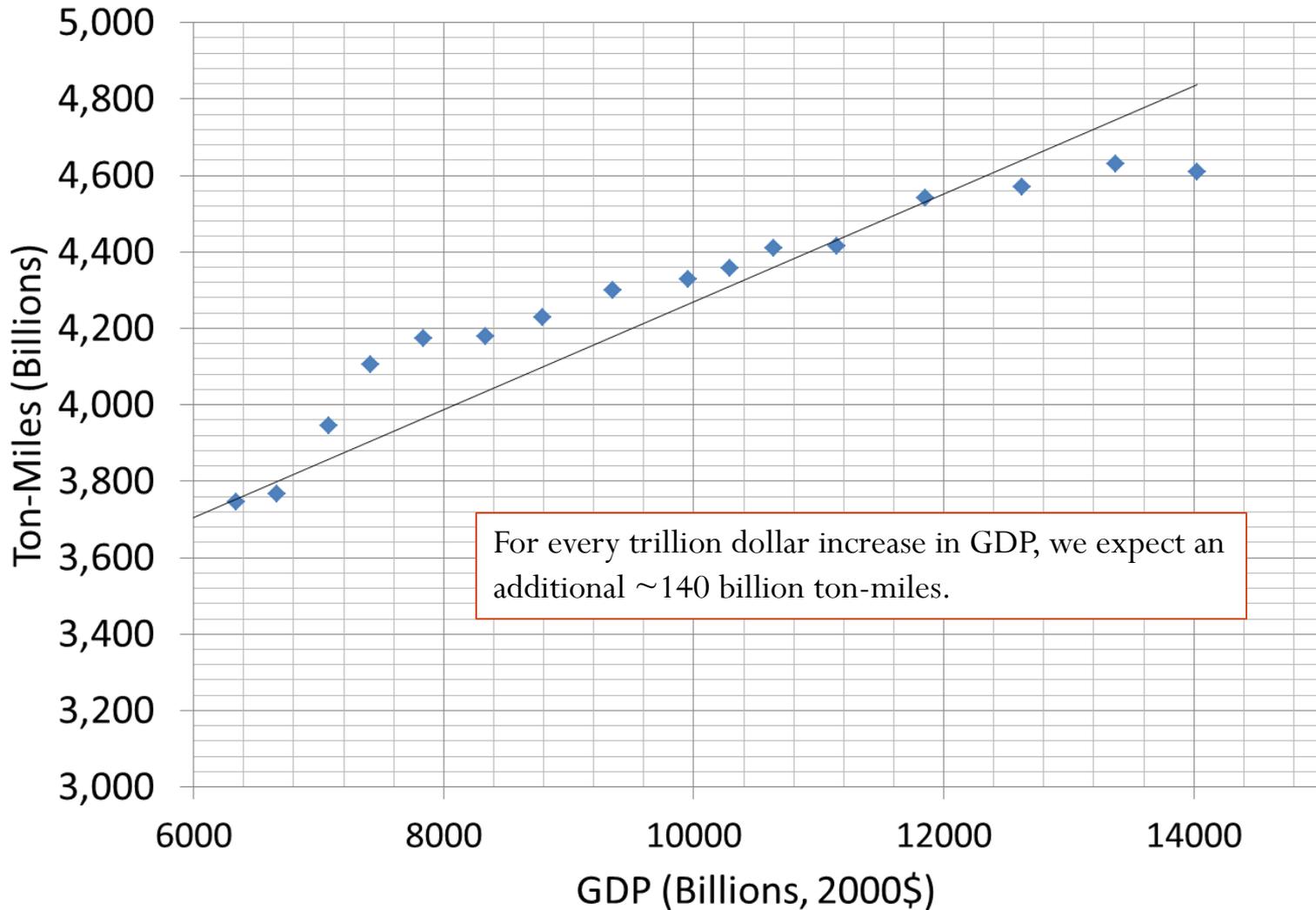
- Understand the problem
- Characterize the data
- Identify energy and emissions reduction opportunities
- Implement results
- Questions and discussion

Understand the Problem

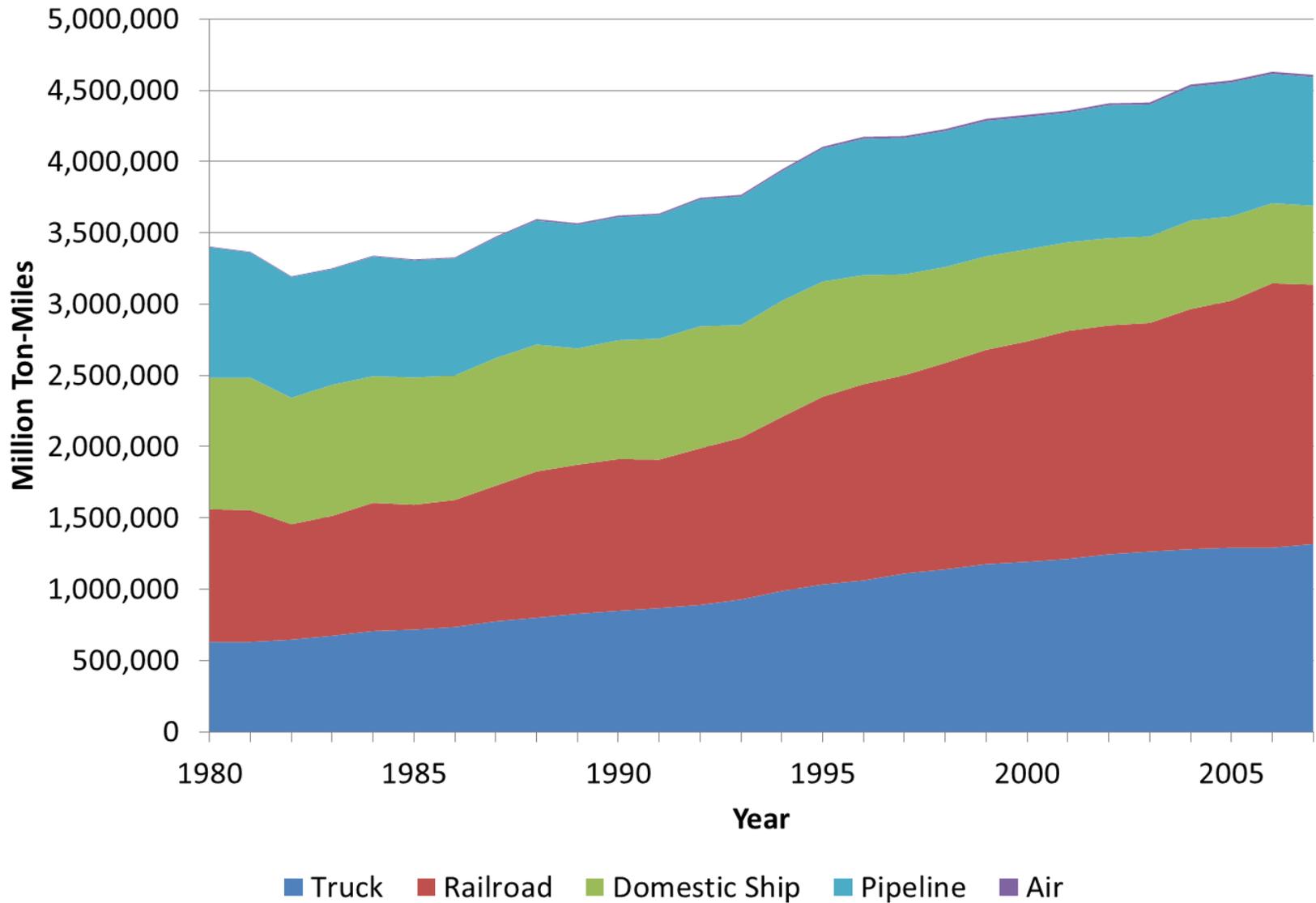
Freight is closely tied to economic growth and is growing; unfortunately, the bulk of freight is moved by high energy-intensive and GHG-intensive modes (truck).

