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The Shifting Nexus of Global Agriculture

Investing in Agricultural Infrastructure

Prepared for

Federal Reserve Bank of Kansas City

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Senior Vice President
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Charting the Course

- Impact of Infrastructure on U.S. Agriculture
- Key Agricultural Transportation and Infrastructure Issues
- Transportation of Grains, Soybeans and Products
- South America Infrastructure Influence
- Sustainable Transportation

Impact of Infrastructure on U.S. Agriculture

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Industries Fully Dependent on Soybeans, Grains and Related Products

- To the Second Order Consumers in the Supply Chain:
  - Delivery of commodities from farming of significant importance to the U.S. economy
  - 1.5 million jobs,
  - More than $352 billion in U.S. output,
  - Over $41 billion in labor earnings, and
  - Greater than $74 billion in value added on the U.S. economy.

Infrastructure Framework

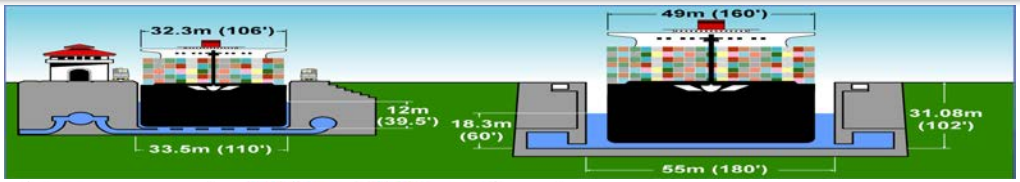
- Infrastructure Problems = Inefficiencies
  - Inefficiencies = Lower Effective Transport Capacity
    - Lower Effective Transport Capacity = Higher Rates
      - Higher Rates = Lower Farmer Returns

Key Transportation and Infrastructure Issues

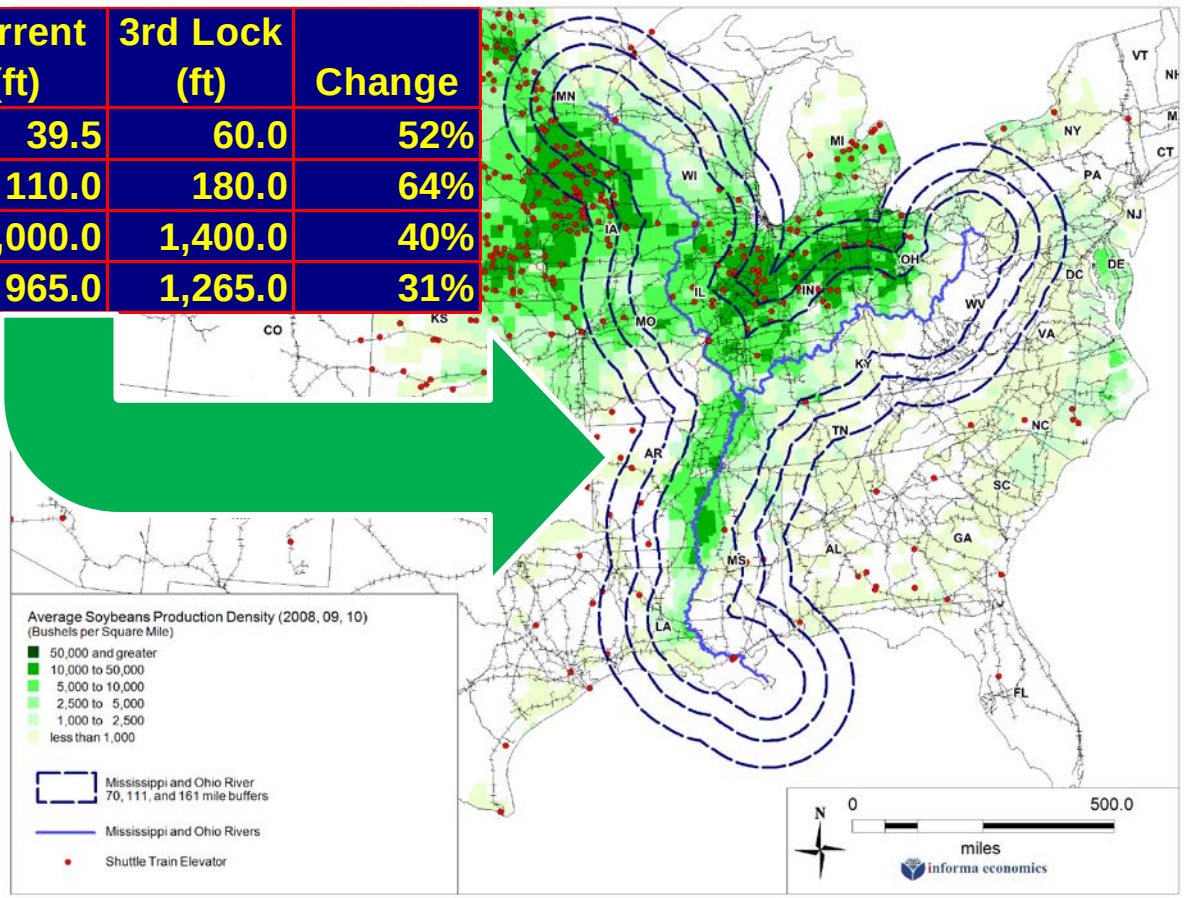
Key Infrastructure Issues

Infrastructure	Project Description	Cumulative Outlays ($ millions)
Inland Navigation Lock and Dams	Mississippi River Lock 20, 1,200 foot Lock Addition + Lock & Dam Rehabilitation	$311.1
	Mississippi River Lock 25, 1,200 foot Lock Addition + Scour Repairs & Rehabilitation	$429.9
	Ohio River Olmsted Lock & Dam Construction and Lock 52 and Lock 53 Removal	$2,044.0
	Ohio River Markland Lock Major Rehabilitation	$35.8
	Illinois River LaGrange Lock Addition	$320.9
	Illinois River LaGrange Lock Rehabilitation	$78.8
Channel Dredging by Army Corps of Engineers District	Galveston	$1,230.8
	Mobile	$677.8
	New Orleans	$2,322.5
	Portland	$288.0

Modal Developments beyond the U.S. Borders: Panama Canal



Dimension	Current (ft)	3rd Lock (ft)	Change
Draft	39.5	60.0	52%
Width	110.0	180.0	64%
Length	1,000.0	1,400.0	40%
Ship Length	965.0	1,265.0	31%



Soybean Planted Acreage Impact

- 70 miles
  - 26.7 mil.
- 111 miles
  - 27.9 mil.
- 161 miles
  - 49.6 mil. (*two-thirds U.S.*)

Cost Savings to Soybean and Grain Users Derived From Infrastructure Improvements

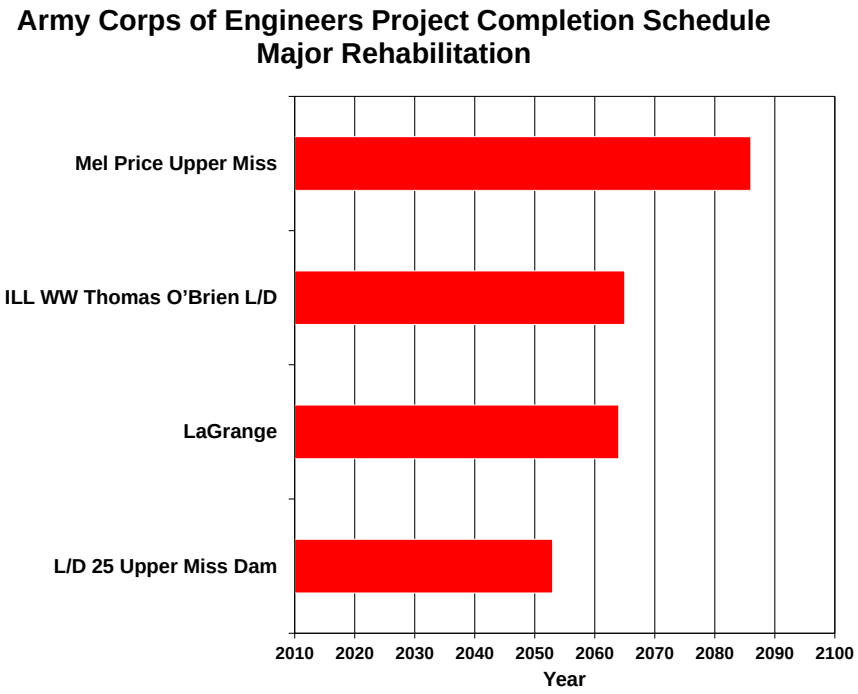
- Improved reliability in the delivery time of soybeans and grains
- Reduced travel time and transit costs
- Improved efficiency at ports for using larger, more efficient ocean going vessels
- Potential re-assignment of rail traffic to barge traffic for freight currently utilizing rail to avoid deficiencies at key lock and dam facilities

