# Rail Transportation Infrastructure for the Bio-economy


June 25, 2008

*Paul Hammes – VP & GM Agricultural Products*

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# UP Franchise – Tremendous Opportunities

Industrial Products

Energy

Automotive

Intermodal

Agricultural Products

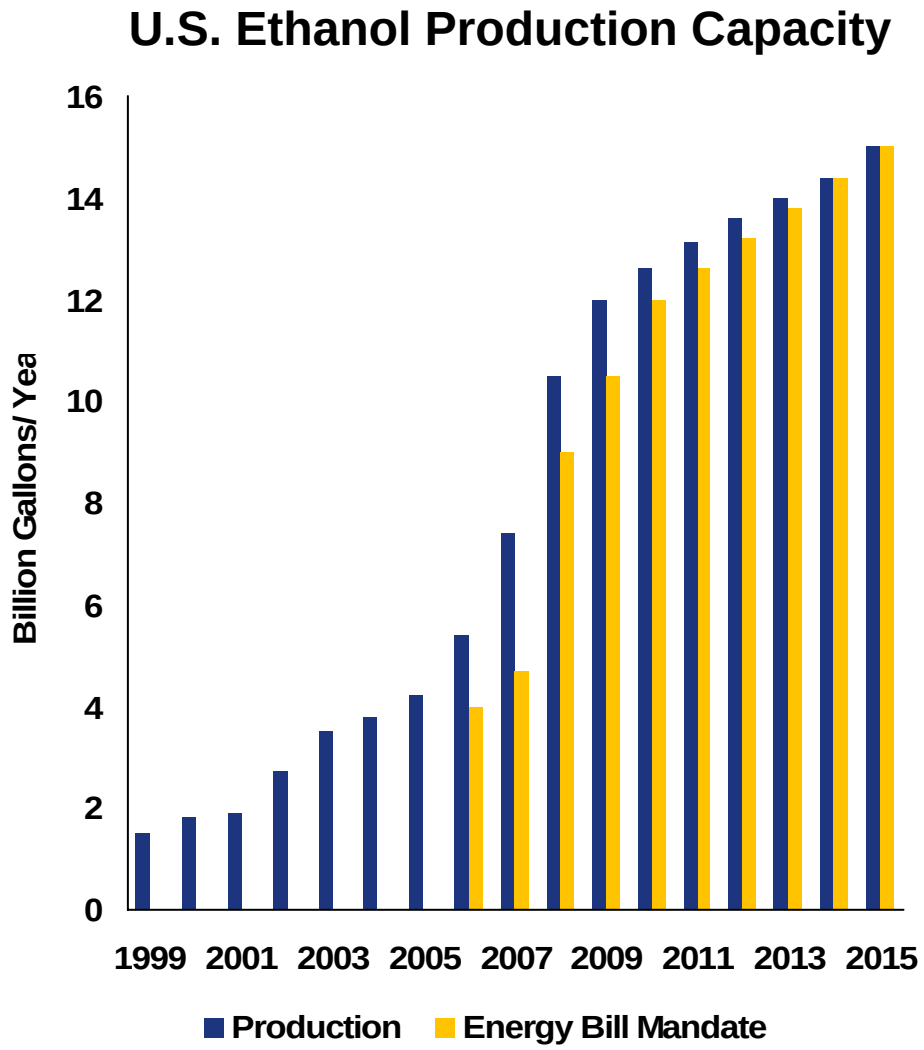
Chemicals

## UP at a Glance

| | |
|---|---|
| Miles of Track | 32,300 in 23 States |
| Employees | 49,000+ |
| Customers | 25,000 |
| Locomotives | 8,700+ |
| Freight Cars | 94,000+ |

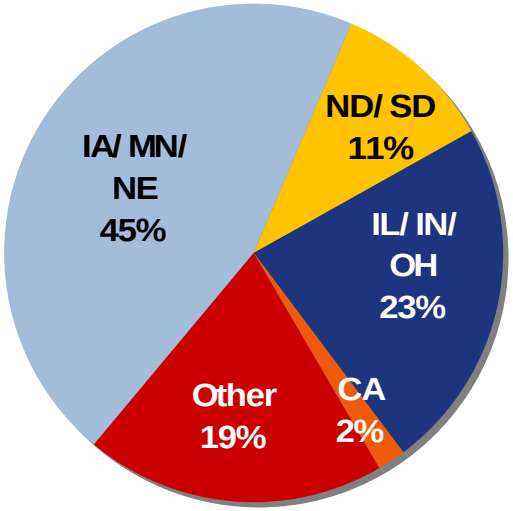
# Ethanol Demand Drivers

- **RFS Mandate**
  - **Political**
- **MTBE**
  - **Ban**
  - **Liability**
- **Extend Gasoline Stocks**
  - **Economics**
  - **Limited Refining Capacity**
- **Octane Efficiency**