Goods Movement and GDP

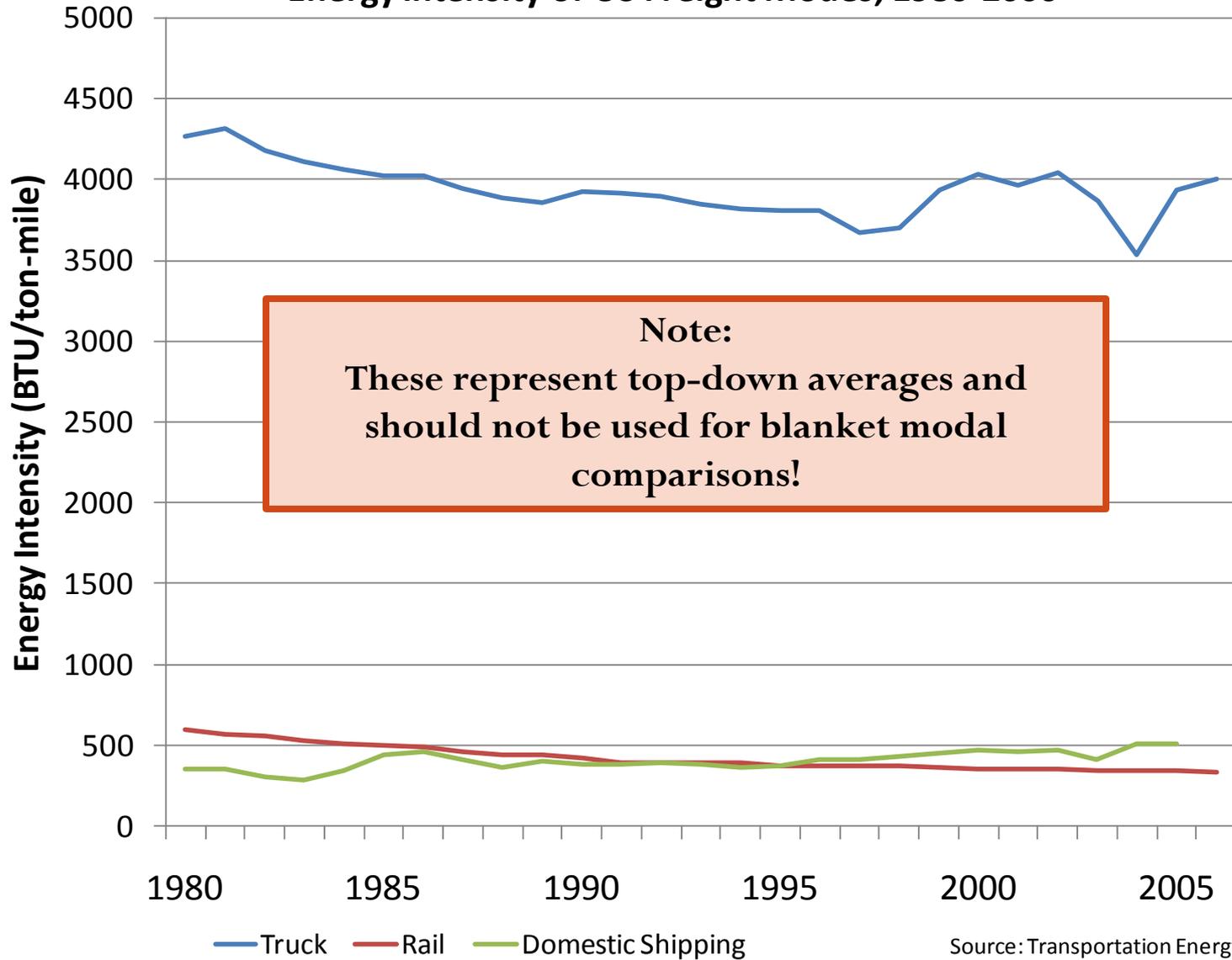
Ton-Miles v. GDP for the U.S. (1980-2007)