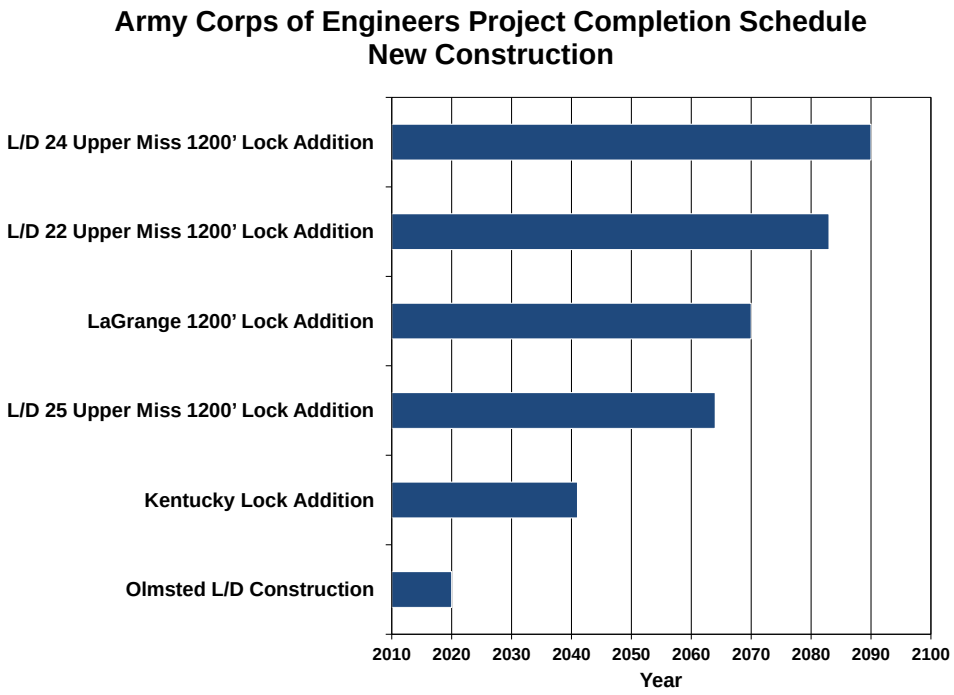
Annual Summary Investment Outlays & Returns for Soybeans & Grain Industries

Description	Impact Type	Dollar Value (million)	Economic Impact			
			Earnings (million)	Output (million)	Employ-ment	Value-Added (million)
Infrastructure Outlays	Construction	$467.2	$400.8	$1,176.5	7,927	$615.2
Supply Chain Impacts	Cost Savings	$145.9	$8.9	$40.3	185	$15.5

Long-Term Problem on the Rivers

Army Corps of Engineers Project Completion Schedule for Select Locks

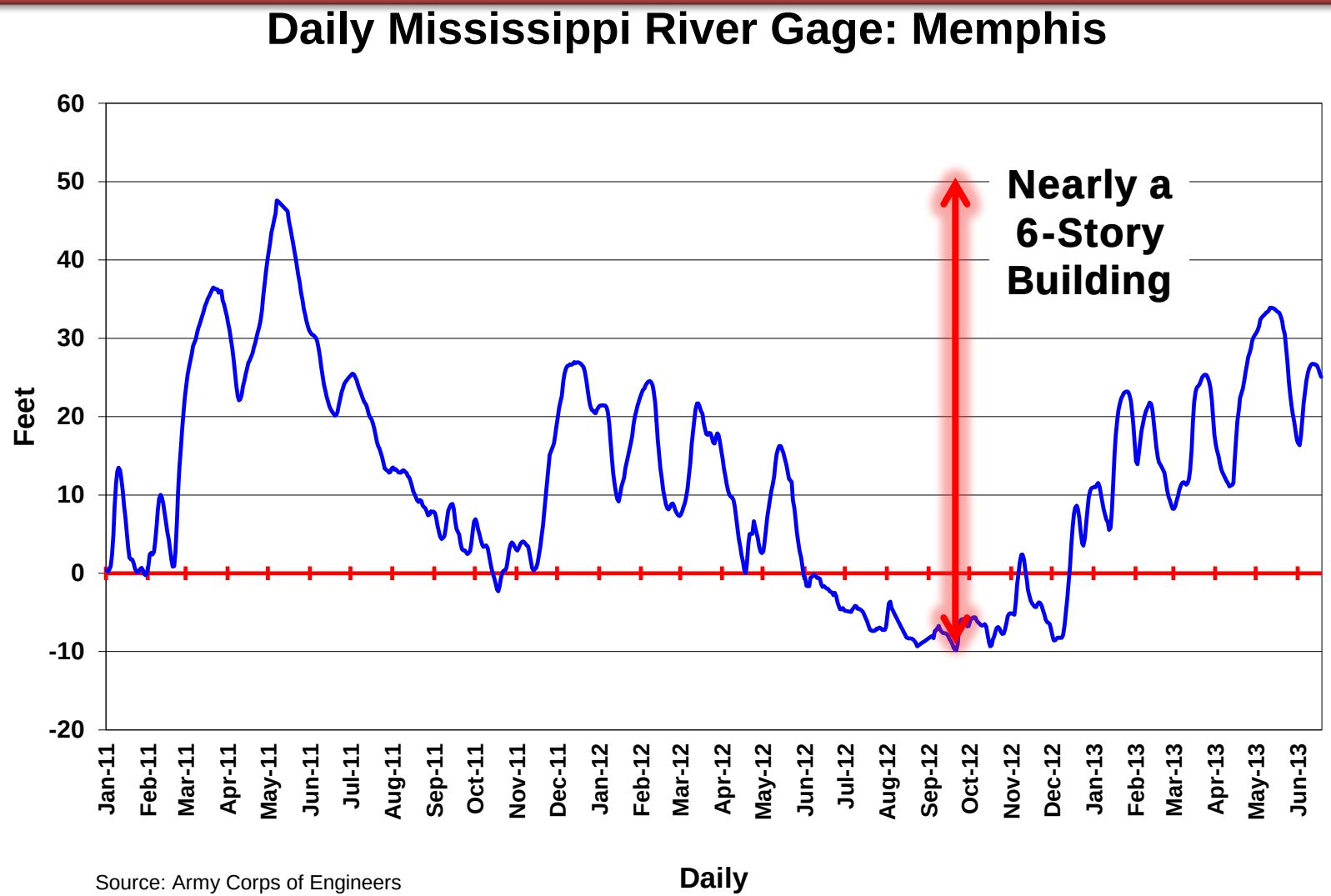




Deteriorating Infrastructure Situation

- Backlog of Lock and Dam Repairs and Emergency Repairs
  - Industry needs reliability through infrastructure maintenance
  - Not full solution, clearing deferred maintenance buys down risk of catastrophic event or closure until authorized major rehabilitation or new construction can be appropriated and completed
  - Diversion to other modes substantial
    - 1 Barge = about 1,600 tons or 53,000 bushels
    - 1 Railcar = about 110 tons or 3,670 bushels
    - 1 Truck / Container = about 26 tons or 870 bushels
    - So, One 15-barge tow on Illinois River is equivalent to 216 rail cars or 1,050 semi-trucks
  - If 90-day closure at LaGrange Lock during peak soybean harvest movement
    - 341 barge loadings diverted as 5,000 rail carloads or 21,000 truck loads

Extreme Wall of Water
Not all Rivers Created Equal



Source: Army Corps of Engineers

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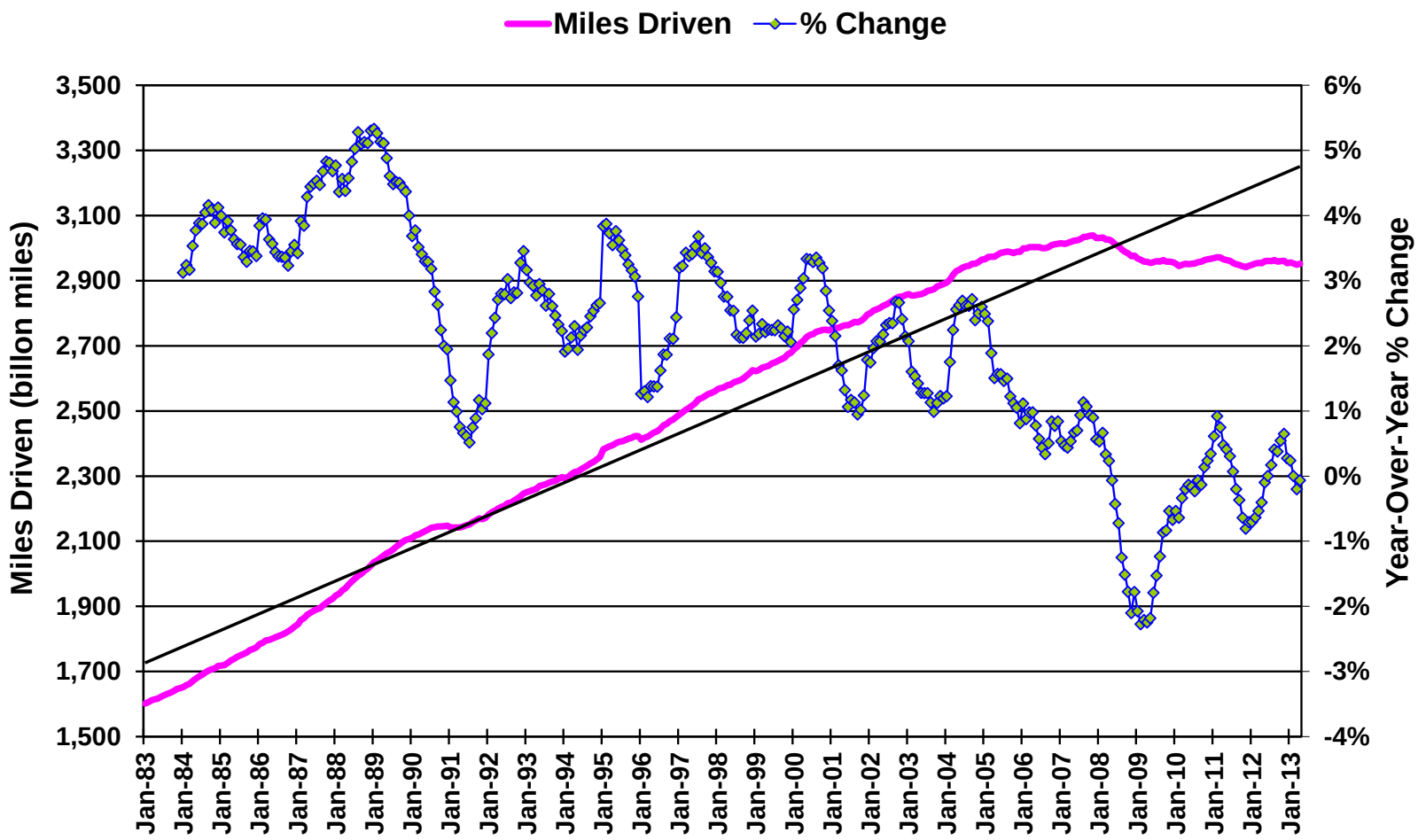
Reduced Driving, Fewer Miles & Improved Efficiencies = Less Highway Funding Base