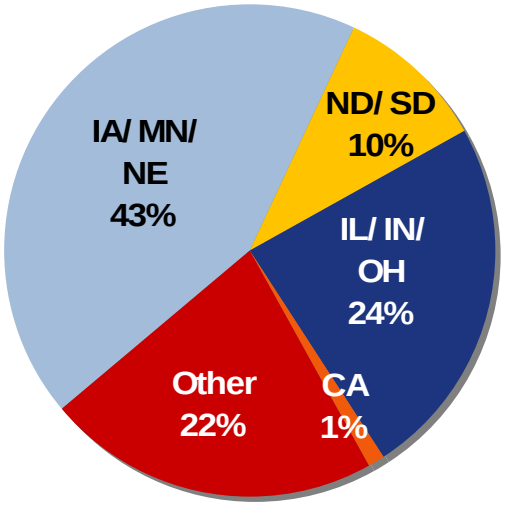



Source: USDA

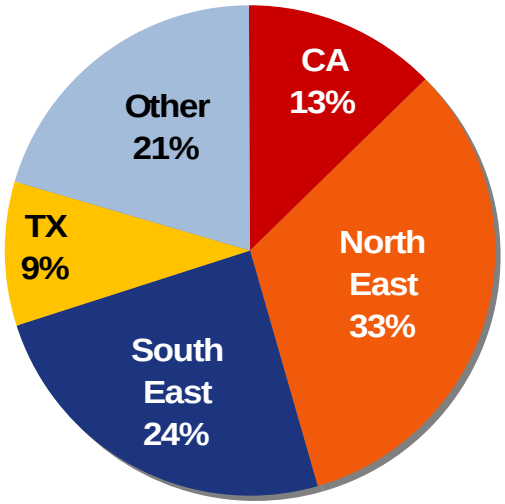
# Ethanol Production and Demand Markets



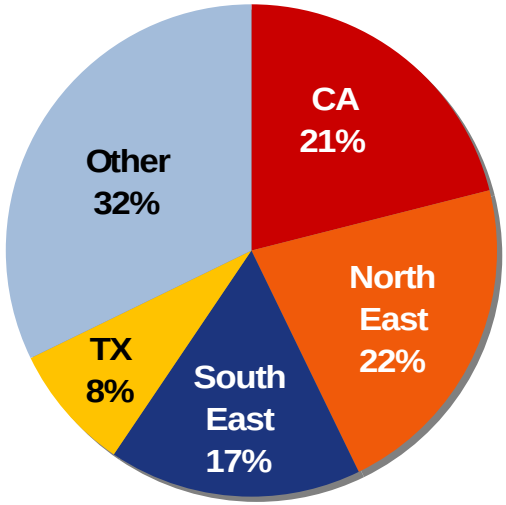

**Production**




**2008** → **2015**

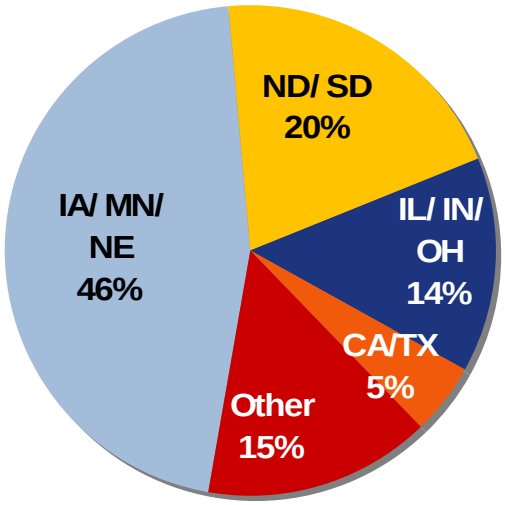



**Demand**

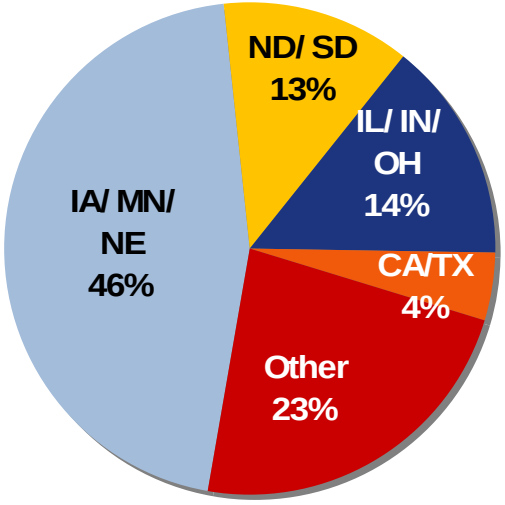



Source: UPRR Estimate using various data sources

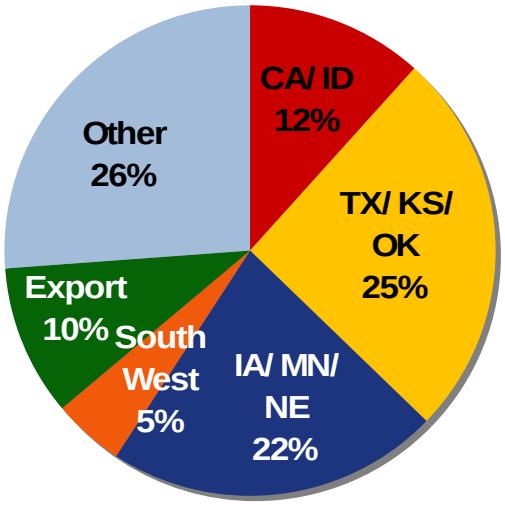
# DDGS Production and Demand Markets



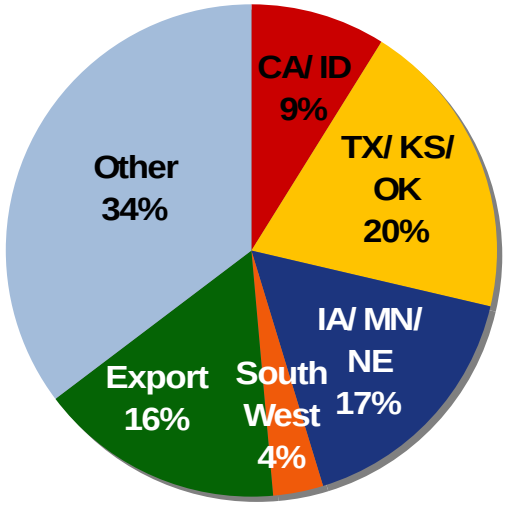

