



TEXAS DEPARTMENT OF TRANSPORTATION



# THE TEXAS FREIGHT TRANSPORTATION SYSTEM 2055

Published: March 2016

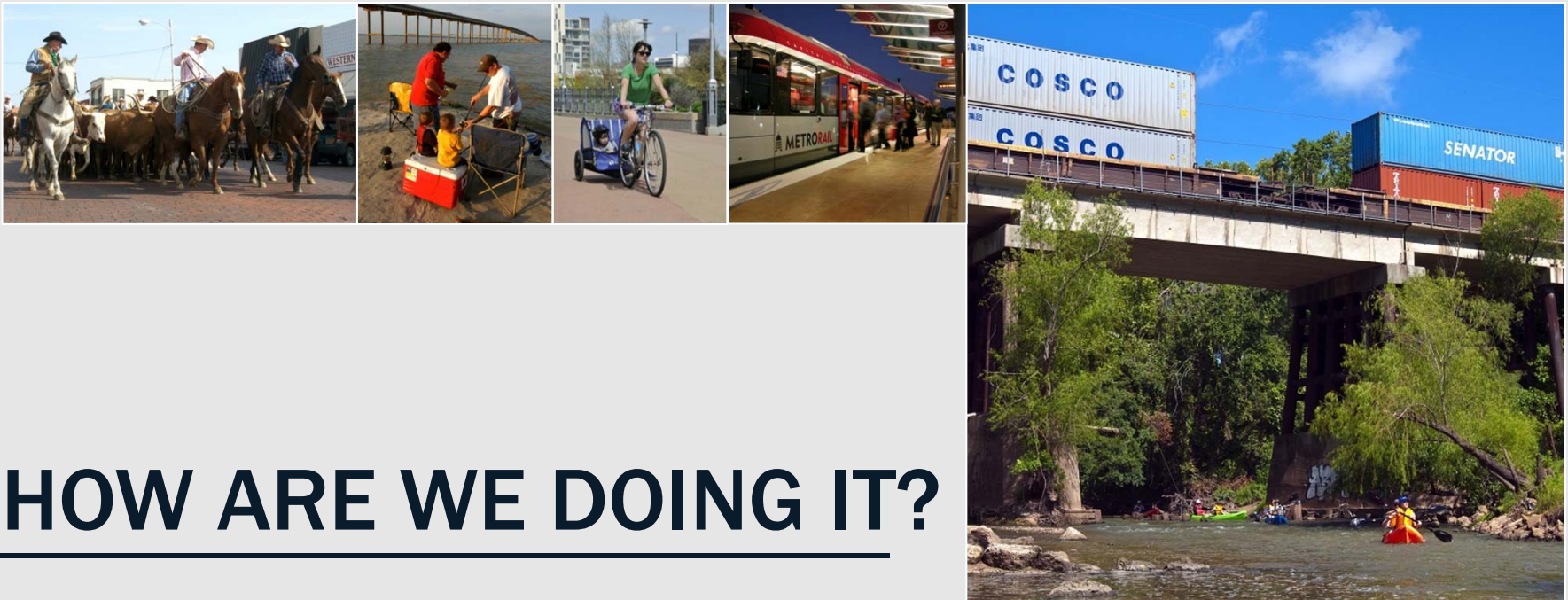
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# WHAT ARE WE DOING?

- Develop framework for Texas' freight transportation system in 2055
  - List and discuss freight strategies
  - Opportunities (including critical investments)
  - Constraints that will need to be overcome
  - Future role of Texas Department of Transportation