Annualized Miles Driven by Month



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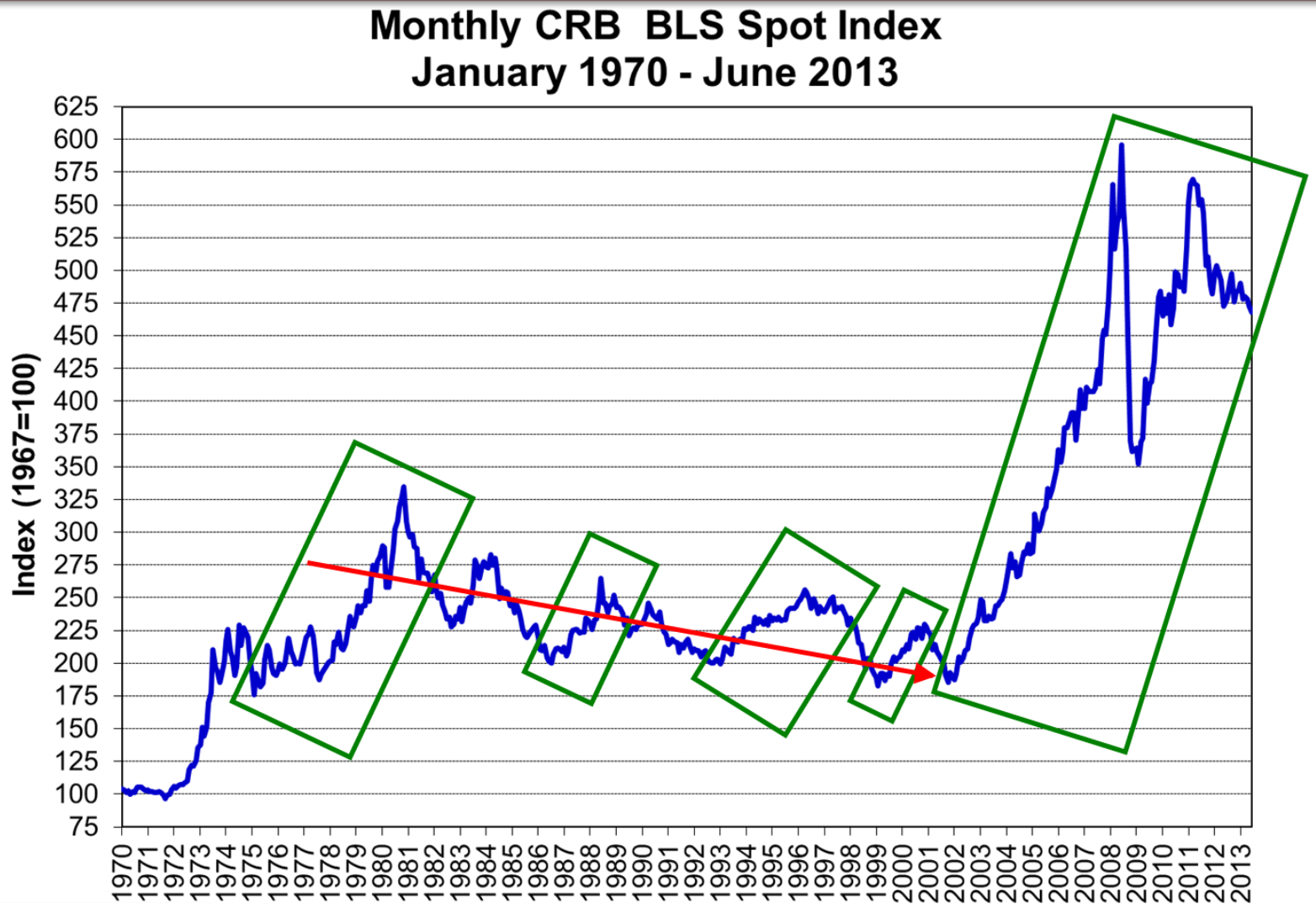
Rising Raw Ingredient Cost Structure Requires Offsets Elsewhere: Logistics



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Transportation of Grains, Soybeans and Products