U.S. Freight Movement by Mode, 1980-2007

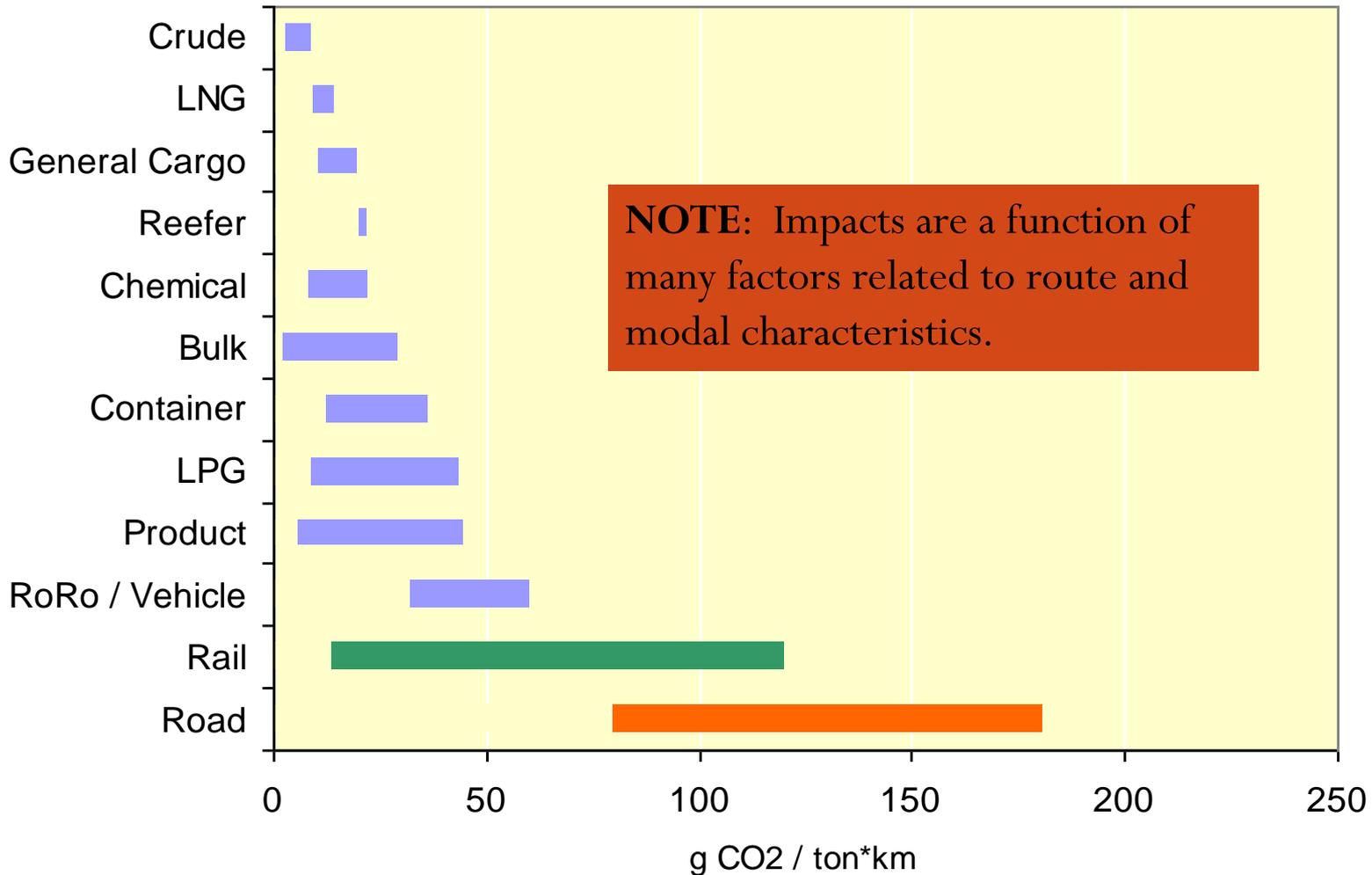


Energy Intensity of US Freight Modes, 1980-2006

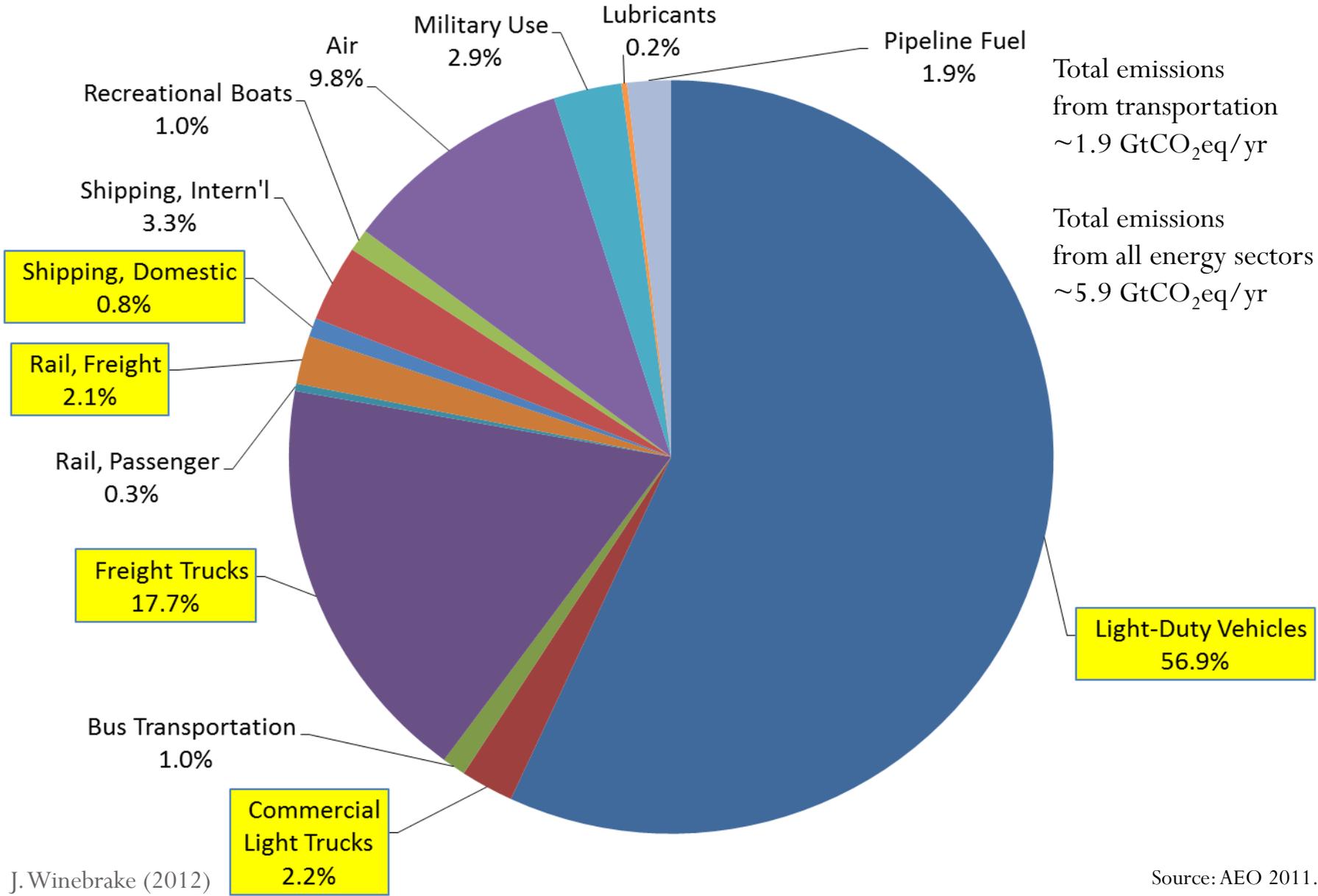


Source: Transportation Energy Data Book 27

Range of typical CO2 efficiencies for various cargo carriers



Percentage of Energy-Related Transportation CO2 Emissions by Mode, 2011



J. Winebrake (2012)

Source: AEO 2011.

Characterize the Data (Northeast and Mid-Atlantic (TCI) Region)

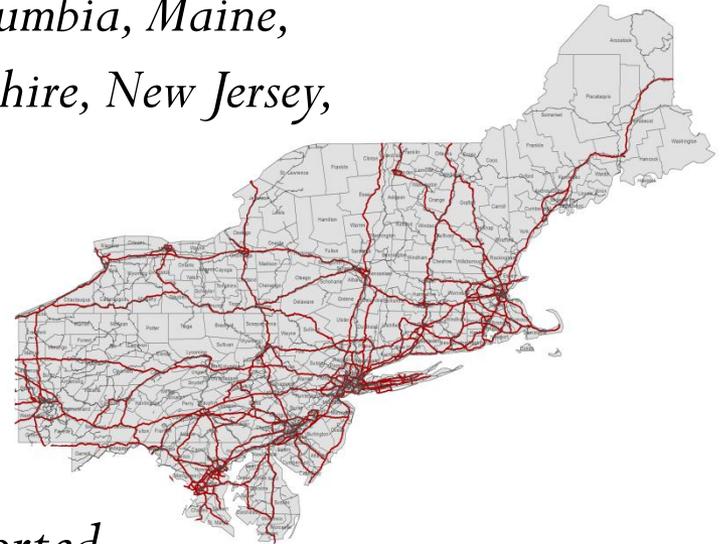
Freight flows for the TCI region are dominated by truck (87%); about 50% of the commodities moved by weight include: gravel and stone; refined fuel; non-metallic minerals; and coal.