**Production**




**2008** → **2015**

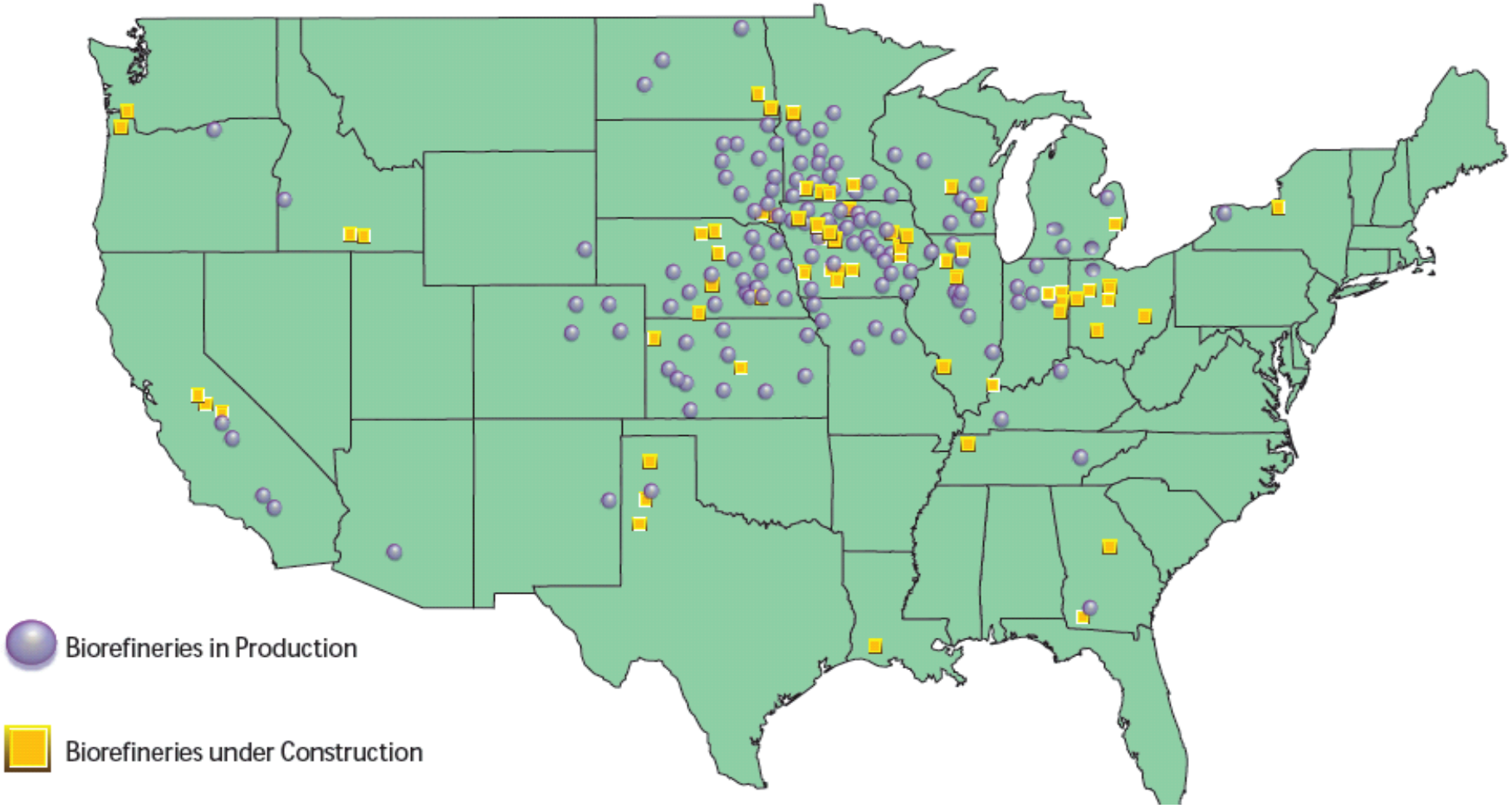



**Demand**



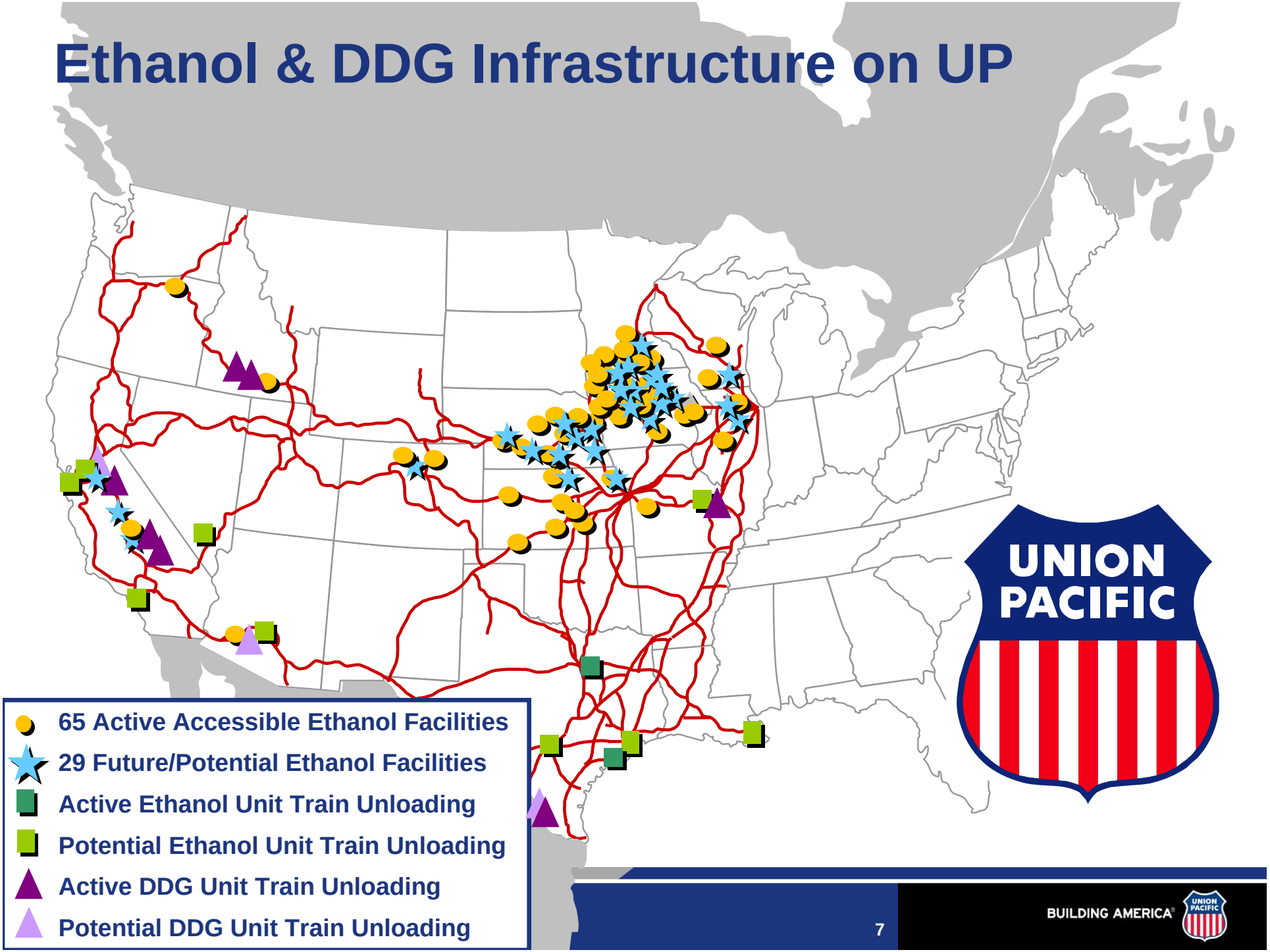

Source: UPRR Estimate using various data sources

# US Ethanol Biorefinery Locations



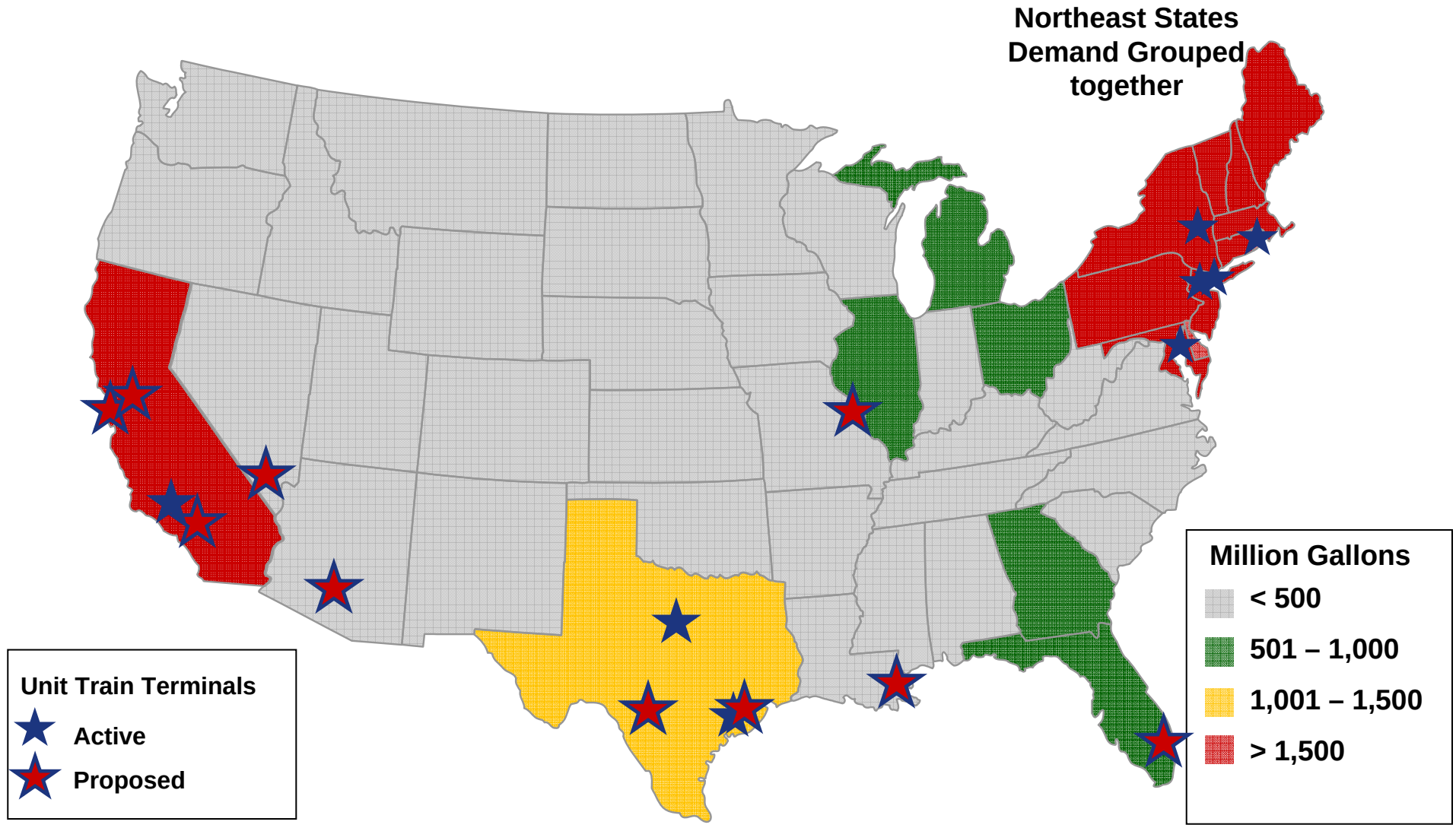

Source: Renewable Fuels Association

# Ethanol & DDG Infrastructure on UP



# Key Ethanol Consumptive Markets

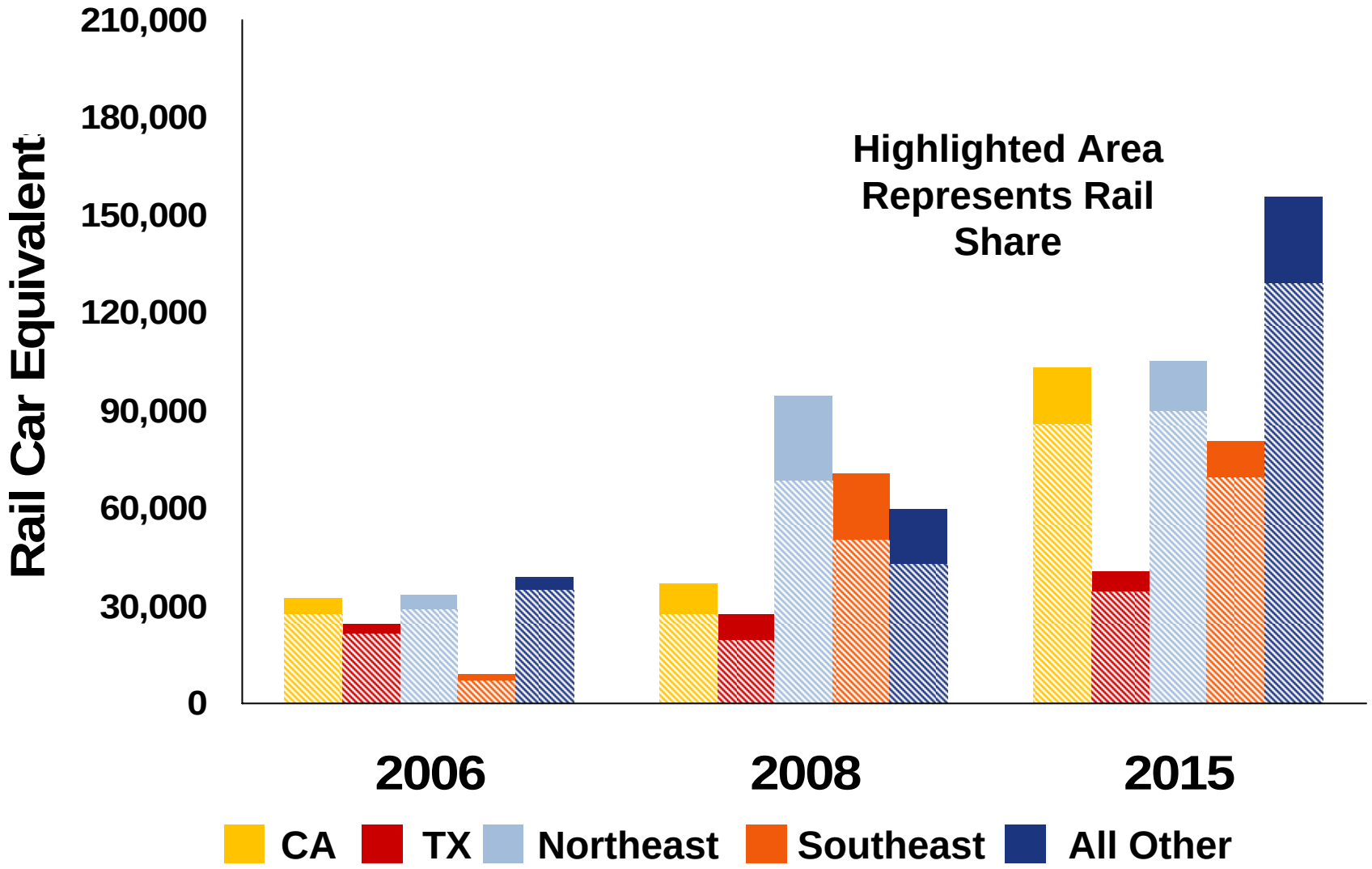
## *Million Gallons Per Year – E10 Demand*




