



# Impact of Ethanol on Iowa's Transportation System



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# Discussion Topics

- Agricultural Trends
- Ethanol Trends
- Transportation Impacts





# Agricultural Trends

## Farms



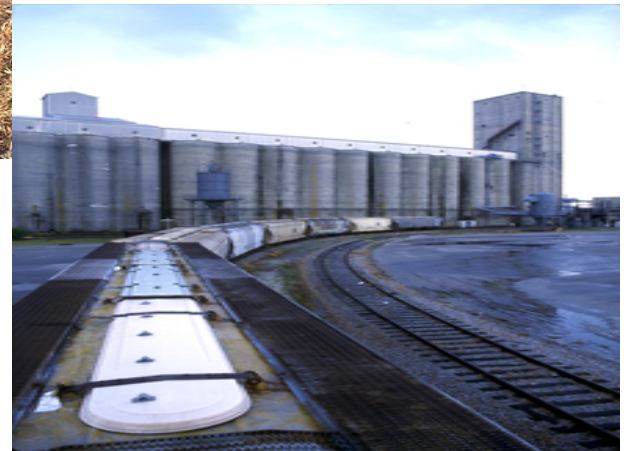
## Production



## Elevators

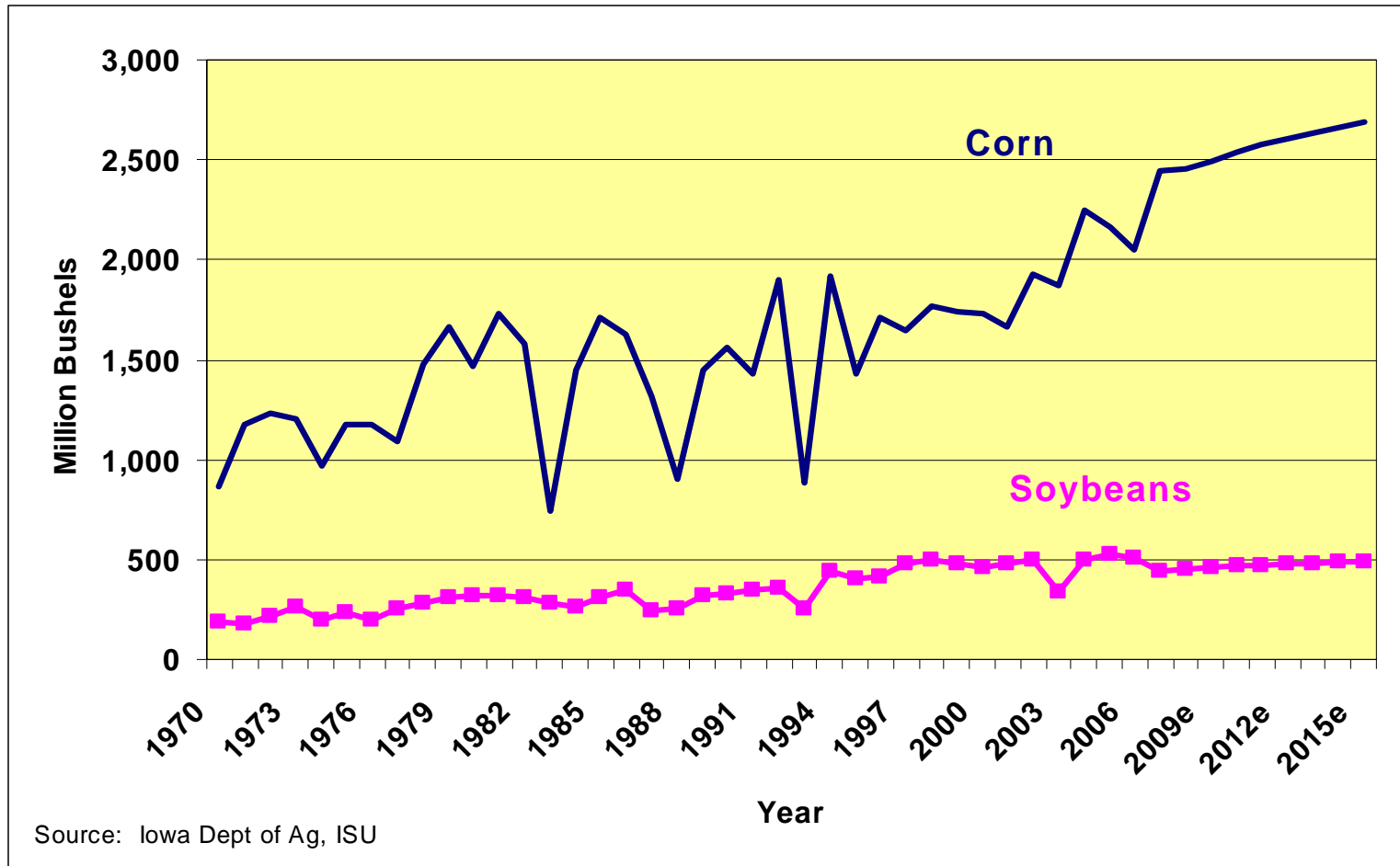