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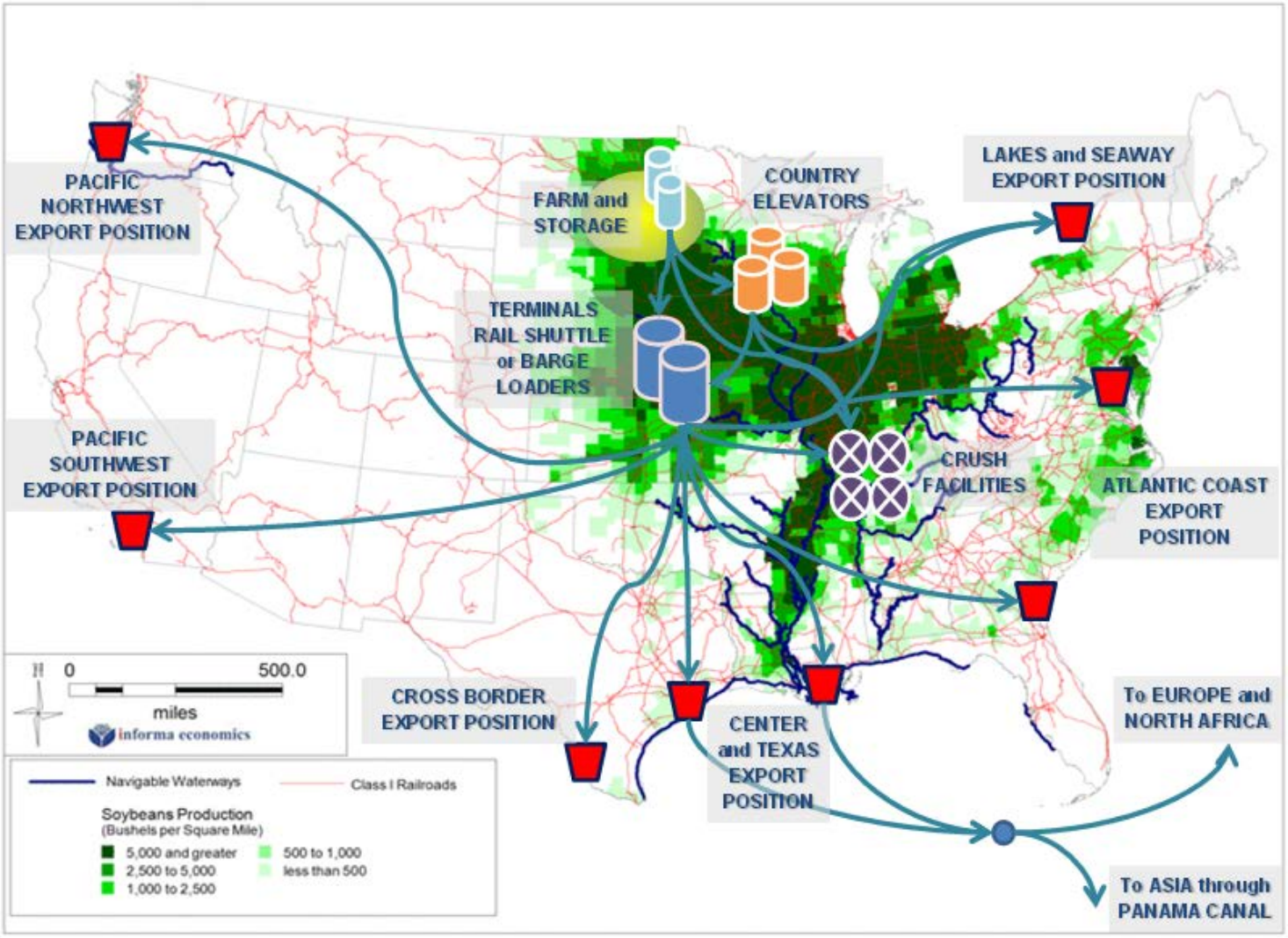
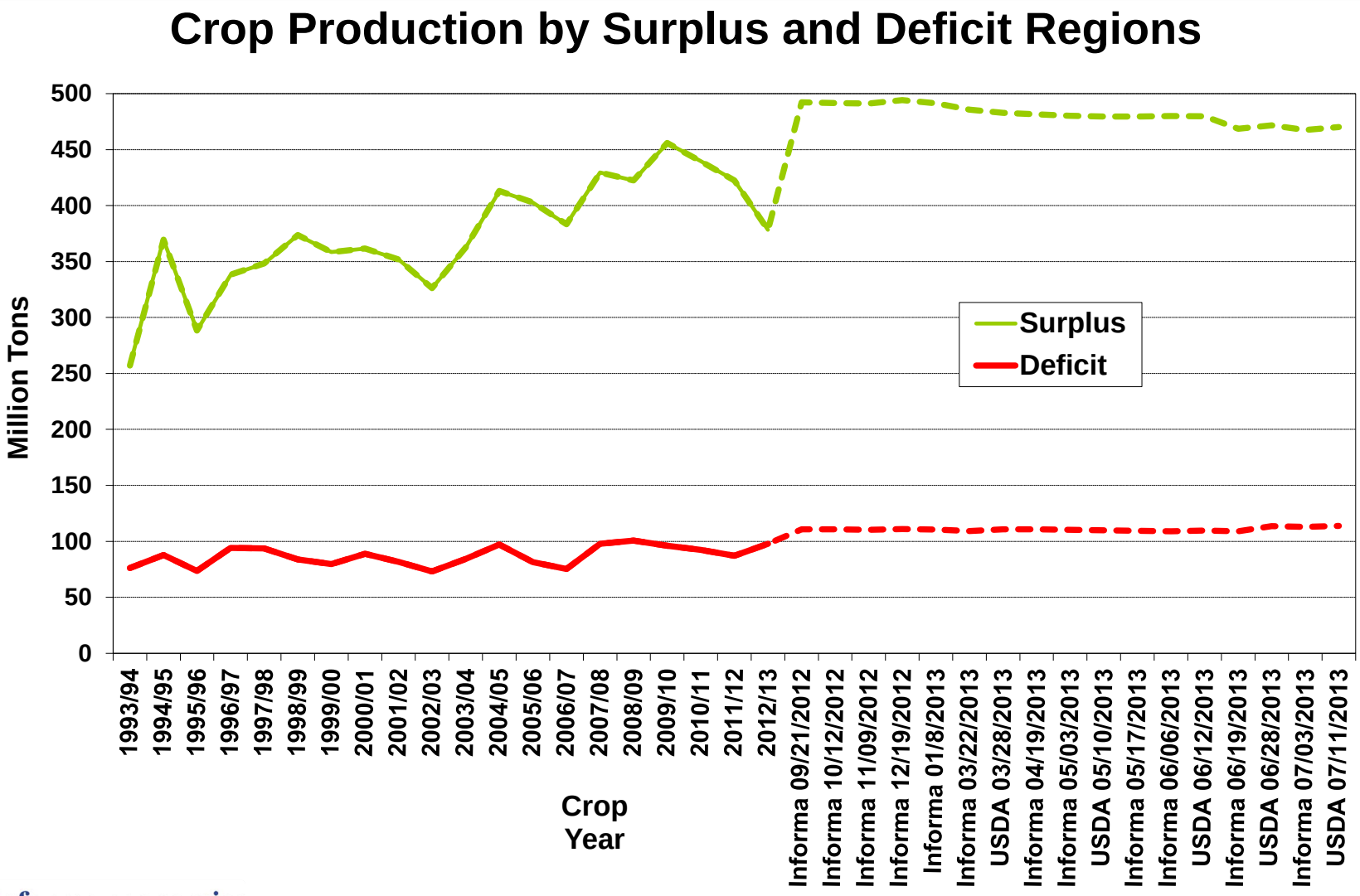
Soybean Logistics Flows
Multiple Markets and Routes



Potential Grain and Soybean Flows by Surplus and Deficit Regions



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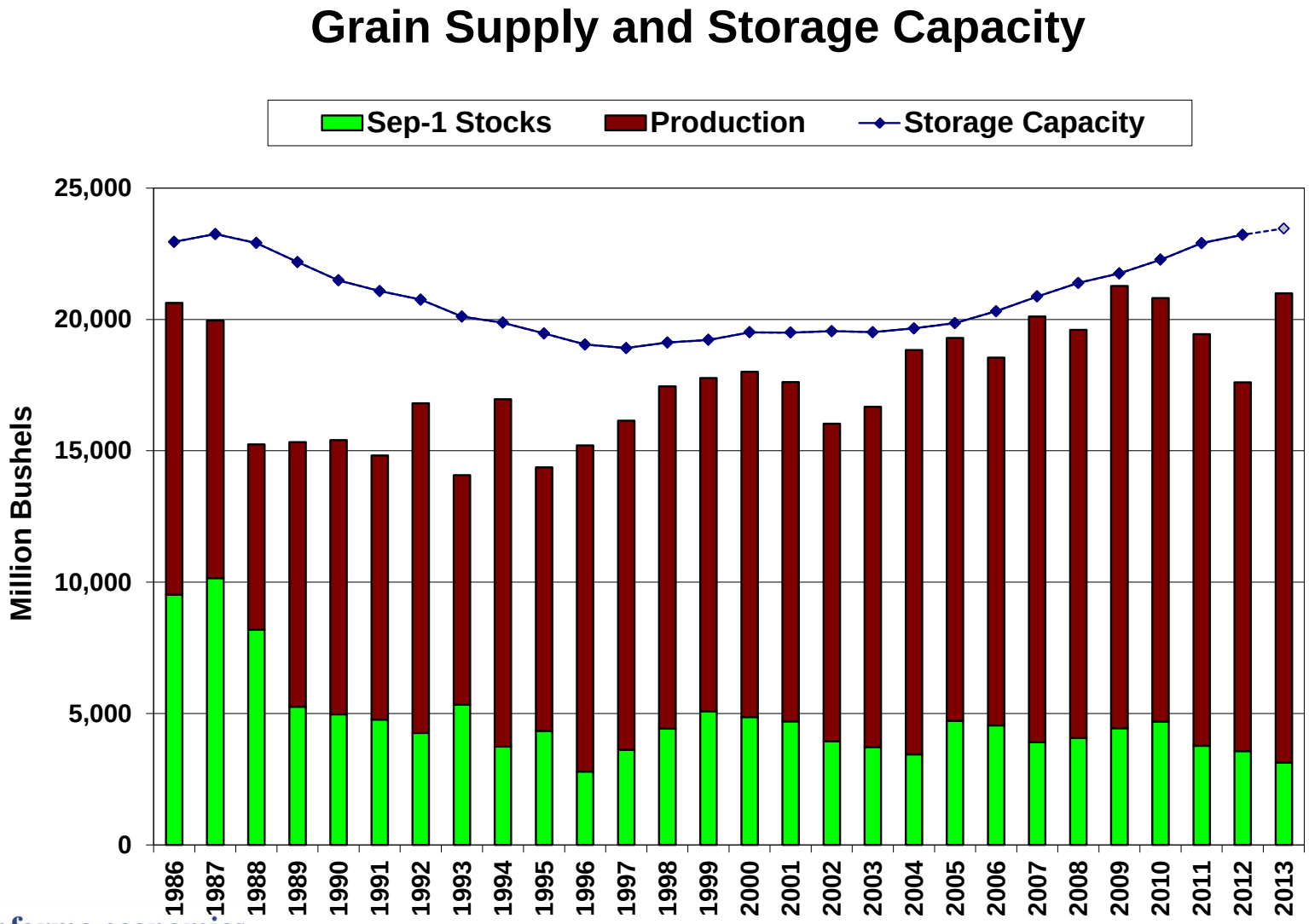
Grain and Soybean Supplies and Storage Response