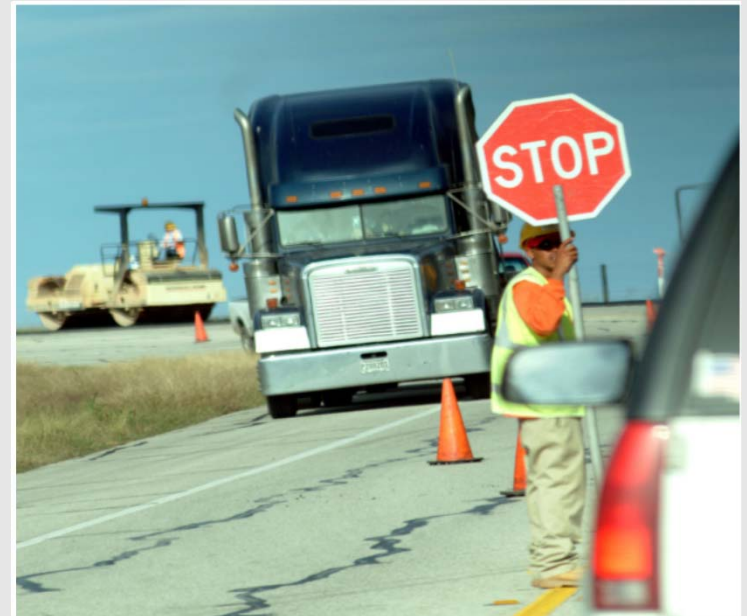


# HOW ARE WE DOING IT?

- Identify factors/trends impacting business models
- Engage/interview
  - Major Texas businesses (Fortune 500)
  - Major Mexican manufacturers
  - Major transportation service providers

# Interview Major U.S. and Texas Businesses

- Envisioned freight transportation system four decades into the future
- Need to understand how technology, demographic changes, the environment, etc. impacts companies' expectations of a future freight system in the context of:
  - Changes in sourcing patterns
  - Changes in freight destinations
  - Changes in routing patterns/modes used
  - Changes in freight volumes
  - Changes in value



# Host Transportation Roundtable

- Translate envisioned Texas Freight Transportation System into viable modal frameworks
  - One-day workshop
  - Brainstorm how alternative views of the future freight transportation system will impact Texas' multimodal transportation system and require it to change





# WHAT DO WE NEED?





- Private industry to participate in interviews
  - Understand future trends and transportation needs
- Private industry to share expectations of future freight transportation system
  - Participate in transportation roundtable





# WHAT ARE THE MAJOR FACTORS/TRENDS?

- Global trade patterns
- Socio-demographic trends
- Environmental trends
- Technology trends





# WHAT ARE THE MAJOR FACTORS/TRENDS?

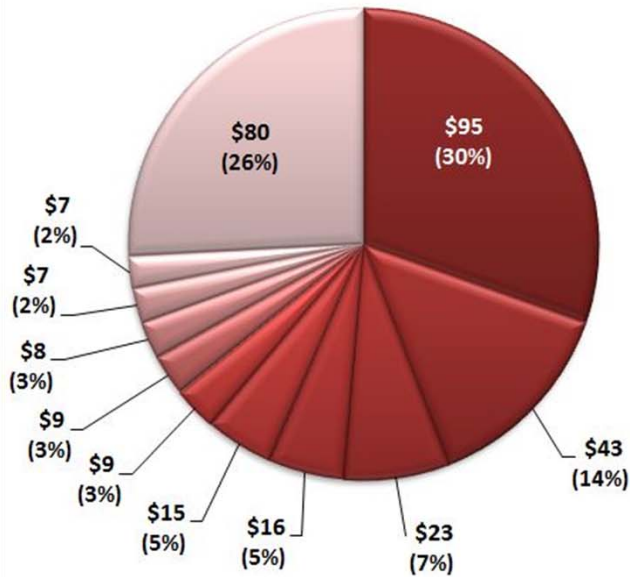
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Global Trade Patterns