## Distribution & Transportation





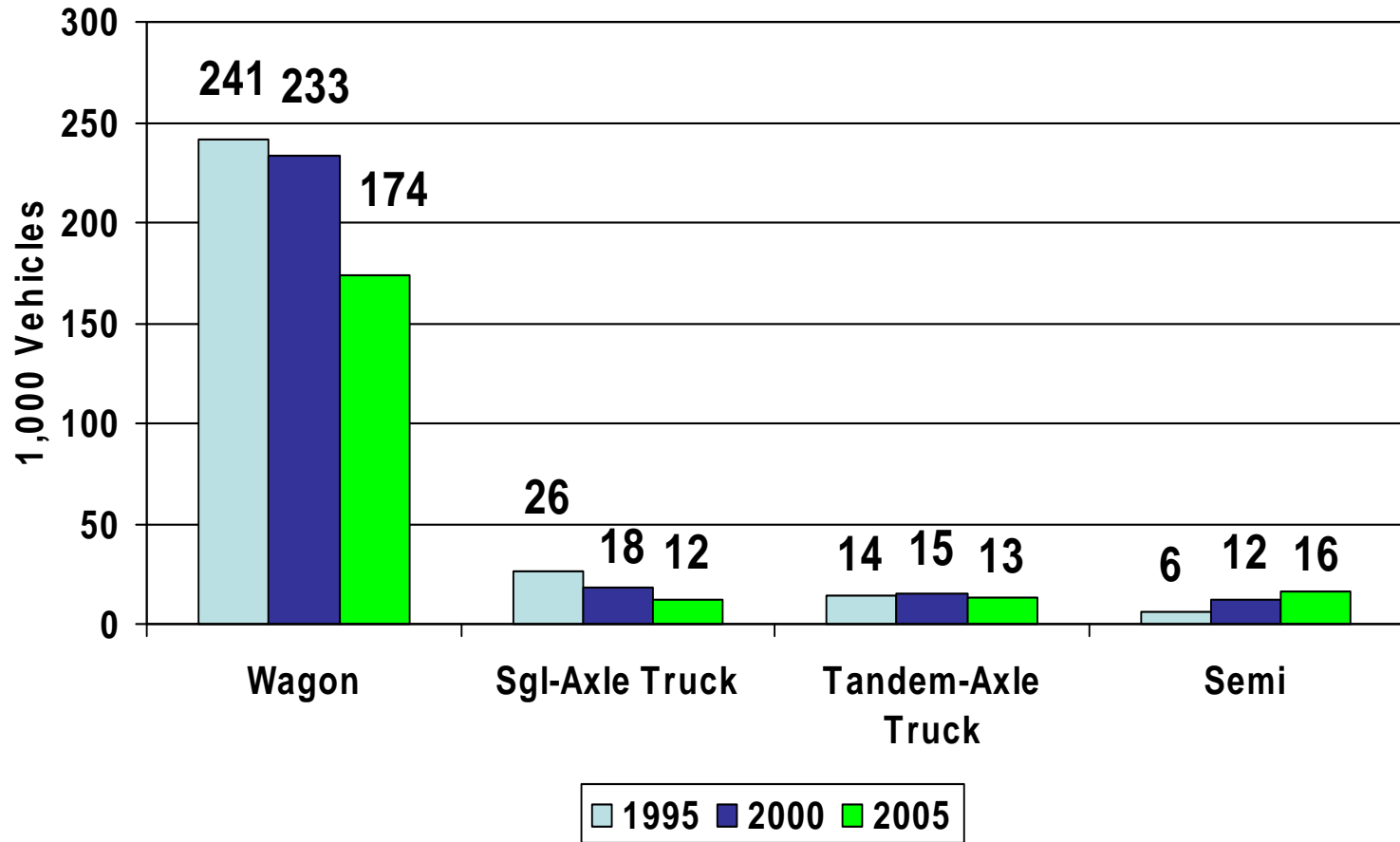
# Increasing Iowa Grain Production





Ethanol

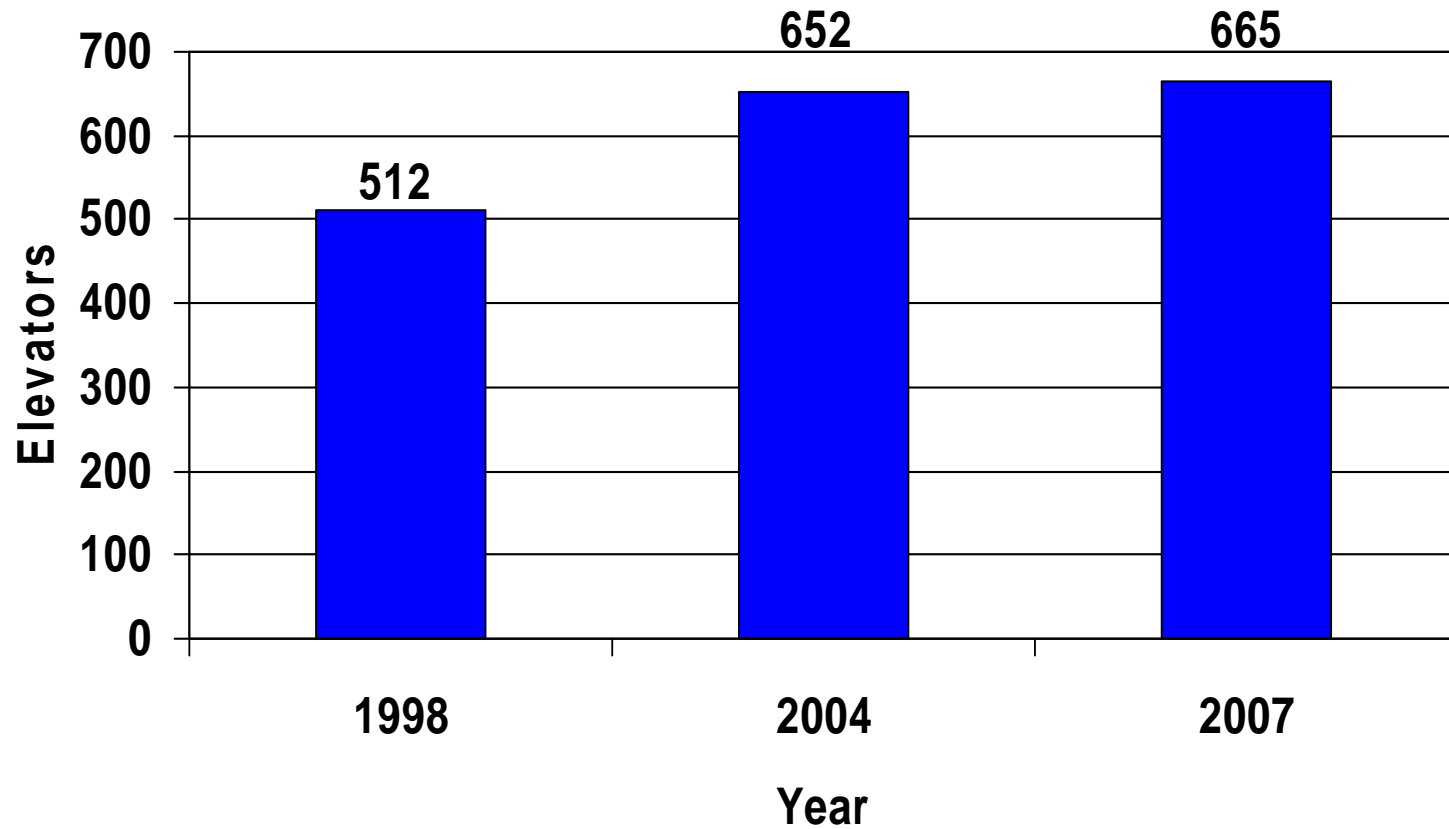