Overview of Characterization Project

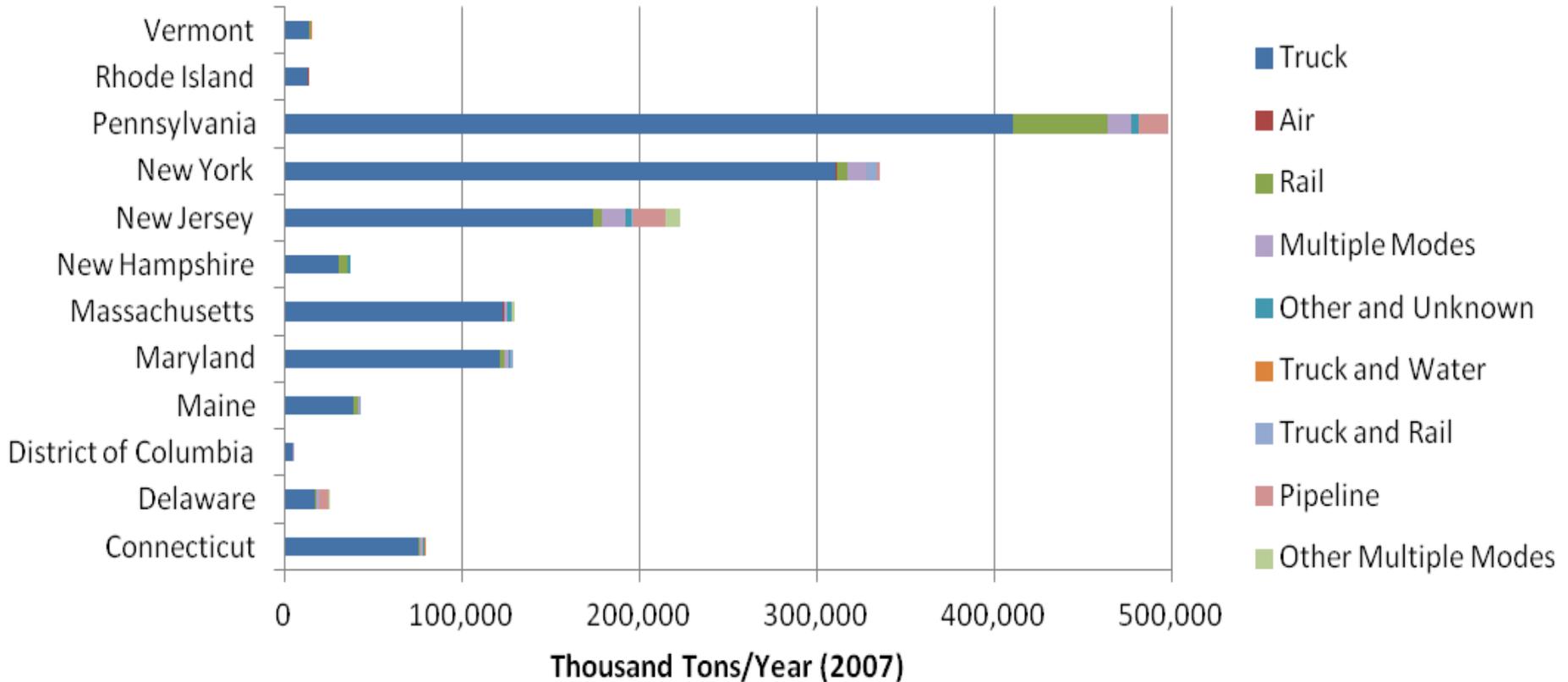
- Purpose
 - Characterize freight flows for the TCI region
 - Provide EXCEL and ArcGIS datasets on freight flows
- Value
 - Results provide data and context for regional plans, programs, and policies to reduce improve efficiency and reduce the environmental impacts from freight transportation
- Supported by the Georgetown Climate Center

Scope of Study

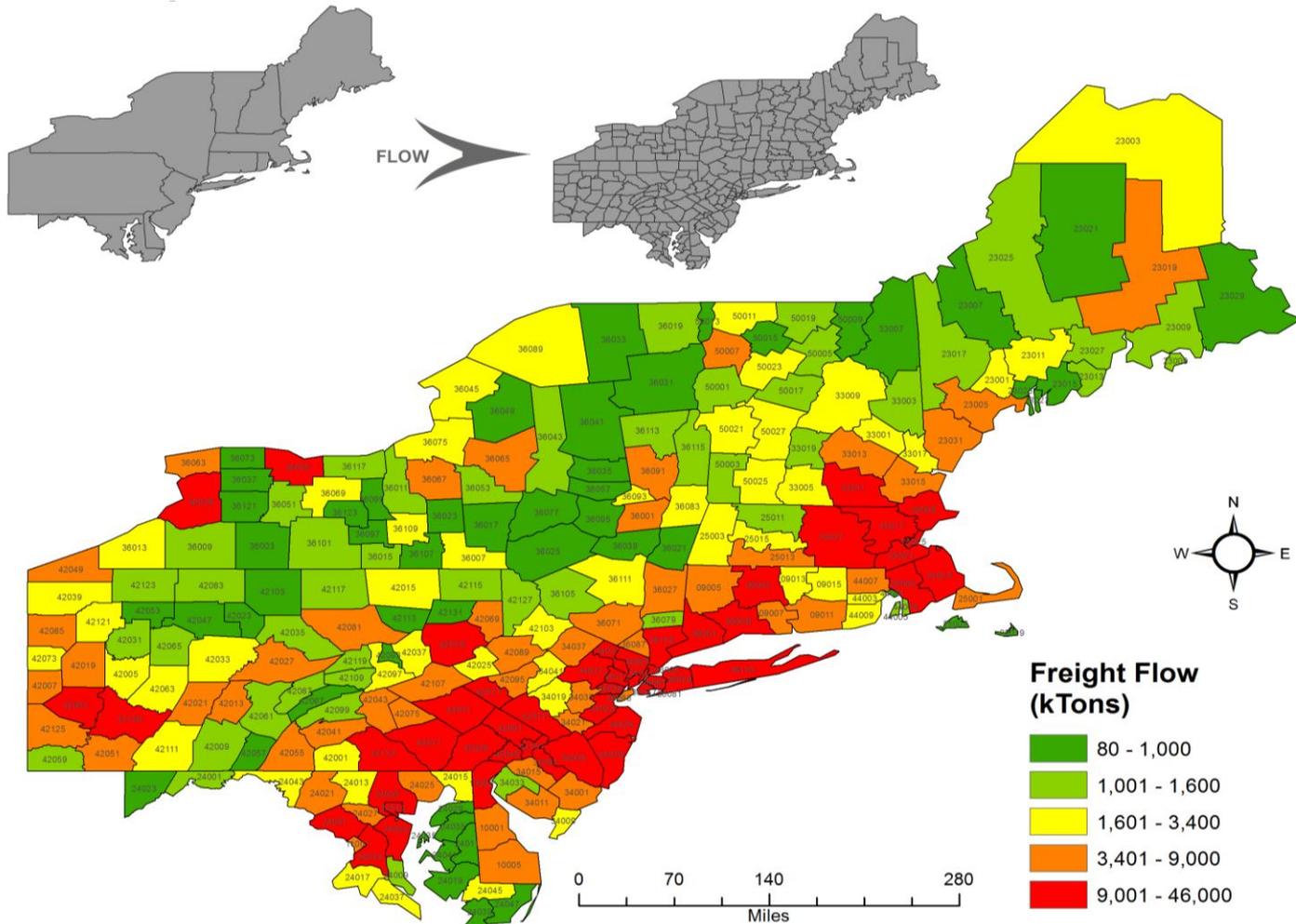
- Geography
 - *Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, and Vermont.*
- Modes: *Truck, Rail, Ship*
- Commodities: *All available and reported*