Source: DOE/ EIA

# Ethanol Supplied by Rail

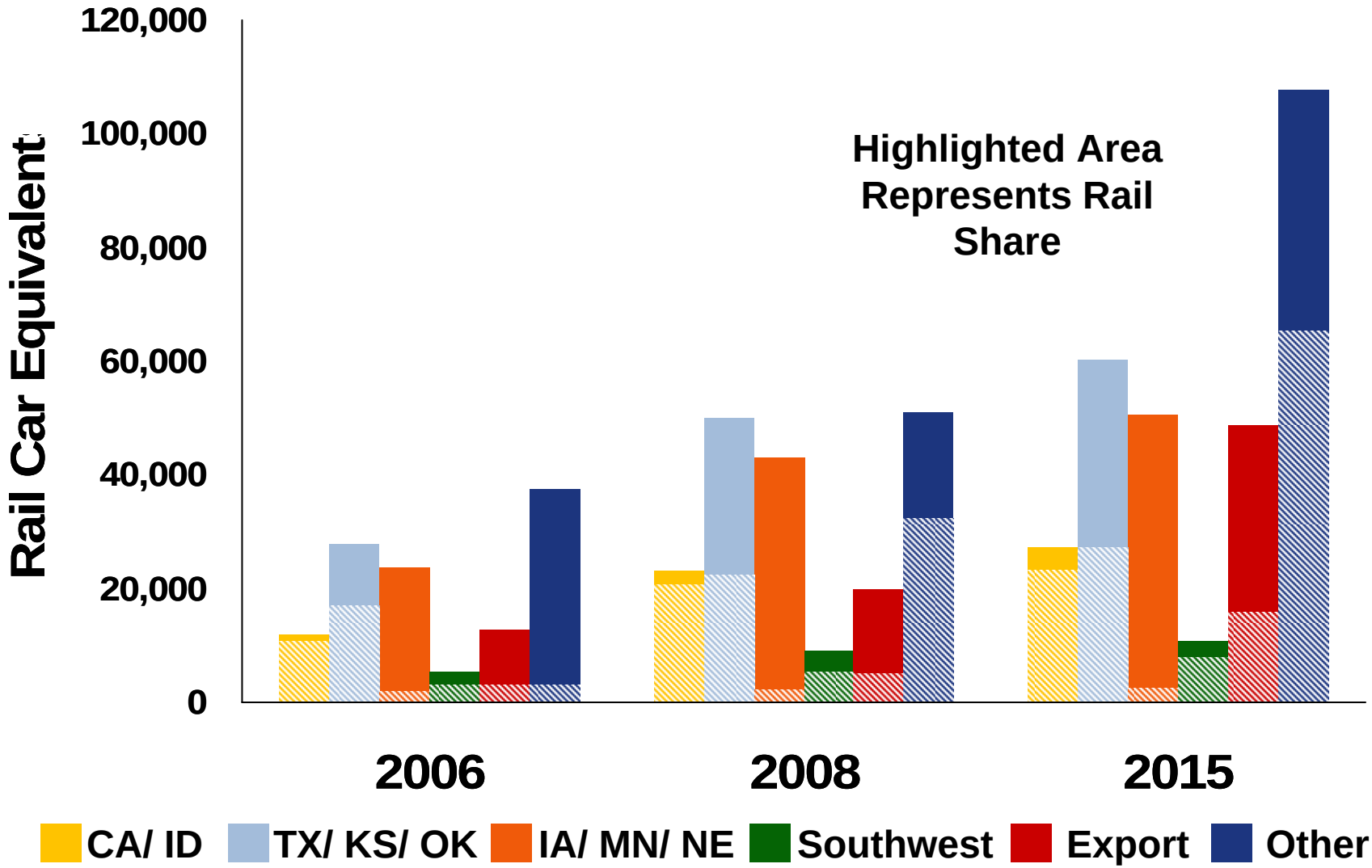
## *Rail Share of Total Ethanol Demand by Region*




Source: UPRR Estimate using various data sources

# DDGS Supplied by Rail

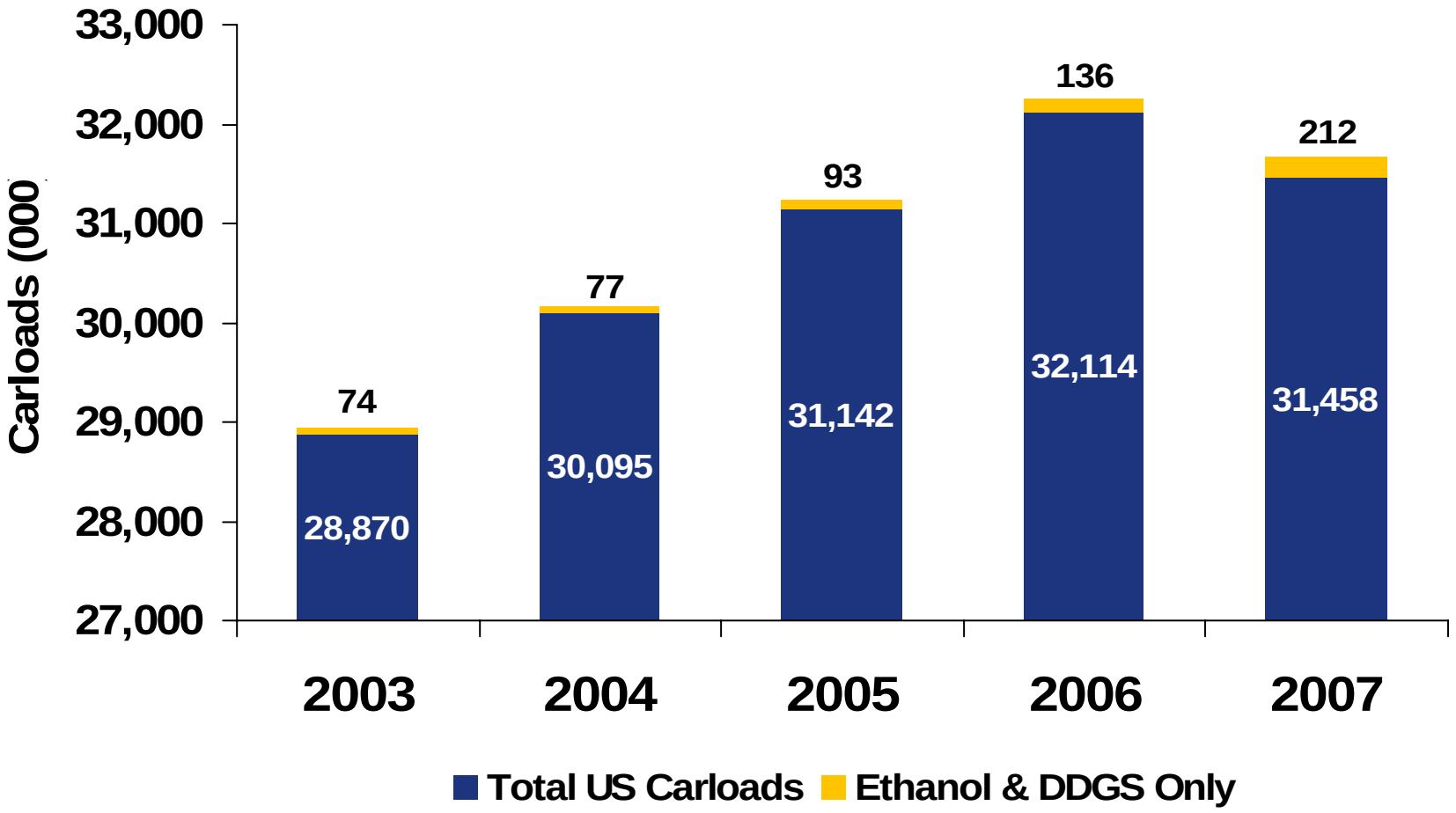
## *Rail Share of Total DDGS Demand by Region*