# Iowa Farmers Owning More Semis





Ethanol

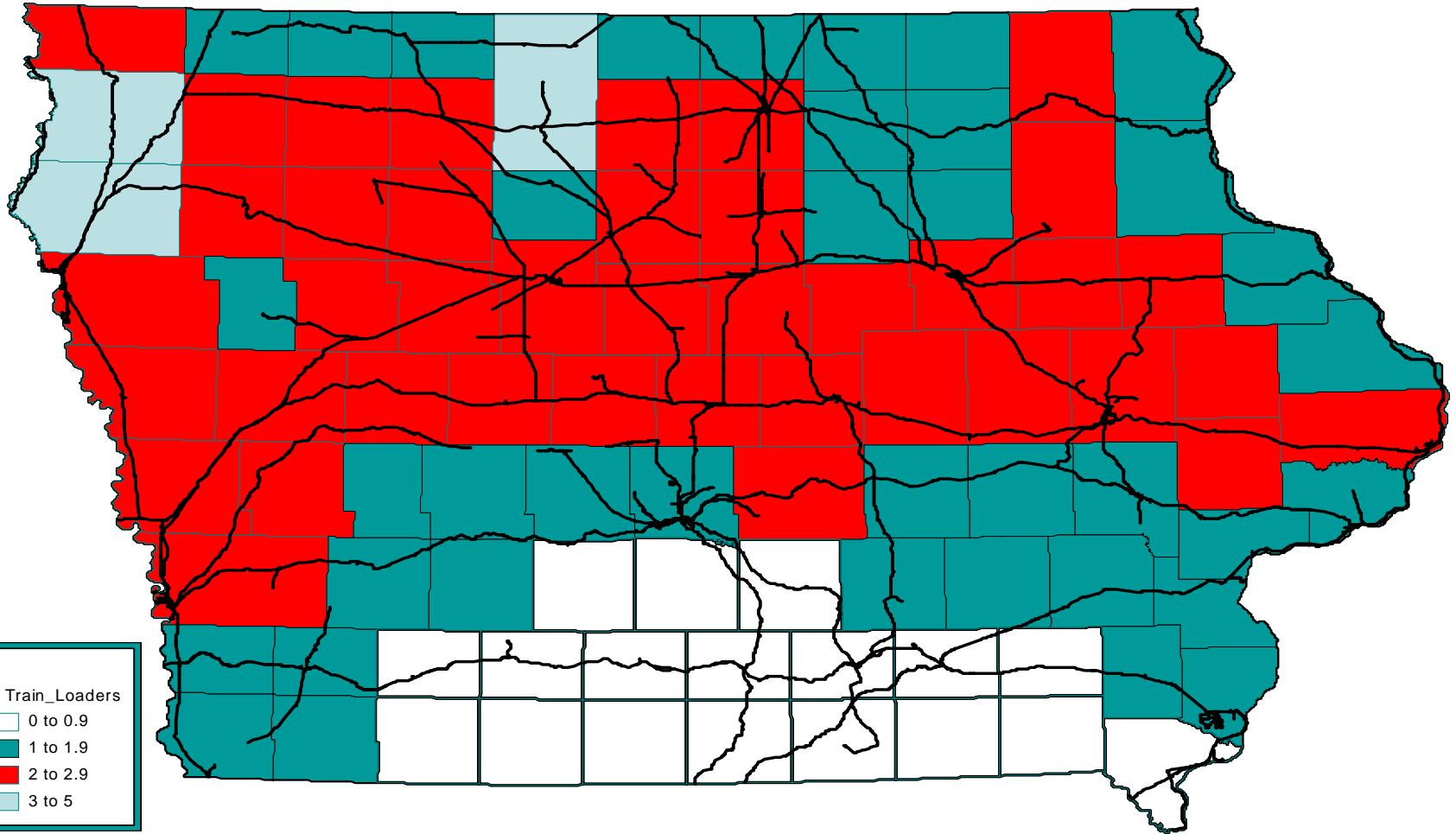
# More Elevator Affiliations







# Iowa May Need only 2 or 3 Shuttle Train Loaders