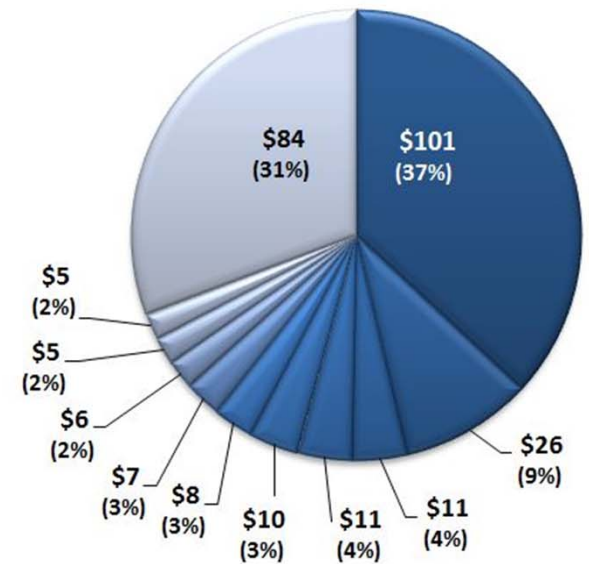


# Texas Trade and Major Trading Partners

■ 2013 Texas Exports  
■ 2013 Texas Imports



- |                 |                     |
|-----------------|---------------------|
| ■ Mexico        | ■ Mexico            |
| ■ China         | ■ Canada            |
| ■ Saudi Arabia  | ■ Brazil            |
| ■ Venezuela     | ■ China             |
| ■ Canada        | ■ Netherlands       |
| ■ South Korea   | ■ South Korea       |
| ■ Russia        | ■ Colombia          |
| ■ Germany       | ■ Singapore         |
| ■ Colombia      | ■ Venezuela         |
| ■ Japan         | ■ Japan             |
| ■ Rest of World | ■ Rest of the World |



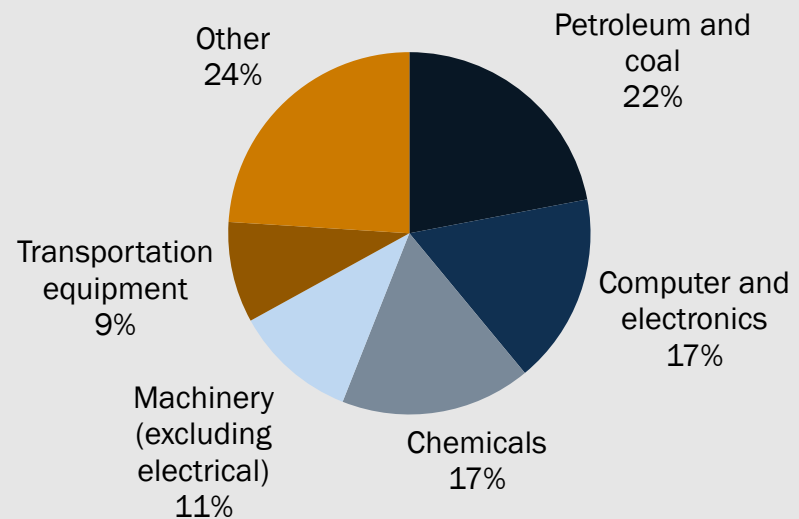
# Texas Exports

- Number one U.S. exporting state for 12 consecutive years (2013)
- Texas' exports increased on average 7.9% per year (1990 to 2012)
  - Manufacturing exports increased 8.1% per year
- 40,737 companies exporting from Texas locations (2012)
- Export trade supported an estimated 1.1 million jobs (2013)

# Texas' Major Export Commodities (2013)

- Petroleum and coal products (\$60.6 billion/22% of Texas' total merchandise exports)
- Computer and electronics (\$48.2 billion)
- Chemicals (\$47.9 billion)
- Machinery (except electrical) (\$29.9 billion)
- Transportation equipment (\$24.4 billion)

Texas's Top Five Export Industries



## Factors/Trends Impacting Texas Trade

- Free Trade Agreements (FTAs)
  - Reduce trade barriers, making it easier and cheaper for U.S. companies to export
  - 60% of Texas' exports in 2013 were to countries participating in current FTAs
  - Trans-Pacific Partnership (TPP) and Transatlantic Trade and Investment Partnership (T-TIP) being negotiated
  - Normalization of trade relations with Cuba



## Factors/Trends Impacting Texas Trade

### ■ Single Window

- International Trade Data System implemented by December 2016
- Use single electronic platform to complete forms needed by multiple government agencies
- Streamline exporting process and reduce clearing times