Source: UPRR Estimate using various data sources

# Ethanol & DDGS Impact on US Rail Volume

***2003 - 2007***




Source: AAR Originated Carloads

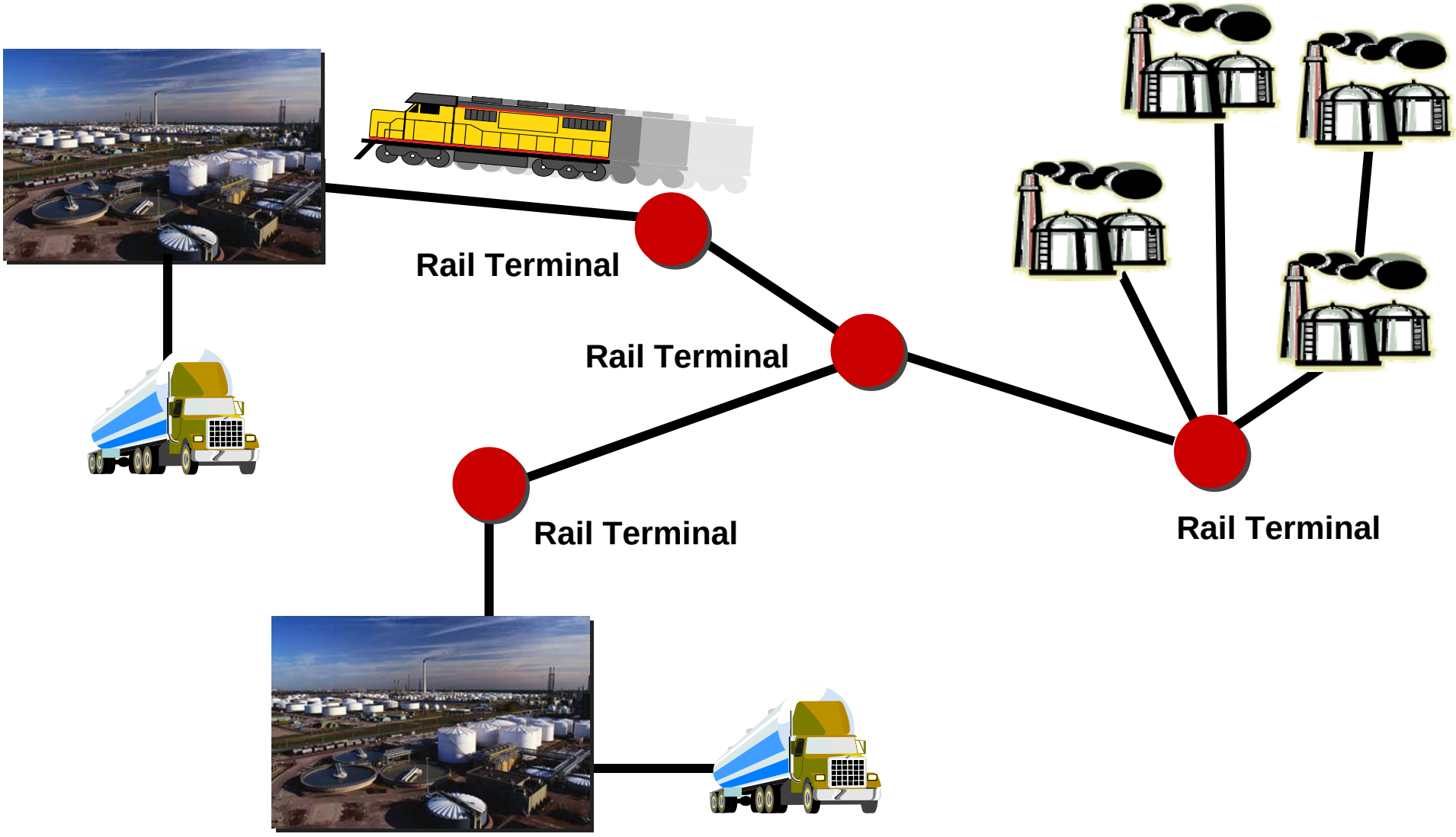
# Ethanol Supply Chain Components

- **Production Plant**
  - **55 MGY generates 5 cars each of ethanol and DDGS per day**
  - **Track infrastructure**
- **Tank Cars**
- **Rail Network**
  - **Manifest/Gathered-Combo/Unit**
  - **Terminal Yards/Line haul**
- **Unload Terminal**
  - **Unload System and Tank Storage**
- **Truck Rack**