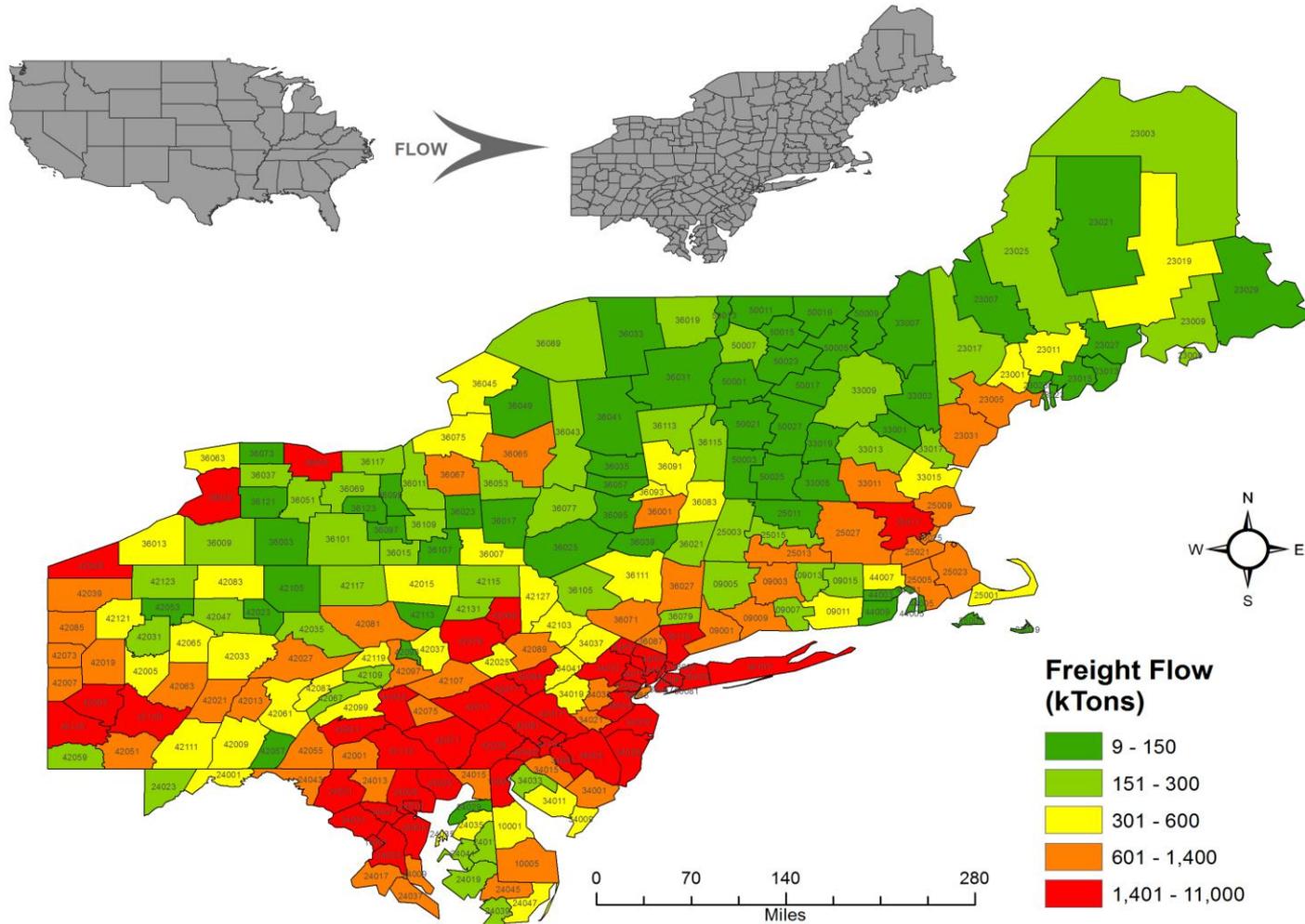
Weight of Freight Flows by State by Mode, Northeast States to All U.S. States



Freight Flow (ktons) to Northeast Counties from the Northeast Region



Freight Flow to Northeast Counties from U.S. States Outside of the Northeast Region, by Weight



Identify Energy and Emissions Reduction Opportunities

The IF-TOLD framework provides insights into options for emissions reductions from freight; the GIFT model can be used to evaluate trade-offs across important criteria (cost, time-of-delivery, emissions, etc.).