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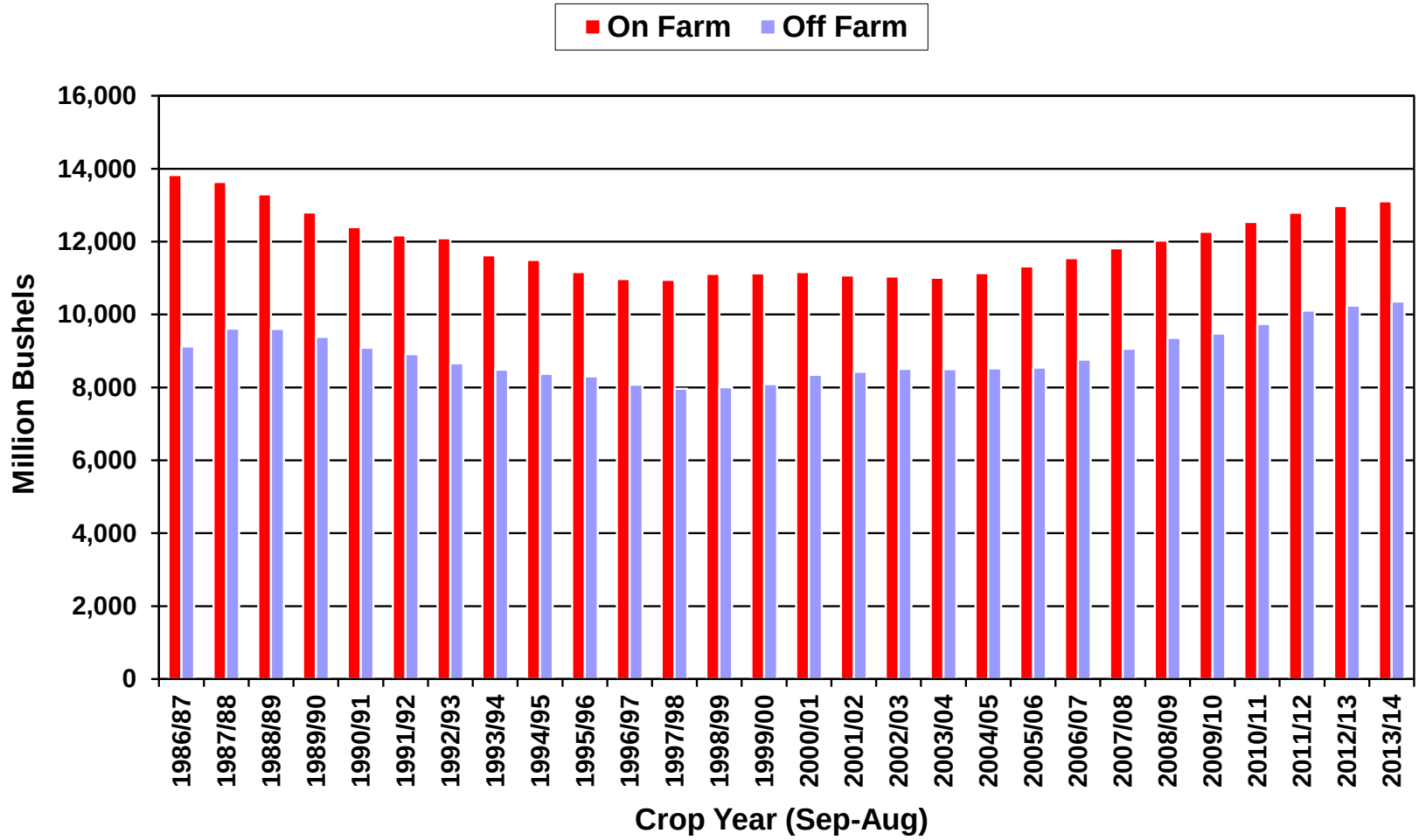
Pace of Grain Storage Expansion Similar whether On Farm or Off Farm



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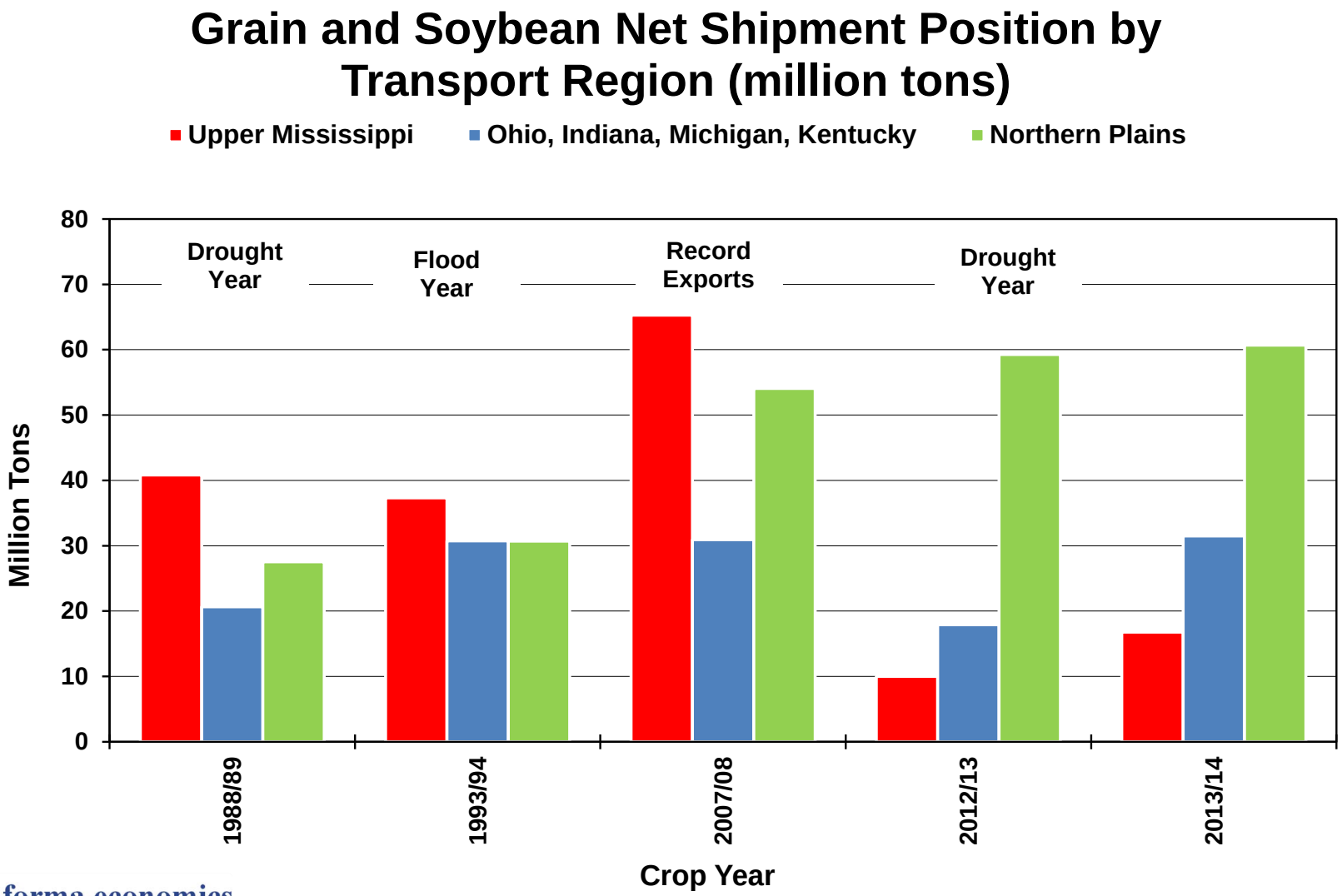

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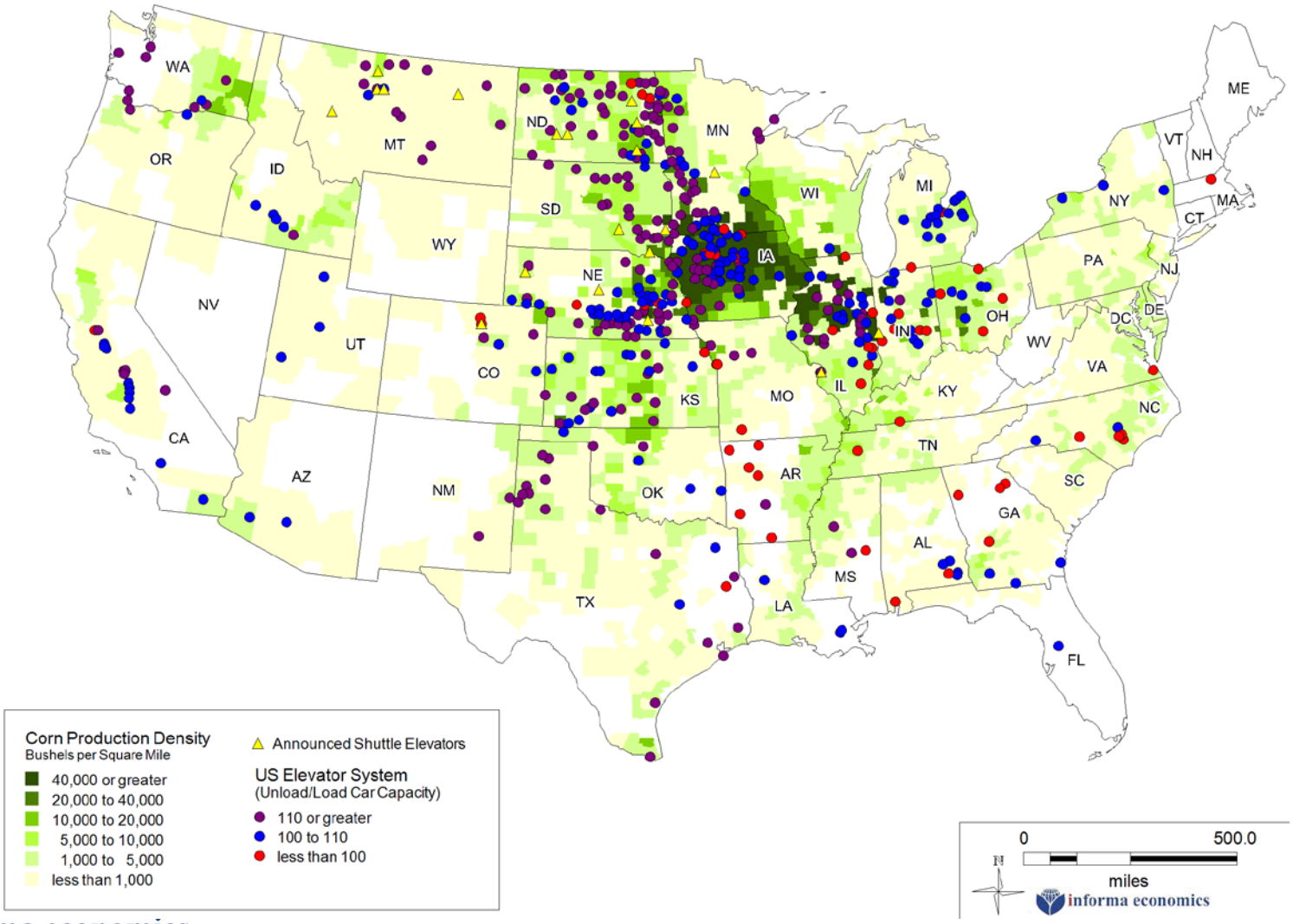
Railroad Grain Shuttle Loaders Filling the Map