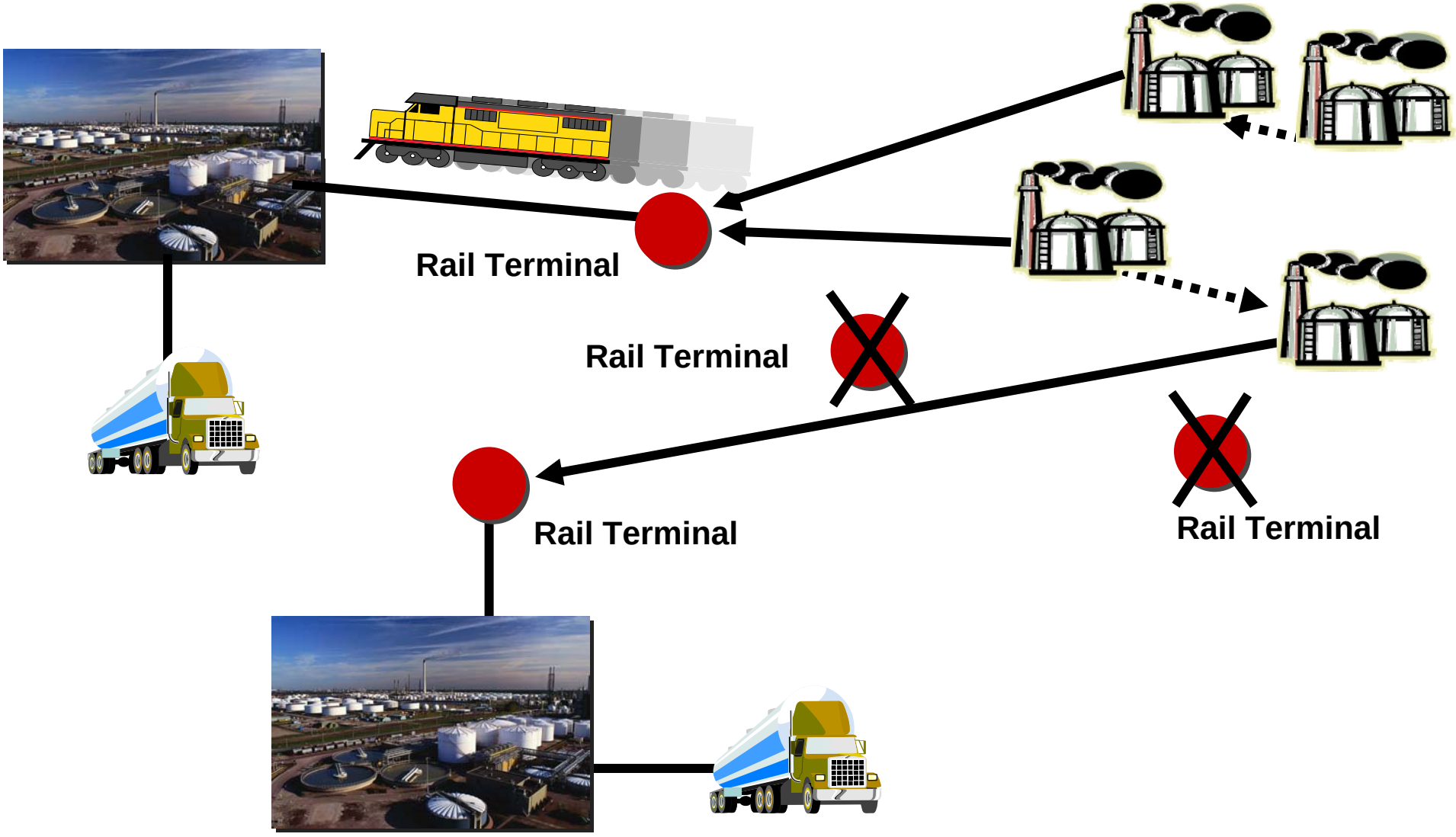
# Ethanol Origin Terminal


Photos Courtesy of Poet Ethanol Products

# Ethanol Manifest Pipeline



# Ethanol Unit Train Pipeline



# DFW Rail Terminal


Photo Courtesy of US Development

# Truck Rack


Photo Courtesy of US Development

# DDGS Destination Terminal

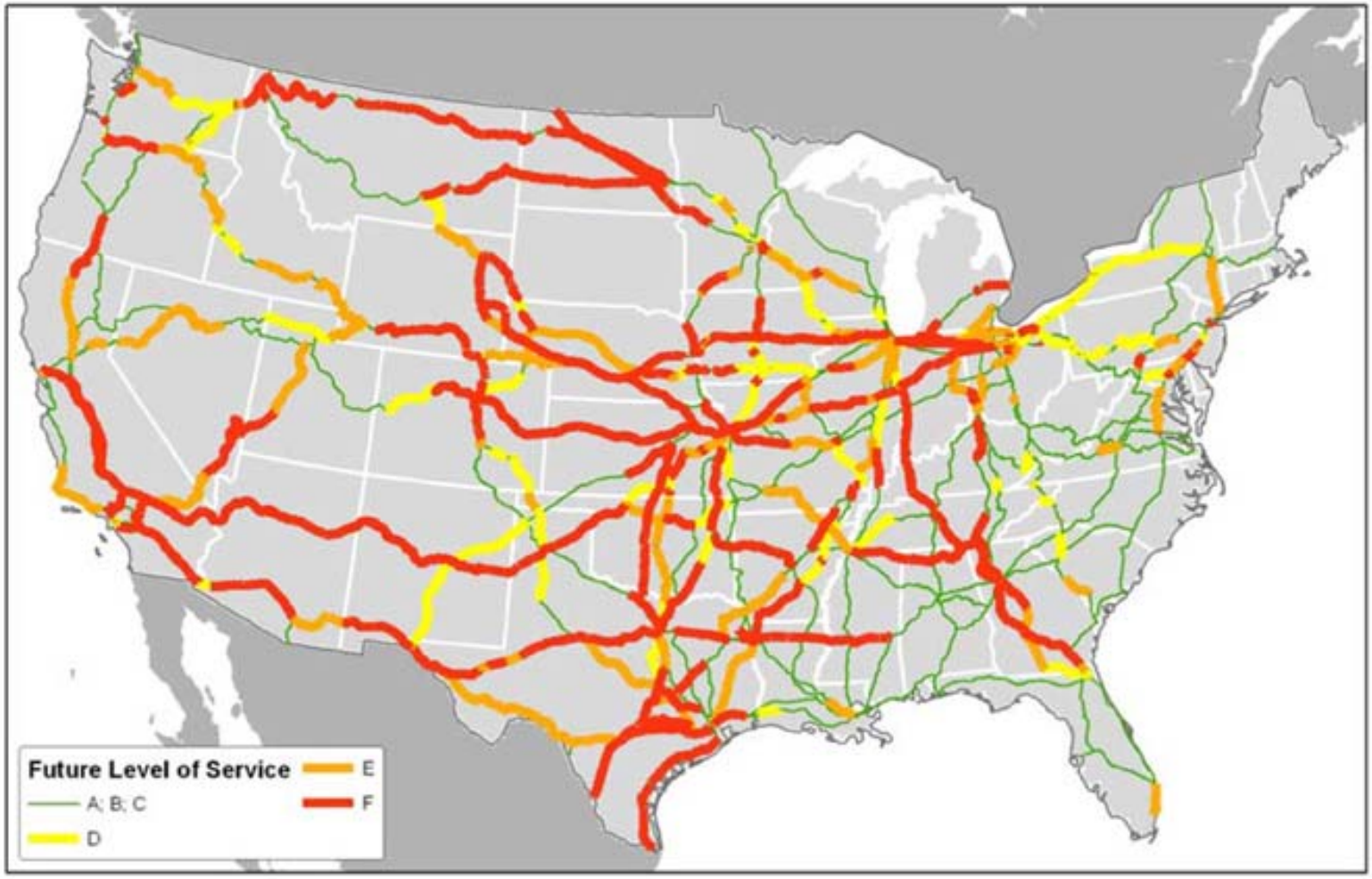

Photo Courtesy of Poet Nutrition

# Potential Ethanol Supply Chain Constraints

- **Rail Line Capacity**
- **Rail Terminal/ Yard Capacity**
- **Unit vs Manifest Shipments**
- **Terminal Unload Capacity**
- **Pipeline Management**
- **Tank Cars**
- **Storage Capacity**