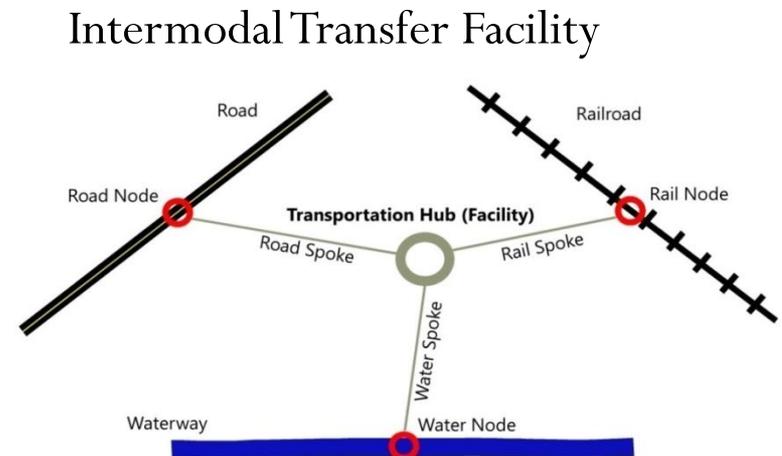
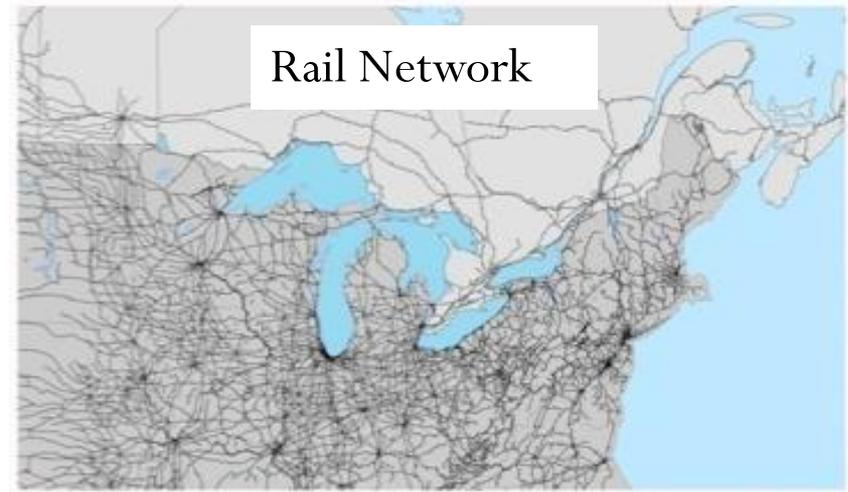
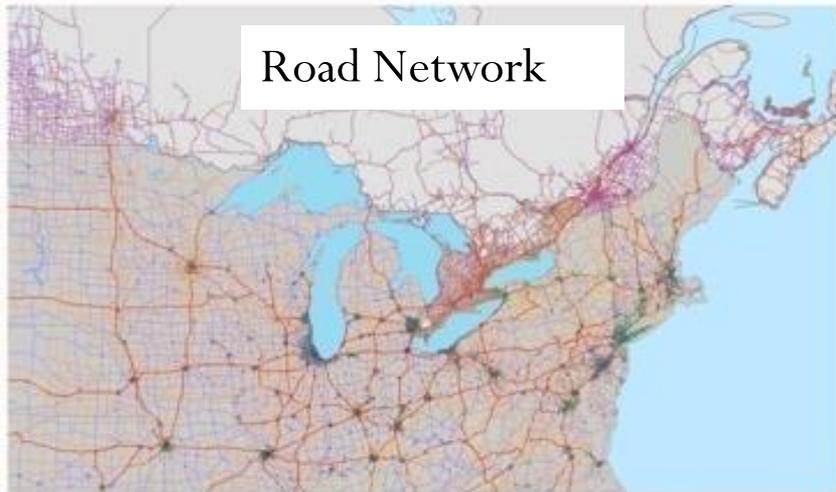
The IF-TOLD Mitigation Framework

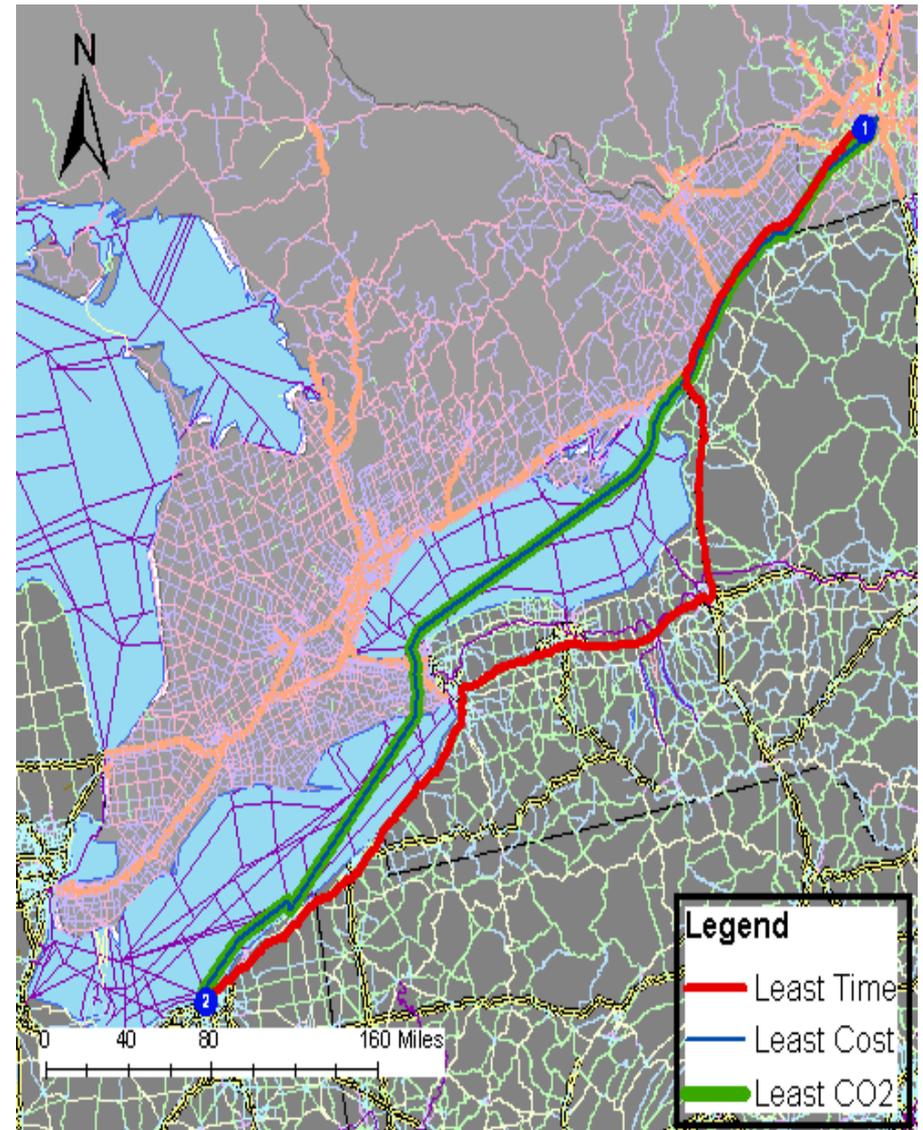
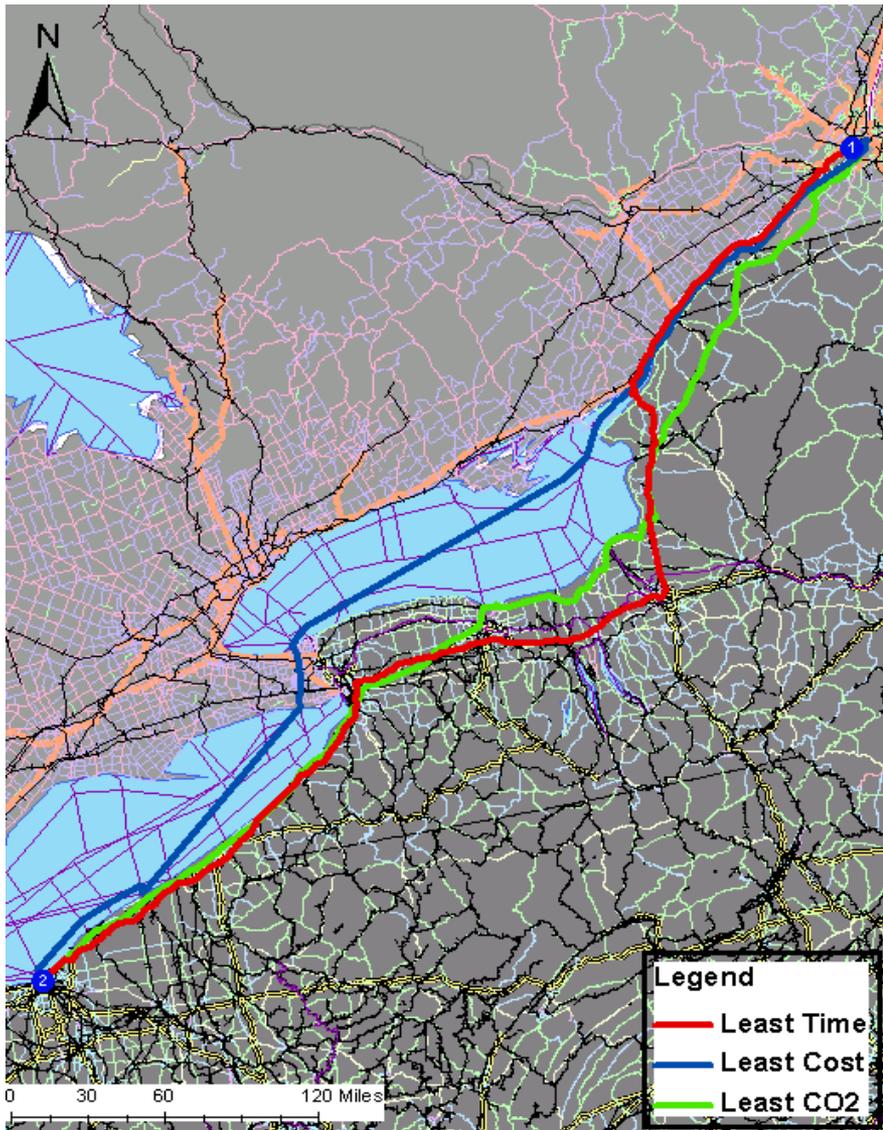
- The IF-TOLD framework:
 - Intermodalism/Infrastructure – use of efficient modes and infrastructure
 - Fuels – use of low carbon fuels
 - Technology – application of efficient technologies
 - Operations – best practices in operator behavior
 - Logistics – improve supply chain management
 - Demand – reduce how much STUFF we consume