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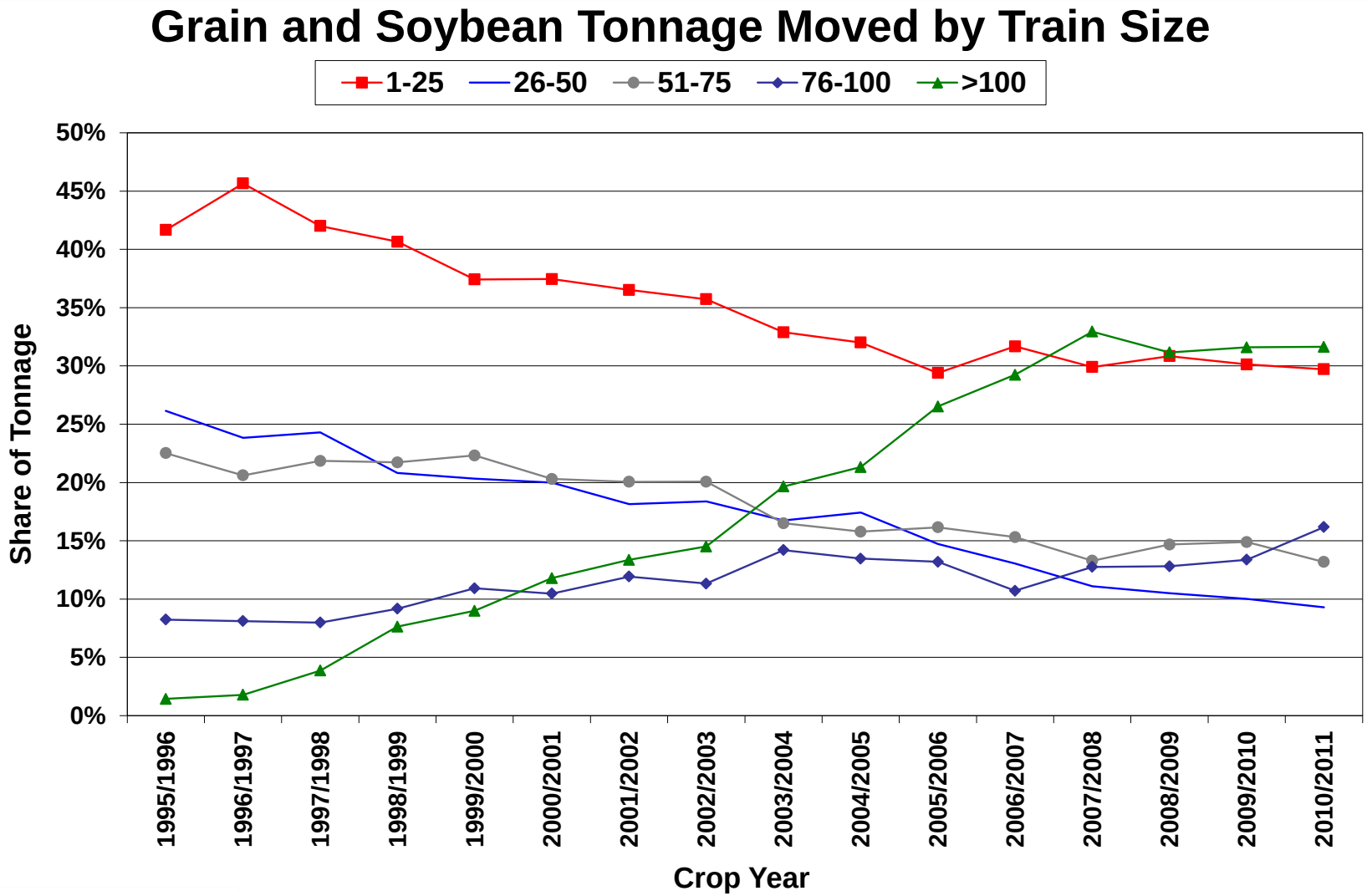
Train Size Increasing, Especially Movements of Soybeans and Corn



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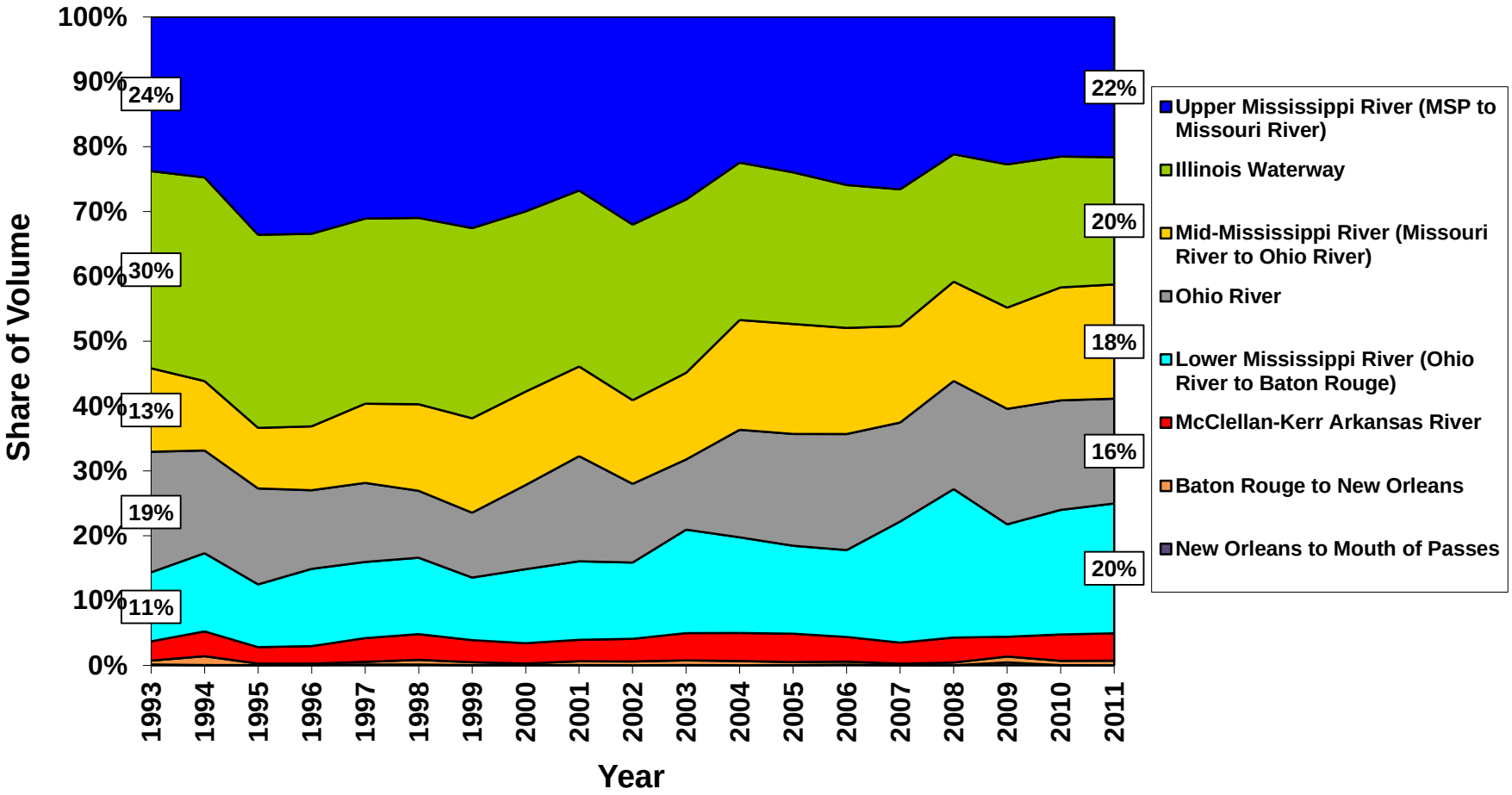
Share of Grain and Soybean Loadings by River Segment