# Future Corridor Volumes Compared to Current Corridor Capacity

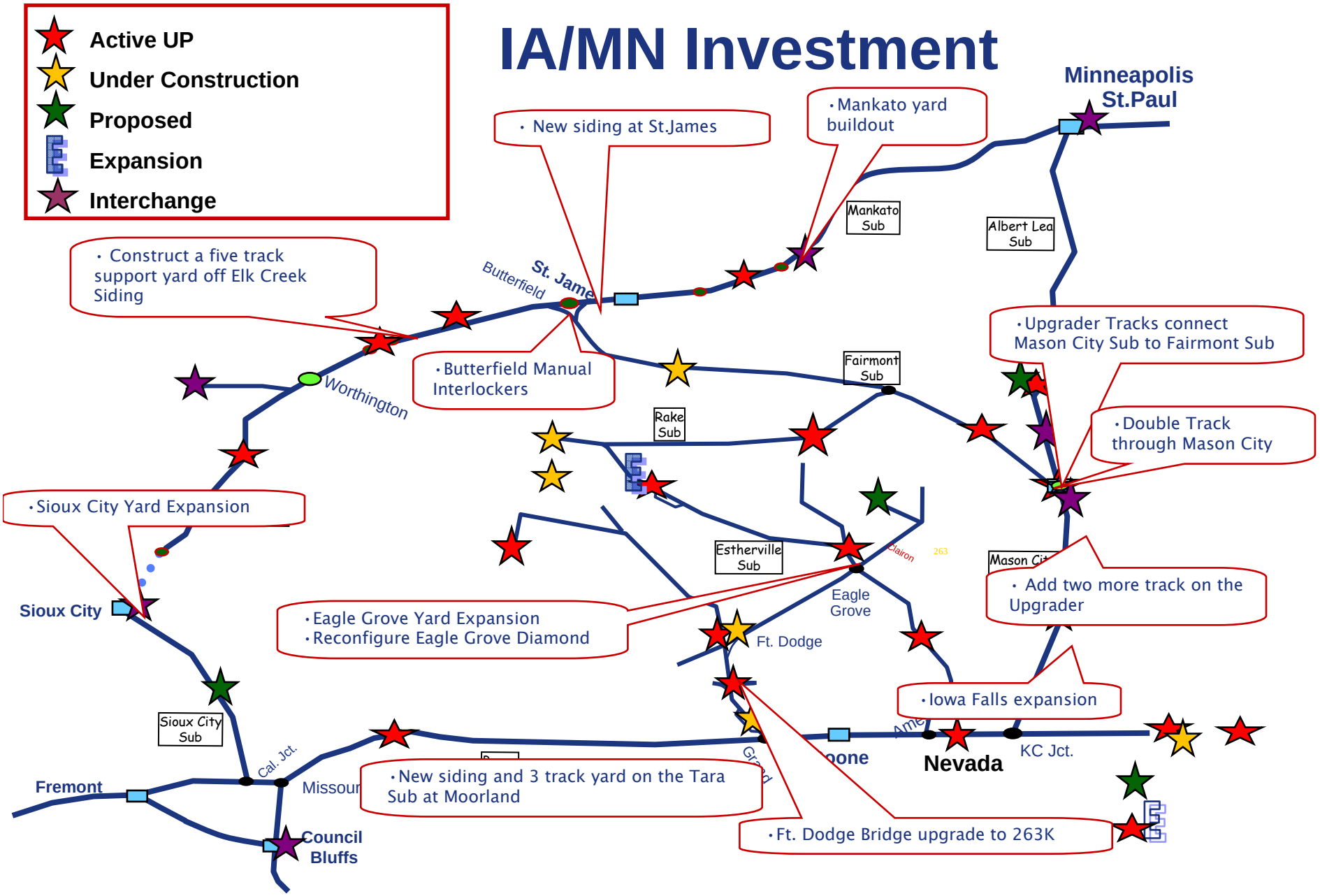
***2035 Without Improvements***




**Note: Volumes are for the 85th percentile day**

**Source: National Rail Freight Infrastructure Capacity and Investment Study by Cambridge Systematics, Inc.**

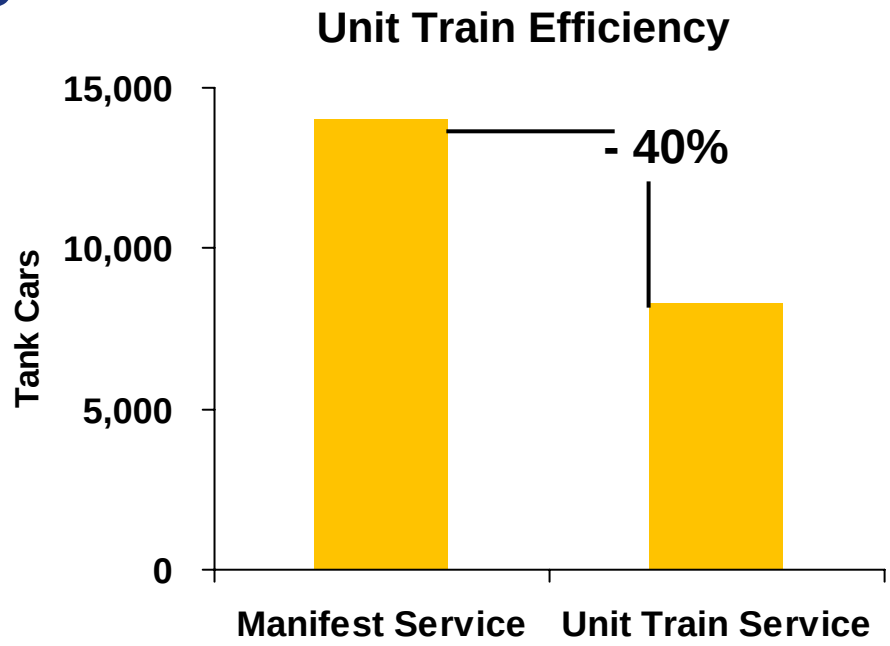
# IA/MN Investment

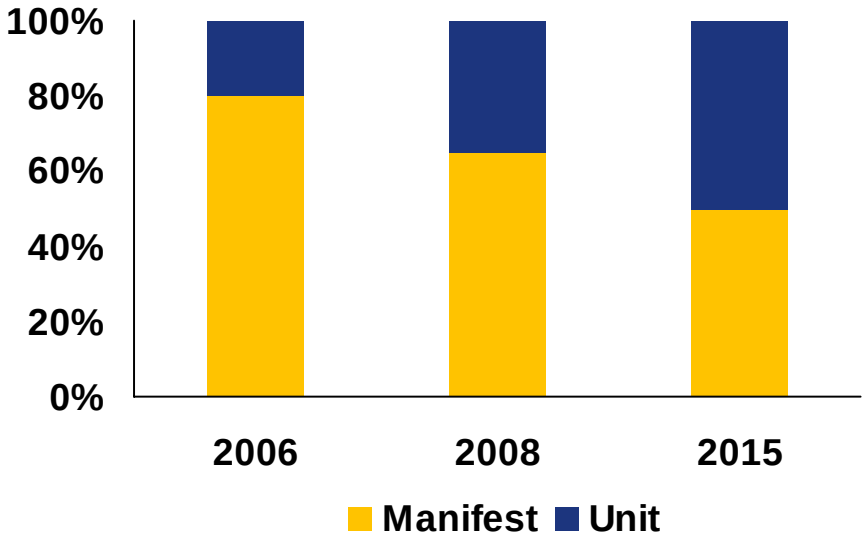


# Unit Train Efficiencies

**Efficiency Example Assumptions**

- Using 2007 AAR Ethanol data
- 40% Reduction in Tank Cars if Volume Moved Via Unit Trains