Example Using the Geospatial Intermodal Freight Transportation (GIFT) Model

GIFT has been jointly developed at the Rochester Institute of Technology (RIT) and the University of Delaware with partial support from the U.S. Department of Transportation, Maritime Administration and the Great Lakes Maritime Research Institute.

Connect Multiple Transportation Mode Networks at Intermodal Transfer Facilities



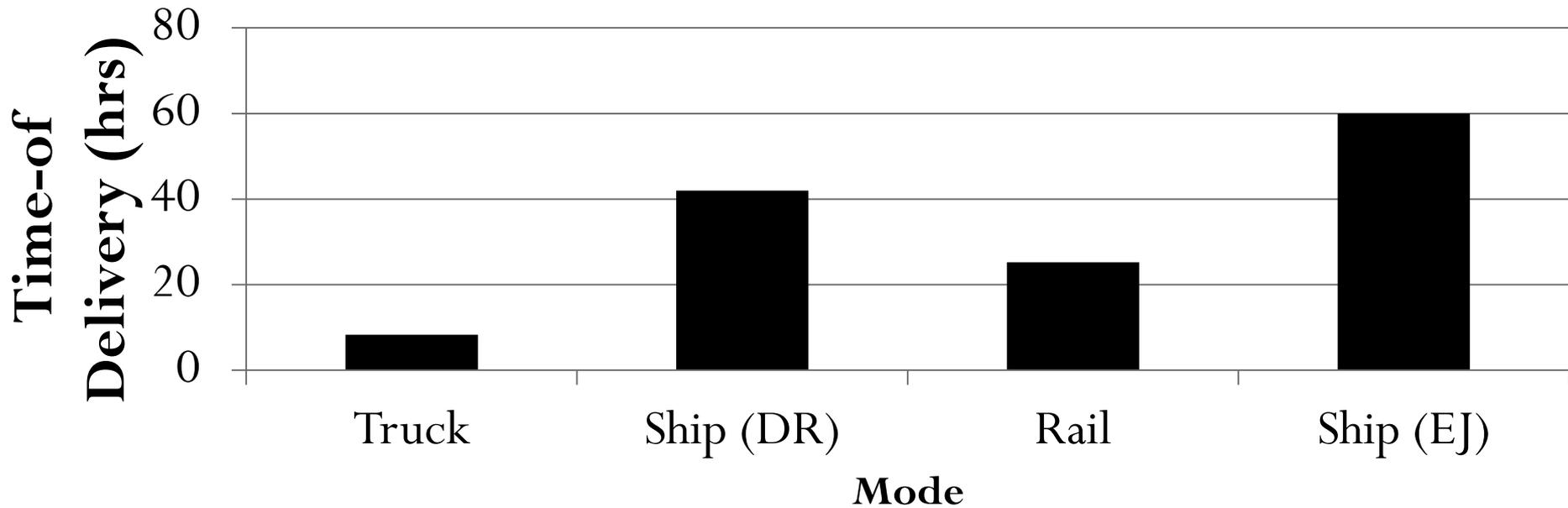
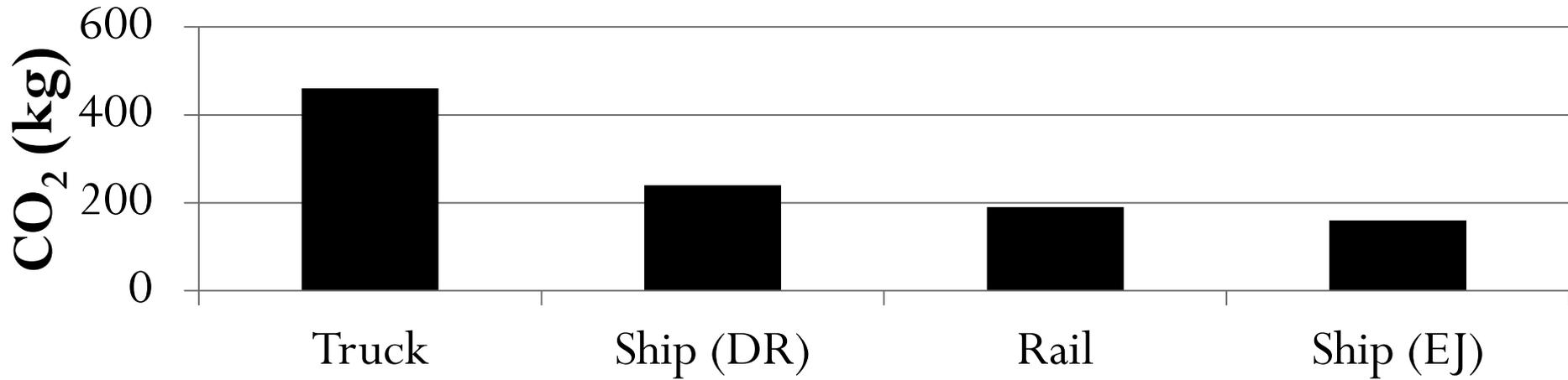