Shift in barge loadings on inland river system: North to South



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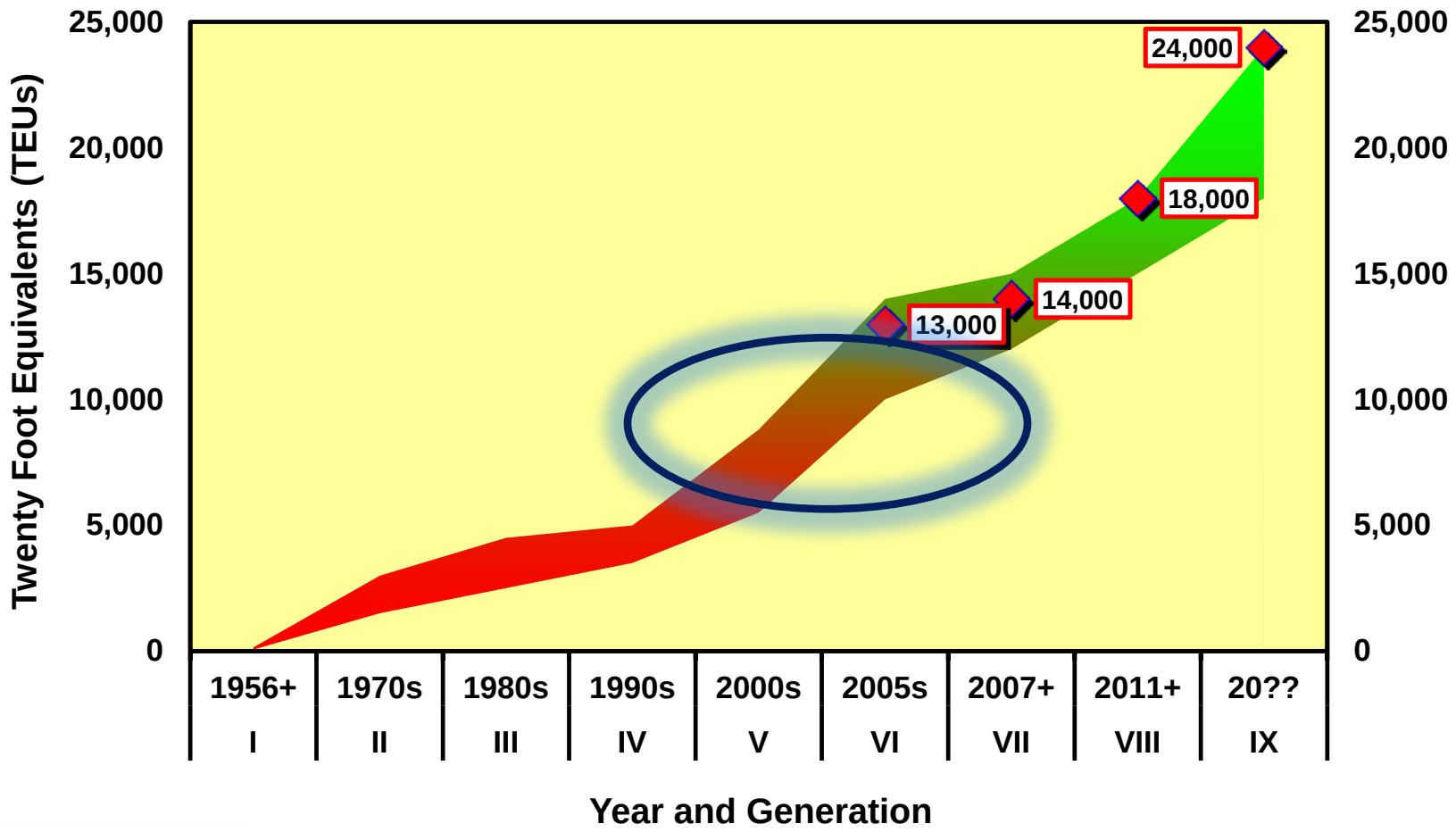
Container Vessel Size Continues to Increase

Generational Development of Container Vessels



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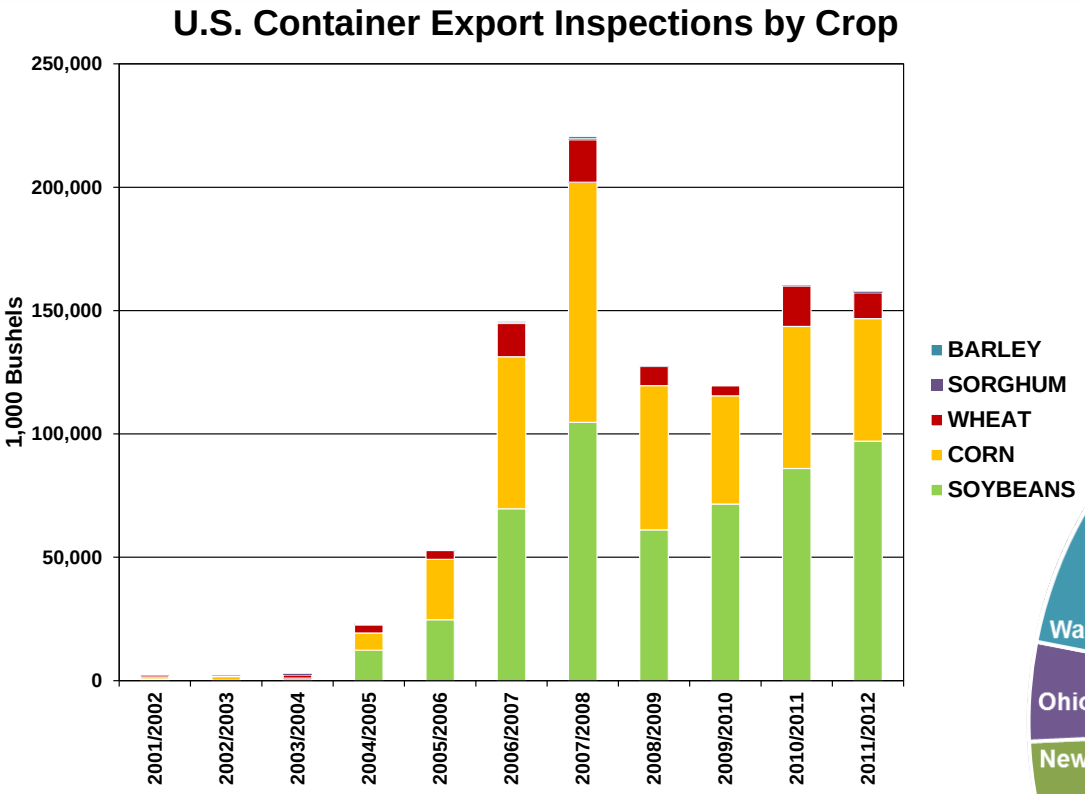
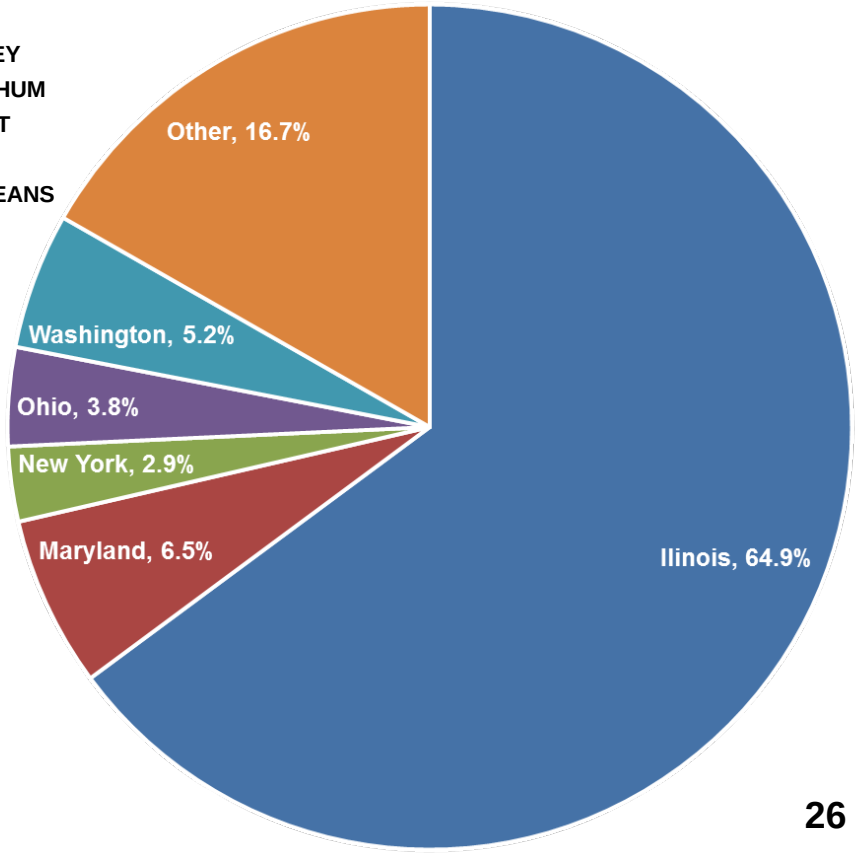
Illinois the Load-Center for Containerized Grain and Soybean Exports