### ■ Supply Chain Redundancy

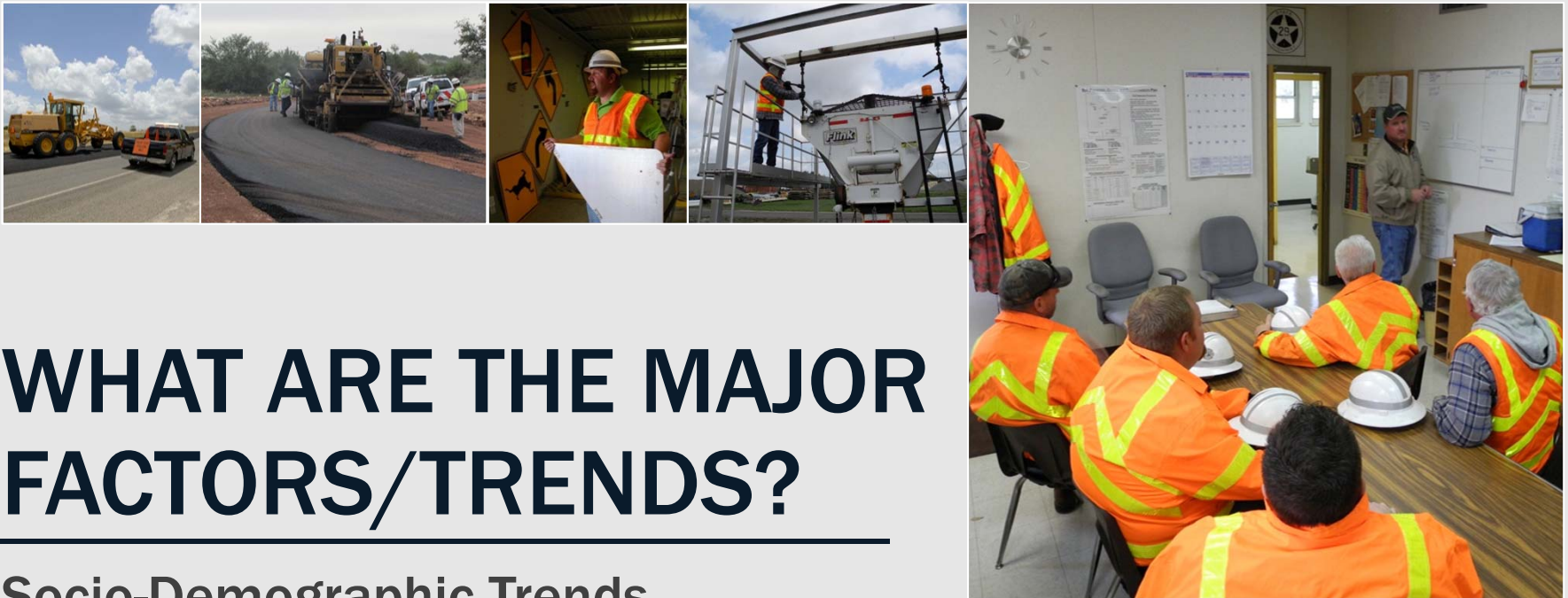
- Move away from just-in-time to redundancy in trade supply chains
- Ensure reliability in the event of extreme weather, urban congestion, labor disputes, etc.

## Factors/Trends Impacting Texas Trade

- Nearsourcing
  - Assign business process to foreign, lower-wage country close in distance (Mexico) to benefit from lower freight costs
  - 84% of surveyed industry executives regard nearsourcing very/somewhat important (2013)\*
- Insourcing/re-shoring
  - Relocate business process back to the U.S.
  - 37% of surveyed industry executives prefer to locate in U.S. (2013)\*

## Texas Trade Forecasts

- Texas trade projected to increase 211% between 2012 and 2040
- Traditional trade partners expected to remain top U.S. and Texas partners
  - Texas trade with Mexico projected to increase to almost \$368 billion by 2040 (remain Texas's major trading partner)
  - Eastern Asia trade projected to increase from \$85 billion (2012) to \$352 billion (2040)
- Brazil represents an important emerging market
  - For export trade with Texas, ranked 10<sup>th</sup> in 2000 and ranked 3<sup>rd</sup> in 2013



# WHAT ARE THE MAJOR FACTORS/TRENDS?

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Socio-Demographic Trends

## Socio-Demographic Trends

- Root of consumer choices; strong impact on business models
- World population
  - Estimated to increase from 7.2 billion (2013) to 9.6 billion (2050)
  - Almost 88% (8.2 billion) of world population to reside in emerging economies (2050)
    - Approximately 20% aged 15 to 59
    - Approximately 24% aged 60 or over
  - Population in developed regions expected to change marginally
    - From 1.25 billion (2013) to 1.28 billion (2050)