per County

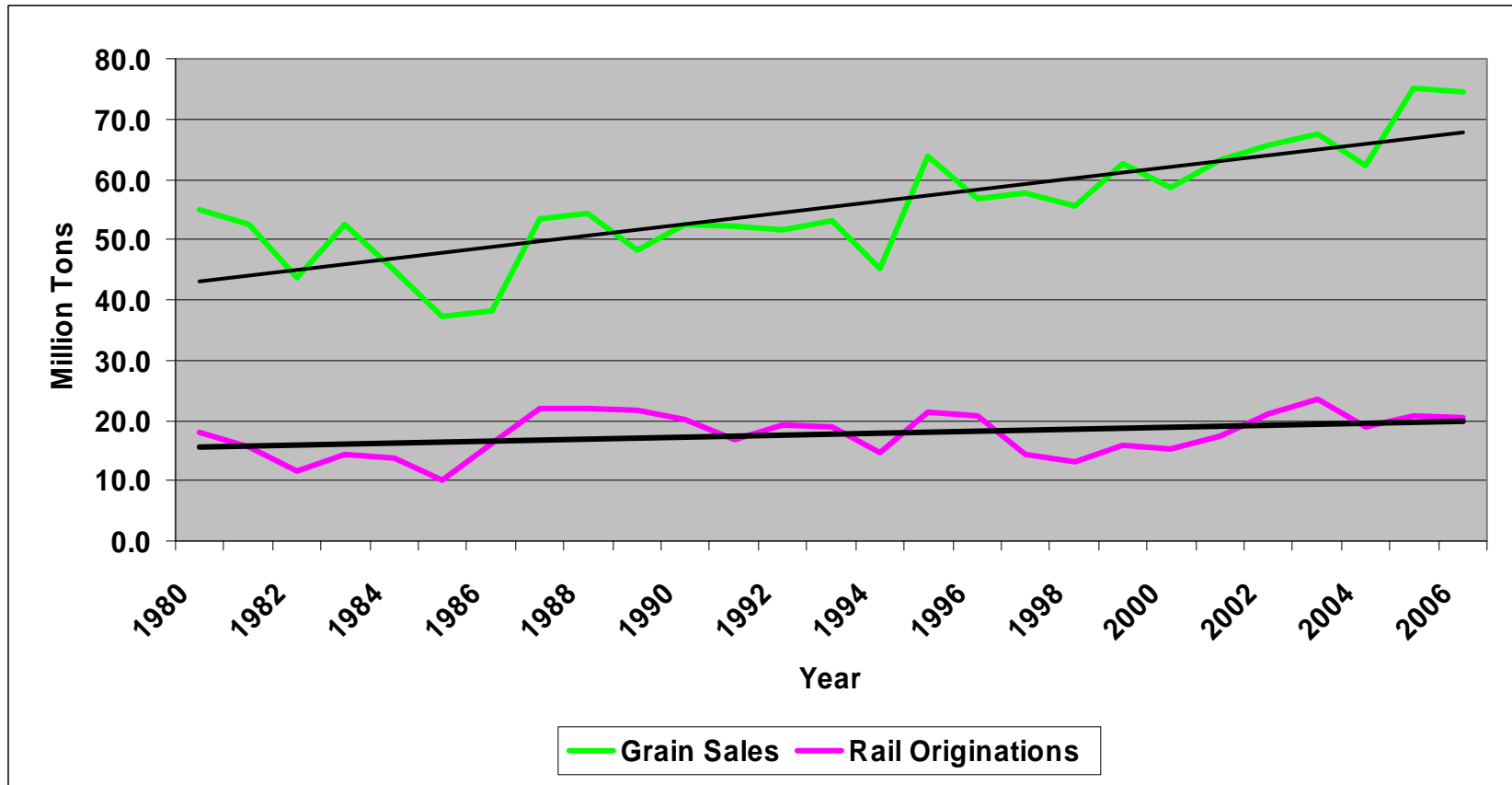


Assumes all corn production is moved by 110-car unit trains at 4,000 bushels per car with 24 turns per year.