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South America Infrastructure Influence

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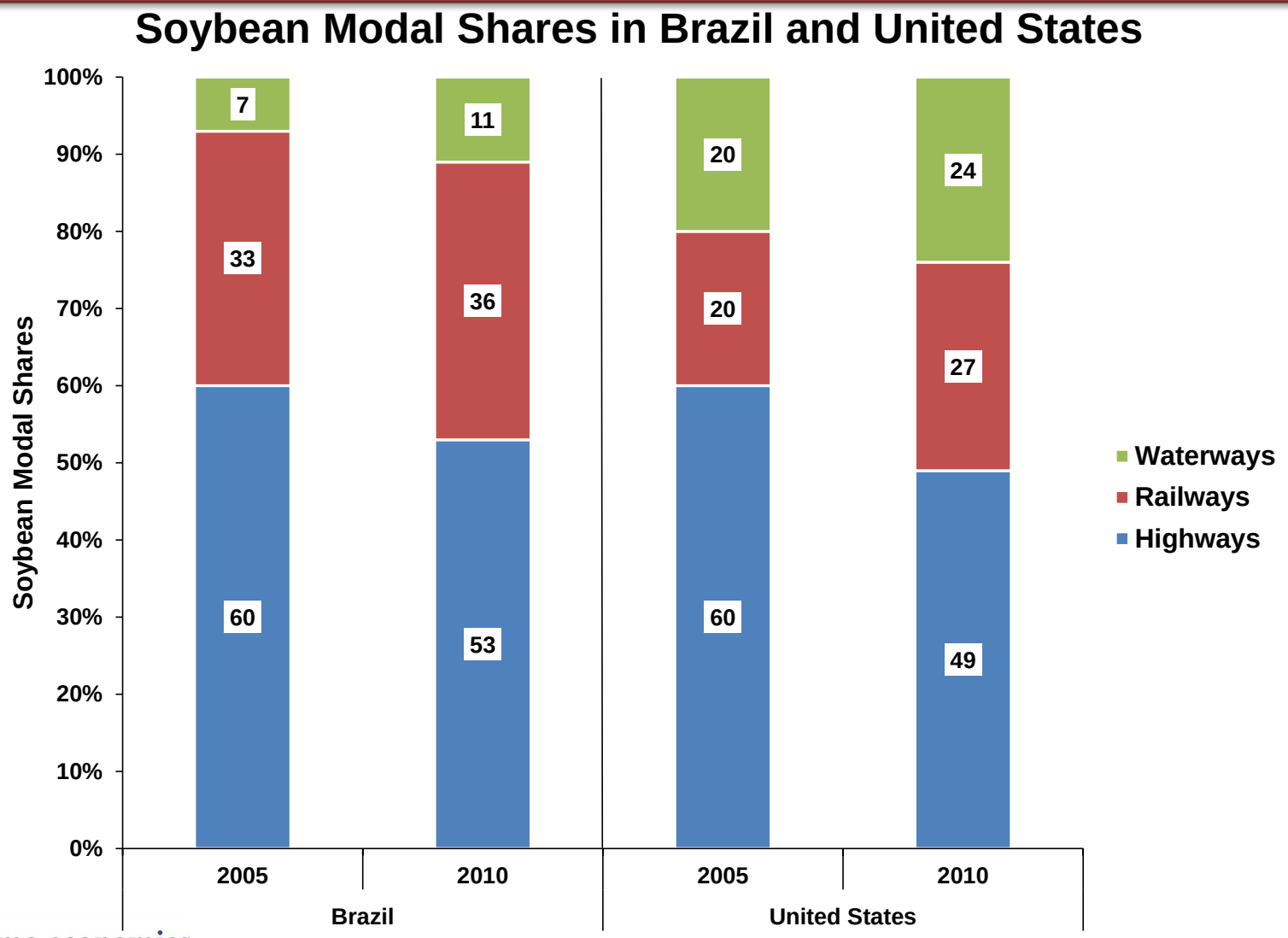
Brazil's Modal Developments not Sitting Idle



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Impacts of Proposed Brazilian Soybean Corridors Can Make a Difference

- Infrastructure projects been proposed to accommodate the reliable and efficient movement of soybeans
- Realized improvements to the infrastructure estimated to reduce freight costs
  - $40 per metric ton, or
  - Between 20% and 30% depending on the origin.
- Accounting for wait times between transportation events and export movement, the estimated cost savings could exceed
  - 50%, or
  - U.S. $55 to more than U.S. $60 per metric ton.
- Such potential improvements bring Brazil nearly on par with the United States in terms of inland transport costs, effectively bolstering its farm industry.

Sustainable Transportation moving Soybeans to Market Position

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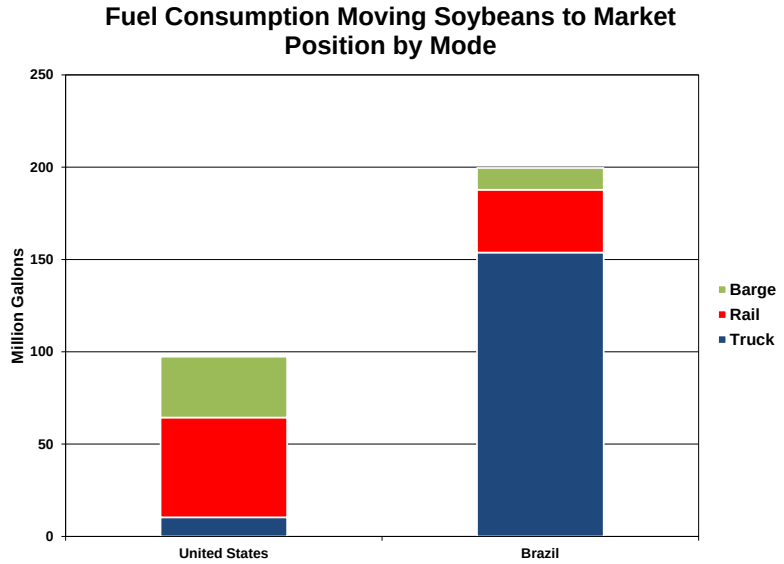
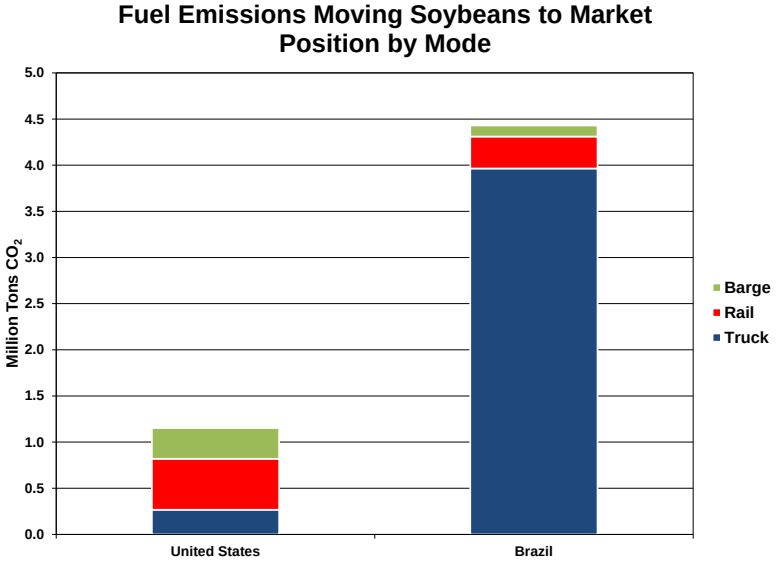
Sustainability Looks Different When Factoring Modal Conditions

- U.S. and Brazilian Soybean Production and Exports on Equalizing
  - Both send about 60% of exports to China
  - Each sends slightly varying volumes to different markets
- Brazil Modal Share becoming Comparable to U.S.
  - Truck is the discrepancy – Brazil hauling 17 times further than U.S.
- Brazil Highly Dependent on Truck to Final Market Position
  - Trucking in Brazil alone:
    - Generates one-half of total ton-miles
    - Consumes more than three-quarters of fuel burned
    - Emits nearly 90% of all CO_2
    - Represents 71% of all fuel spills
- Compared to the U.S., Brazil:
  - Consumes twice as much fuel
  - Emits four times as much CO_2
  - Spills nearly double the fuel





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Summary and Conclusions

Global Summary

- The Global Age is Readily Apparent
  - The world is shrinking
  - Shipping options expanding
  - The U.S. is not as pivotal
- Developing Countries Slowly Coming of Age
  - Expanding infrastructure
  - Port developments
  - Still a ways to go however
- Economy Driving Infrastructure Issues
  - Much work to be done
  - Funding issues to abound
  - Renewed efforts of collaboration required
    - Consistent message with meaningful facts

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