# Socio-Demographic Trends

- United States
  - Older population (Baby Boomers) living in smaller households
  - Share of Americans living in urbanized areas is increasing
    - Half of Americans live in suburban areas
    - One-third in cities
    - Only one-sixth in rural areas
- By 2025
  - 20% of drivers will be 65 years or older
  - More elderly households in rural areas
- By 2050
  - 50% of households expected to live in single-family households

# Socio-Demographic Trends

- Texas
  - Younger population growing faster than U.S. population
    - Higher than average birth rates
    - Net migration to the state (mainly from Mexico)
  - Houston 2013 population
    - 28% are college educated
    - Predominantly married couples with kids living in single-family units
    - Median age is 33.3 years (37 years in the U.S.)
    - Household annual income is \$75,255 (\$70,173 in the U.S.)
    - Unemployment rate is 10% (11 percent in the U.S.)

## Socio-Demographic Trends

- Dallas 2013 population
  - 30% are college educated
  - Predominantly married couples with kids living in single-family units
  - Median age is 33.4 years (37 years in the U.S.)
  - Household annual income is \$81,554 (\$70,173 in the U.S.)
  - Unemployment rate is 9% (11 percent in the U.S.)
- Austin 2013 population
  - 37% are college educated
  - Predominantly married couples with kids living in single-family units
  - Median age is 33 years (37 years in the U.S.)
  - Household annual income is \$80,516 (\$70,173 in the U.S.)
  - Unemployment rate is 7% (11 percent in the U.S.)





# WHAT ARE THE MAJOR FACTORS/TRENDS?

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Environmental Trends



## Environmental Trends

- Changing consumer demand
  - Demand for sustainably produced products
  - Concern about carbon footprint
    - Carbon labeling
- More stringent environmental regulations
  - Reduce criteria pollutants
  - Reduce greenhouse gas emissions

## Impacts on Freight Transportation

- Extreme weather events present challenges for freight transportation infrastructure
  - High sea levels destroy or displace ports, coastal highways, and railways
  - Temperature and precipitation extremes cause premature deterioration of infrastructure

## Impacts on Freight Transportation

- Green supply chains
  - Alternative fuels (biofuels, electric trucks)
  - Technologies (more fuel efficient vehicles)
- Improve efficiency of supply chain
  - Optimization of transportation routes
  - Consolidation of multiple orders
  - Intermodality (maximizing capacity)
  - Reverse logistics

## Impacts on Freight Transportation

- Shift in freight transportation modes
  - Specifically truck to rail
- New urban freight transportation systems
  - Lightweight freight trams
  - Underground delivery network
- Technological innovations
  - Autonomous and driverless systems (Freight Shuttle System)



# WHAT ARE THE MAJOR FACTORS/TRENDS?

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Technology Trends

## Technology Trends

- Current technologies that shippers and freight carriers use to manage their operations (RFID, GPS)
- Emerging technologies that have the potential to transform the supply chain (3D printing, automated vehicles)
- Technologies accessible to consumers that are reshaping demand for goods and services (e-commerce)

## Current Technology Trends

- Radio Frequency Identification (RFID)
  - Contactless/wireless method of identifying objects
  - No signs of slowing down even after a decade of use
    - Global market for RFID technology expected to reach \$30 billion (2024)\*
    - 3.9 billion tags sold (2014) compared to 2.93 billion (2011)\*\*
- Global Positioning System (U.S. system)
  - Navigation systems enhanced reliability and provide better visibility to freight dispatchers
    - Estimate arrival times, optimize routes, track fuel costs, and manage resources



### ■ 3D Printing

- Create objects by adding (rather than subtracting) materials
- Customization of objects (made to order products)
- Projects will be made closer to final destination

### ■ Big Data

- Point-of-sale RFID data streams, GPS data from company fleets, call center logs, consumer blogs, online shopping habits
- Requires analytics to unearth information
- Initiate shipments proactively before customer places order (anticipatory logistics)
- Many companies have yet to realize supply chain potential

- Automated/self-driving trucks
  - Potential to reduce crashes, drive longer distances, and increase fuel efficiency
  - Public acceptance is a concern
  - Reduction in truck driver employment may cause political and social backlash

### ■ Electronic Commerce

- Trading of products/services using computer networks
- Choosing products/services, comparing prices, and receiving items at home
- Room to grow – penetration in the retail industry is still less than 10% globally
- Trend toward same day shipping services
- Increase requirement for last-mile, small package delivery services

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