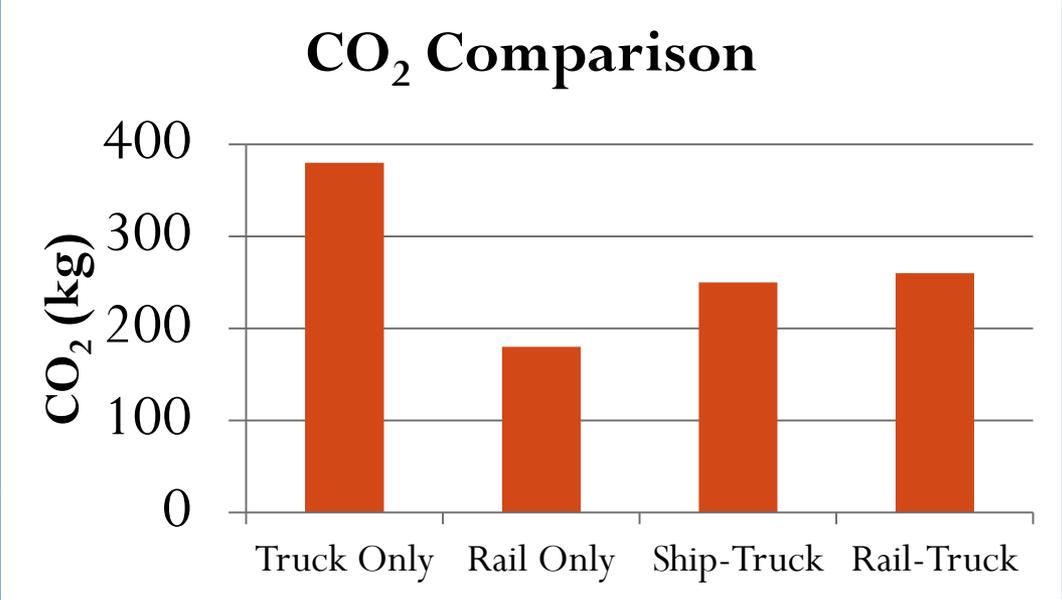
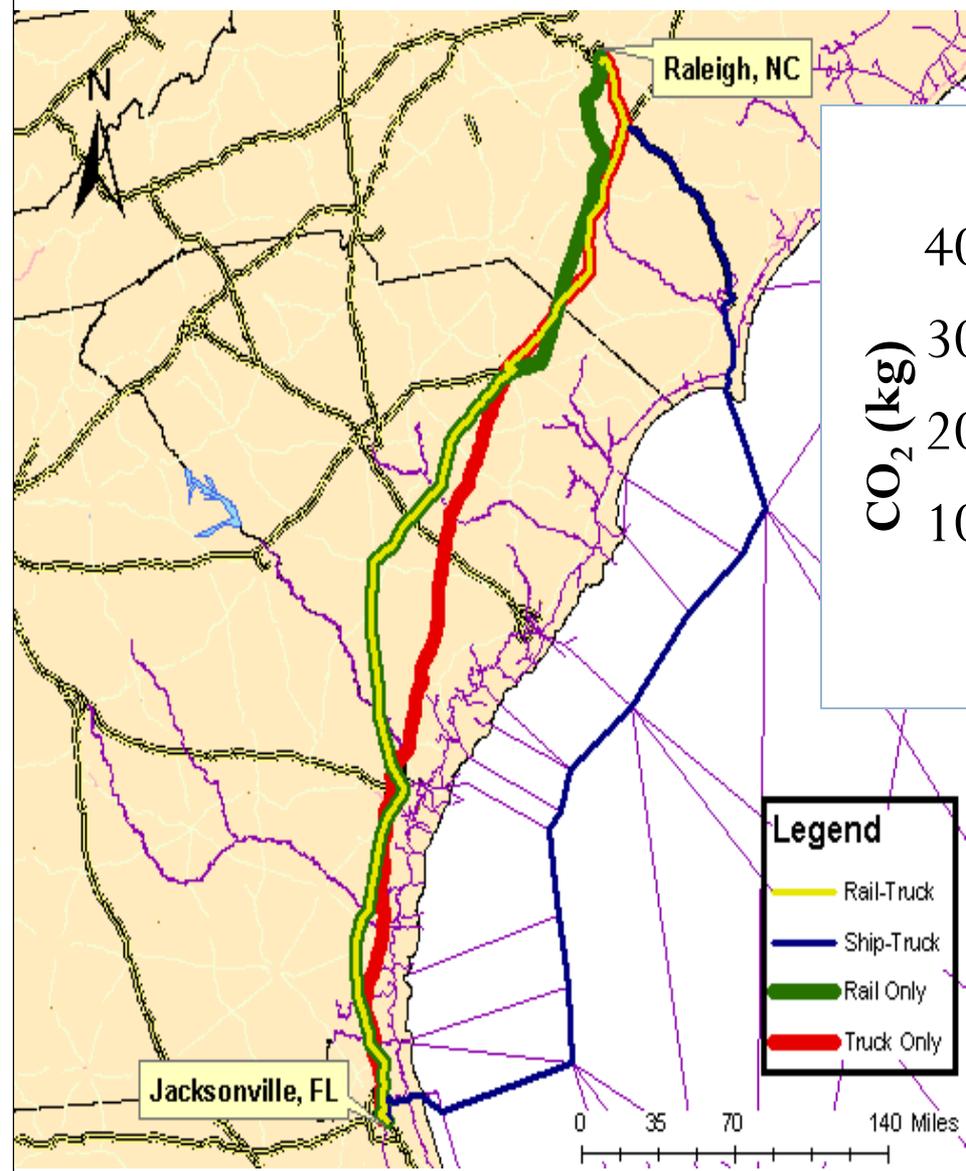
Montreal to Cleveland (Ship 1)

Montreal to Cleveland (Ship 2)

Emissions and Time of Delivery Tradeoffs

Montreal to Cleveland





Implement Results

More analysis of policy impacts needed for the Northeast and Mid-Atlantic states; however, one could use IF-TOLD to identify potential opportunities for a menu of policies .

Policy Options

	Intermodalism	Fuel	Technology	Operations	Logistics	Demand
Policy Options	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						•

Questions/Discussion