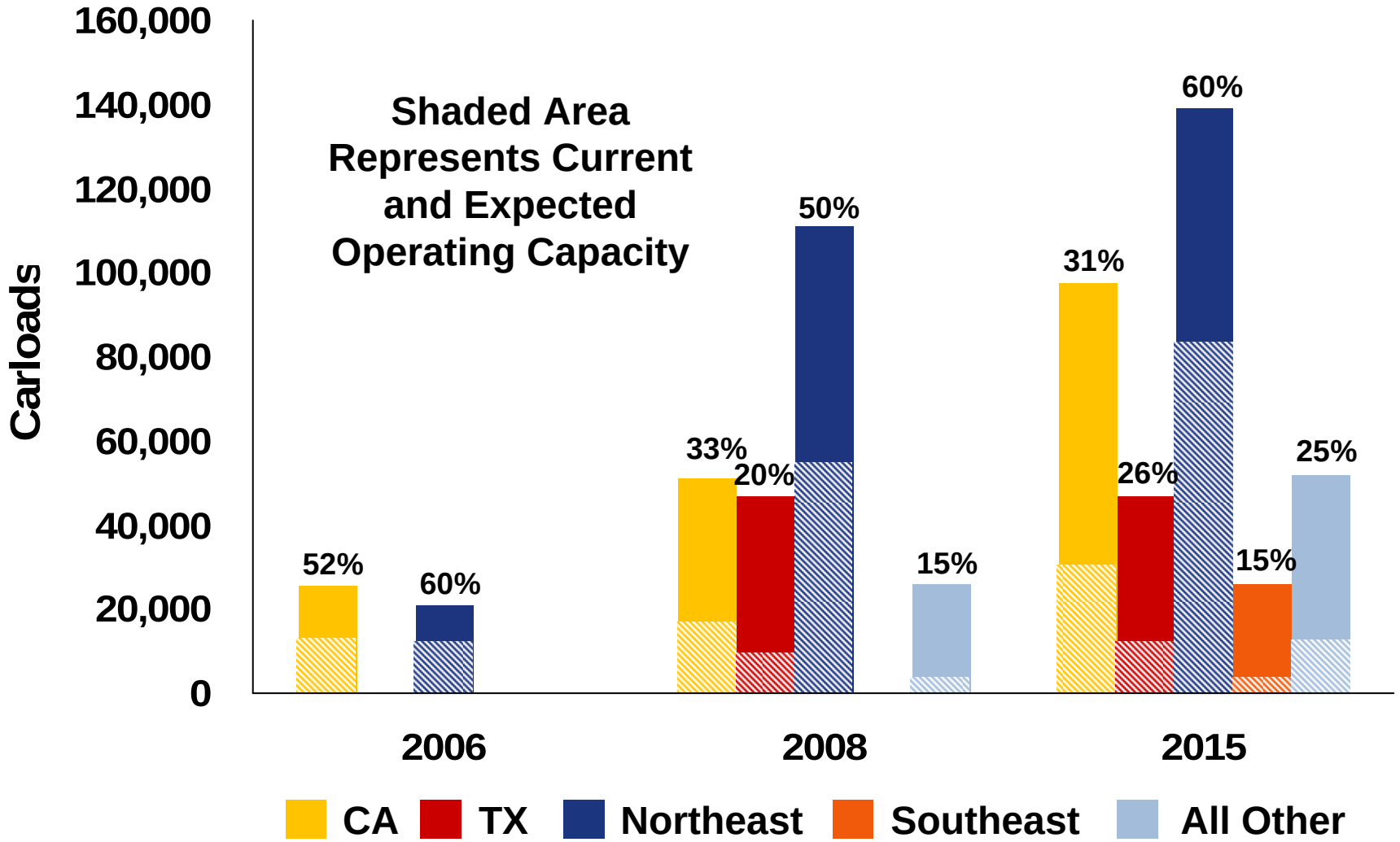




- Unit vs Manifest Breakdown for US Ethanol Industry

Source: UPRR Estimate using various data sources

# Estimated Unit Train Terminal Capacity

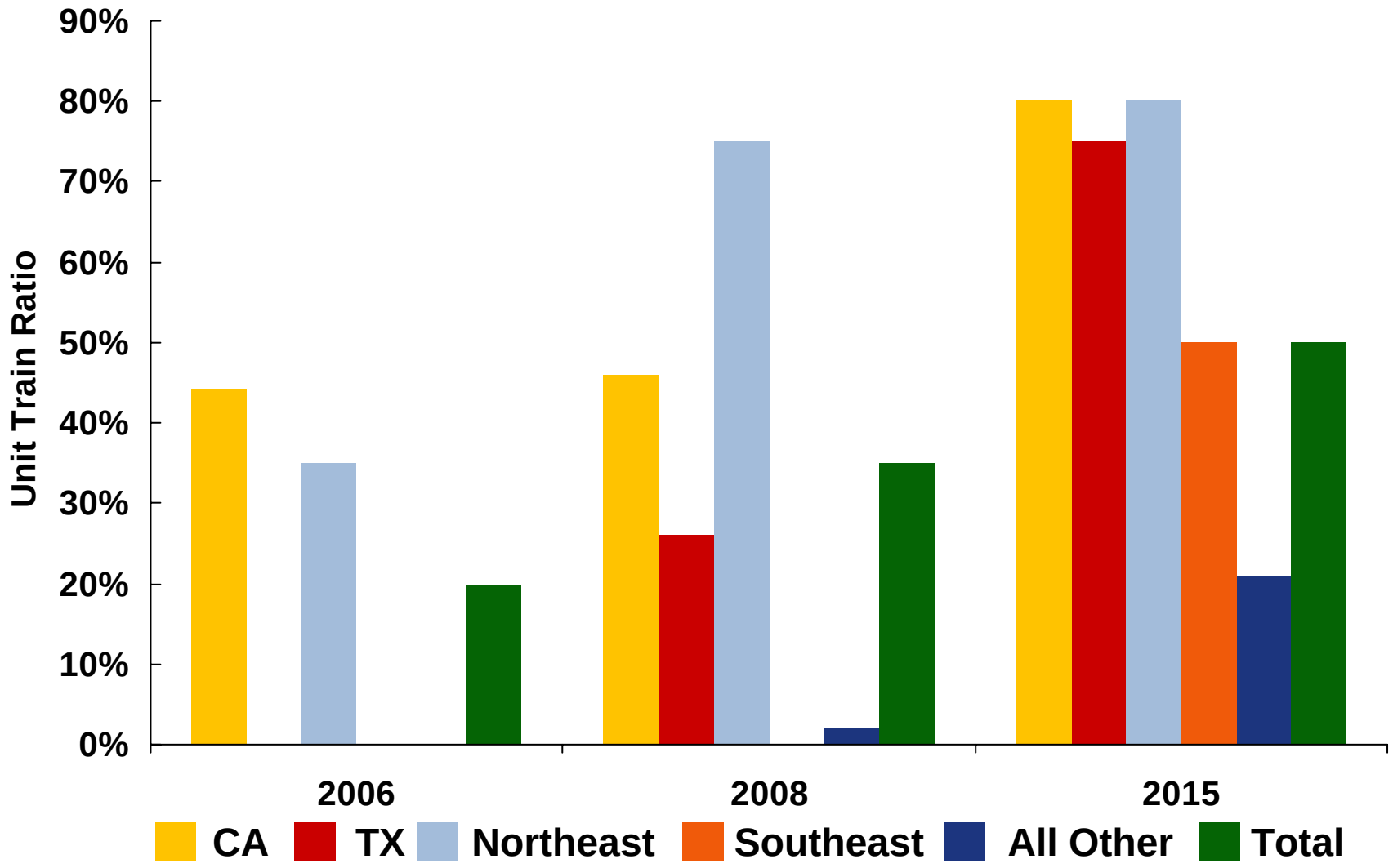
## *Maximum vs Current or Forecasted*




Source: UPRR Estimate using various data sources

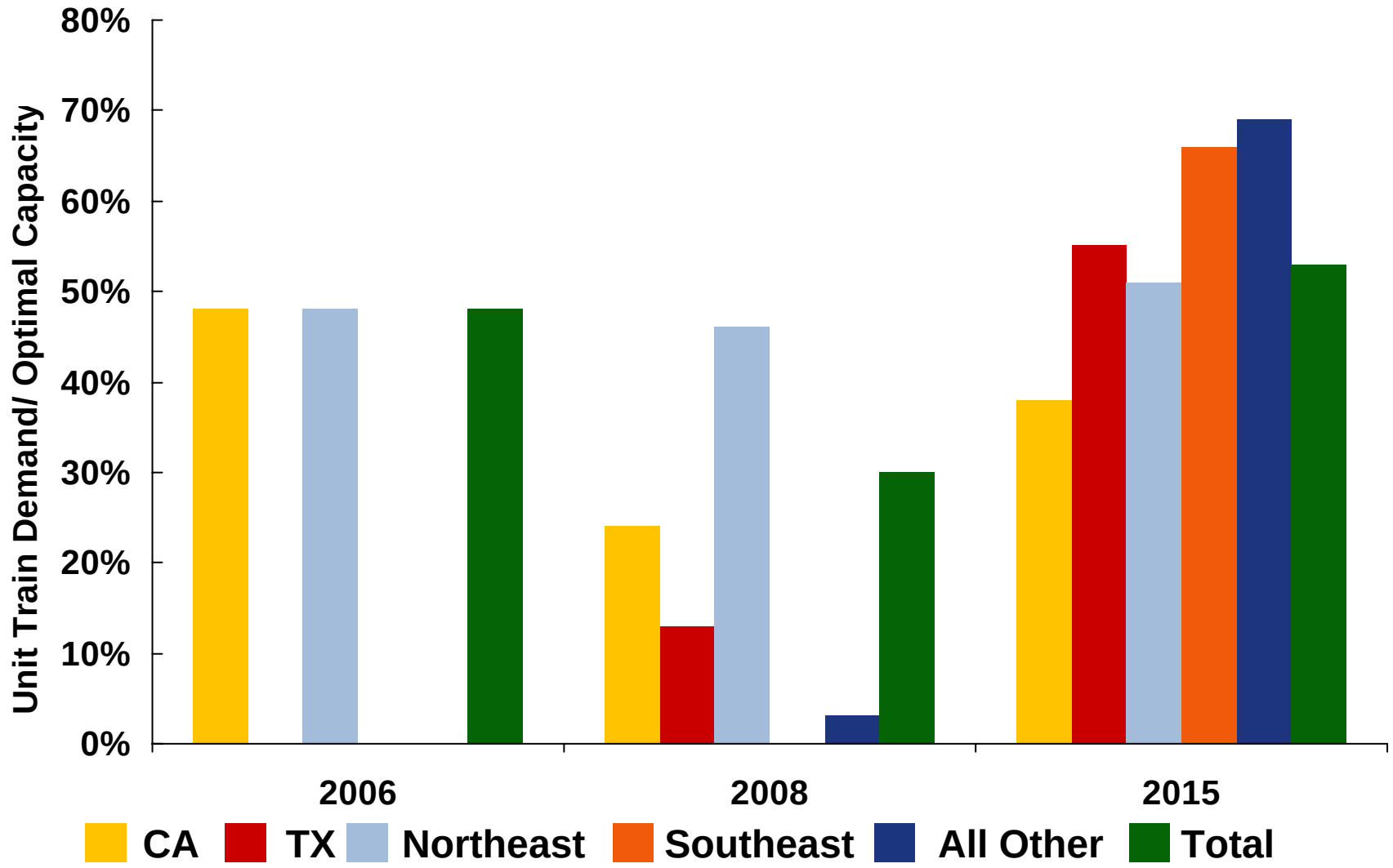
# Estimated Ethanol Unit Shipments

***Unit Train as a percent of total***




Source: UPRR Estimate using various data sources

# Estimated Unloading Capacity Utilized by Unit Train Demand




Source: UPRR Estimate using various data sources

# Constraints

| Constraint | 2006 | 2008 | 2015 |
|---|---|---|---|
| Tank Cars | | | |
| Terminal Load out | | | |
| Unit vs Manifest Shipments | | | |
| Rail Terminal/ Yard Capacity | | | |
| Rail Line Capacity | | | |
| Terminal Unload Capacity | | | |
| Storage Capacity | | | |

Constraint Marginal No Constraint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