# More Iowa Grain is Moved by Truck





# Iowa Ethanol Trends

## Production



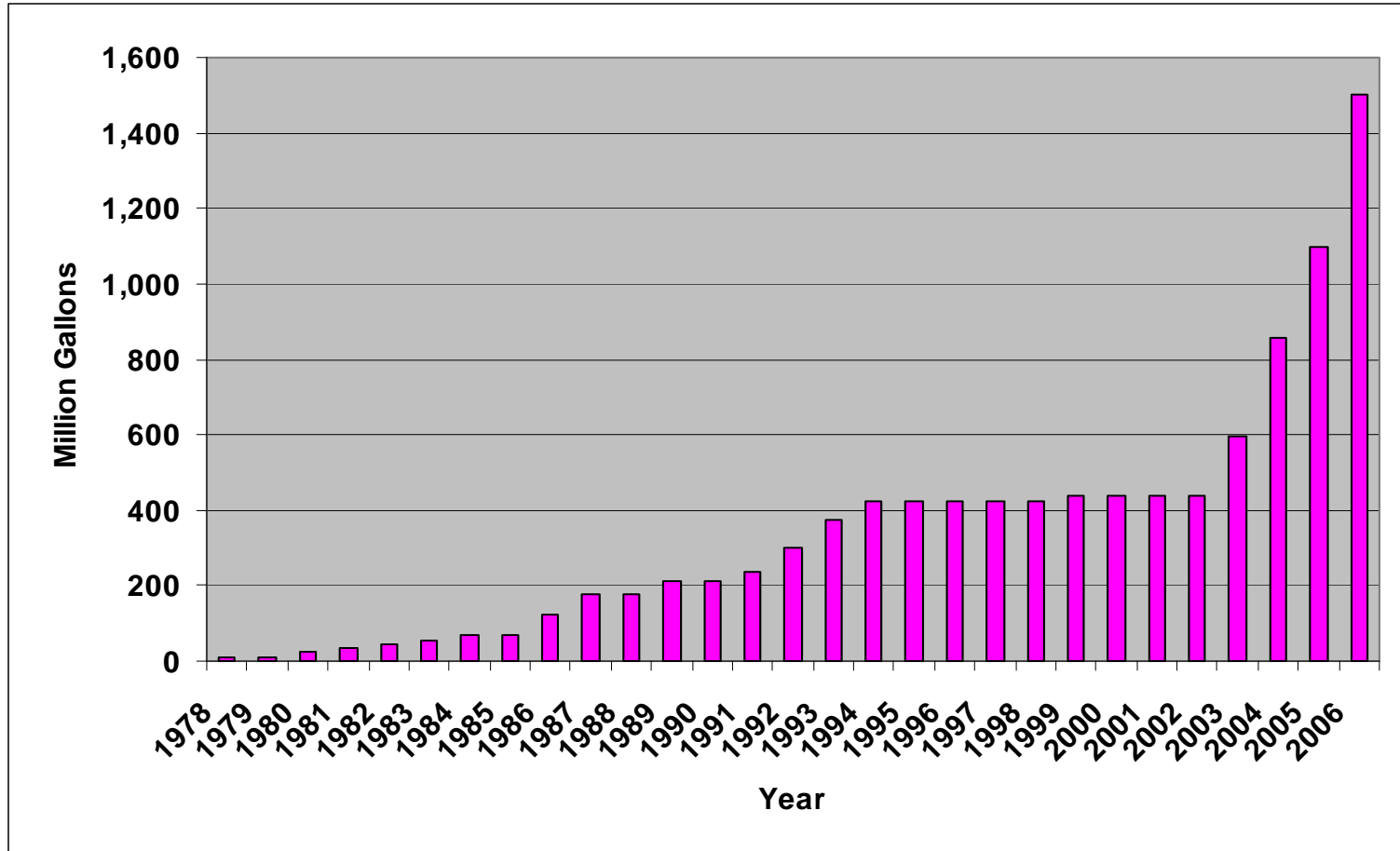
## Facilities



## Distribution & Transportation

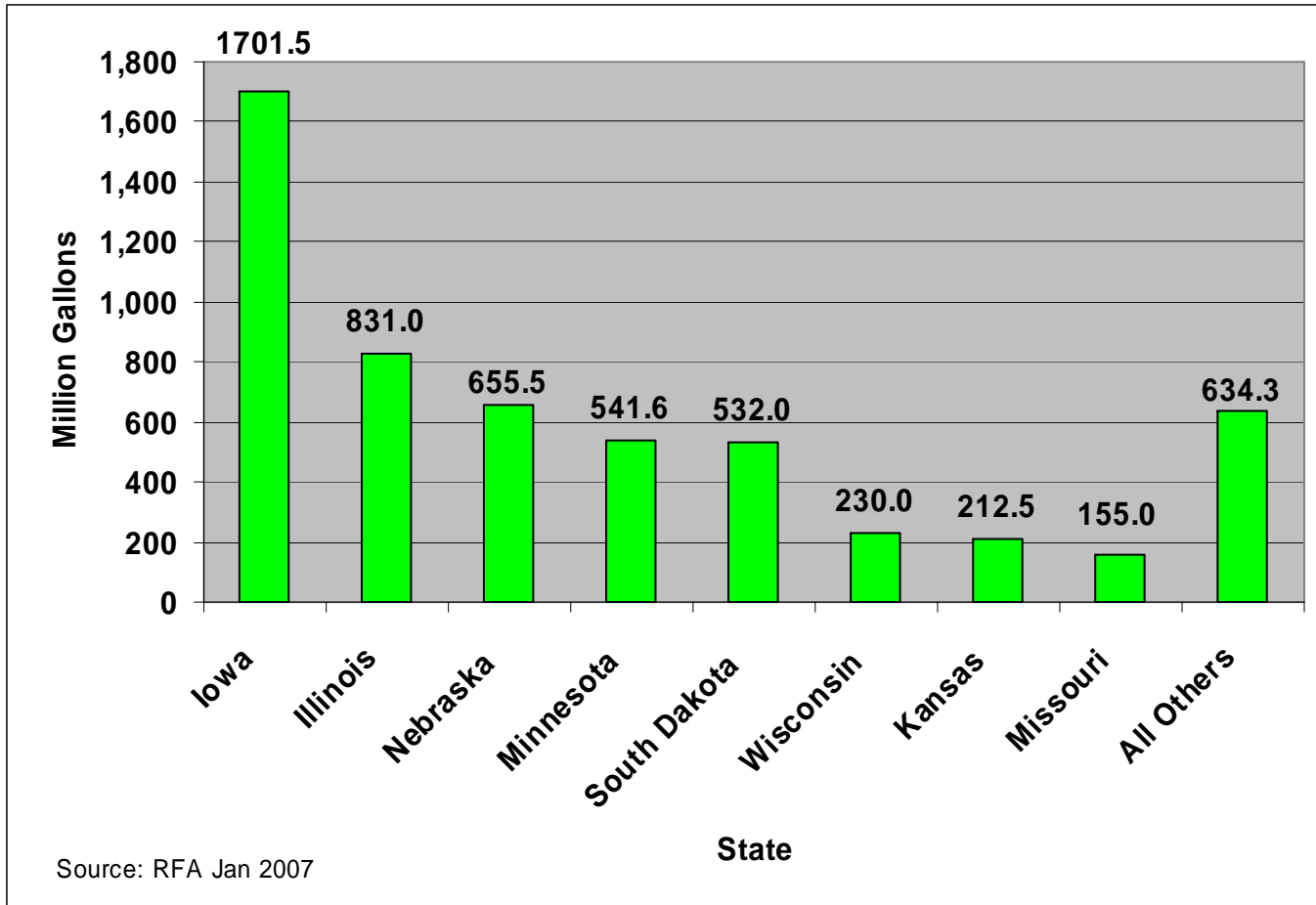


# Iowa's Ethanol Production is on the Rise





# Iowa Leads the Nation in Ethanol Production





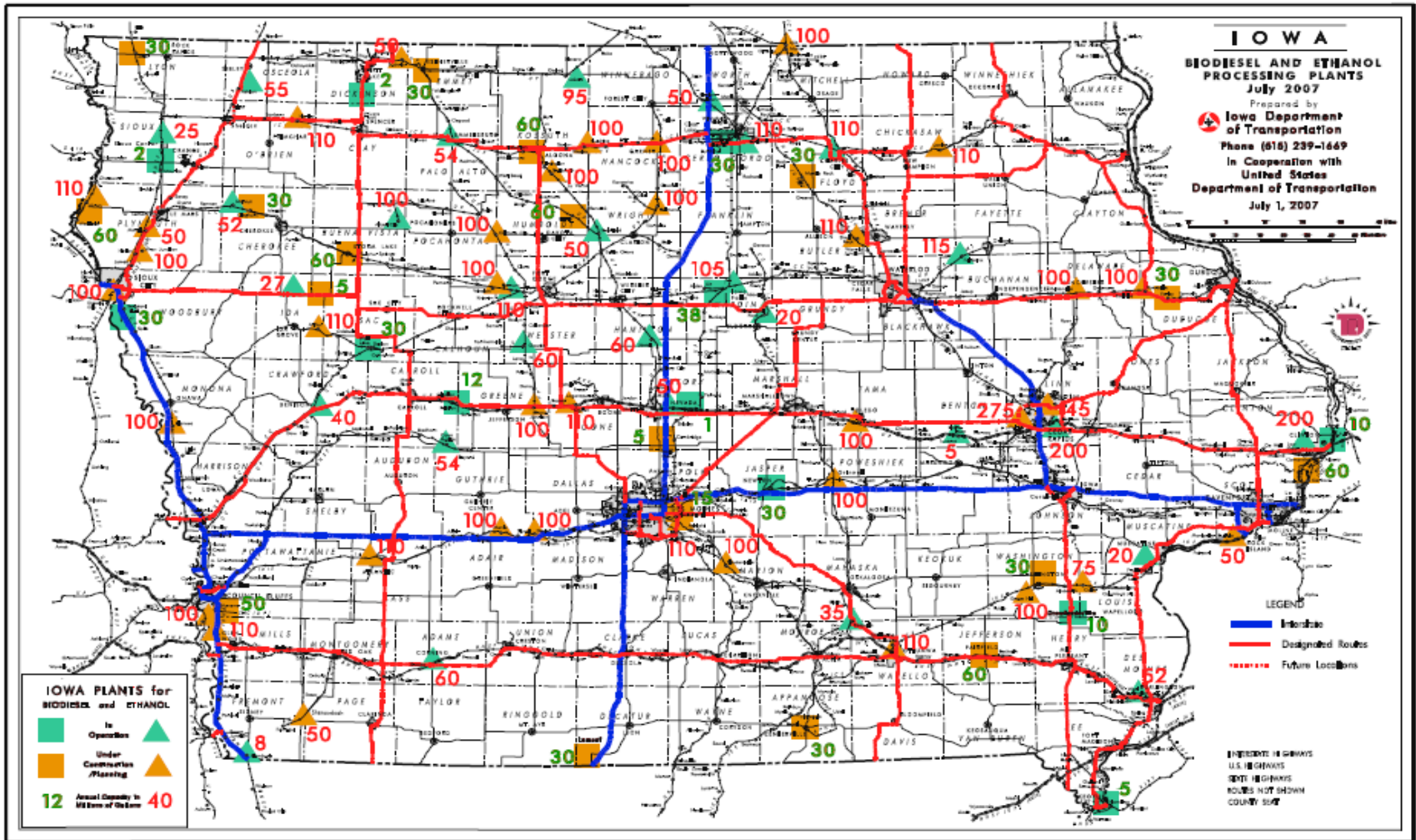
# Iowa Ethanol Facilities have Increased Dramatically

| Year |                         | Number of Plants | Ethanol Capacity (million gallons) | Corn Required (million bushels) |
|------|-------------------------|------------------|------------------------------------|---------------------------------|
| 2002 | Existing                | 9                | 506                                | 190                             |
|      | Construction / Planning | 9                | 335                                | 124                             |
|      | <b>Total</b>            | <b>18</b>        | <b>841</b>                         | <b>314</b>                      |
| 2007 | Existing                | 29               | 1,972                              | 730                             |
|      | Expansion (12)          |                  | 639                                | 237                             |
|      | New Construction        | 16               | 1,505                              | 557                             |
|      | Planning                | 24               | 2,410                              | 893                             |
|      | <b>Total</b>            | <b>69</b>        | <b>6,526</b>                       | <b>2,417</b>                    |



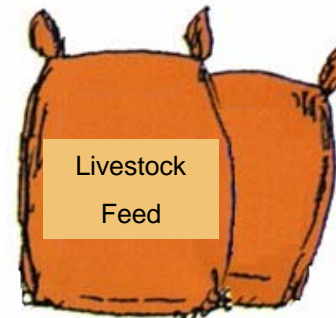
Ethanol

# Iowa's Ethanol Facilities





# Corn Equivalence

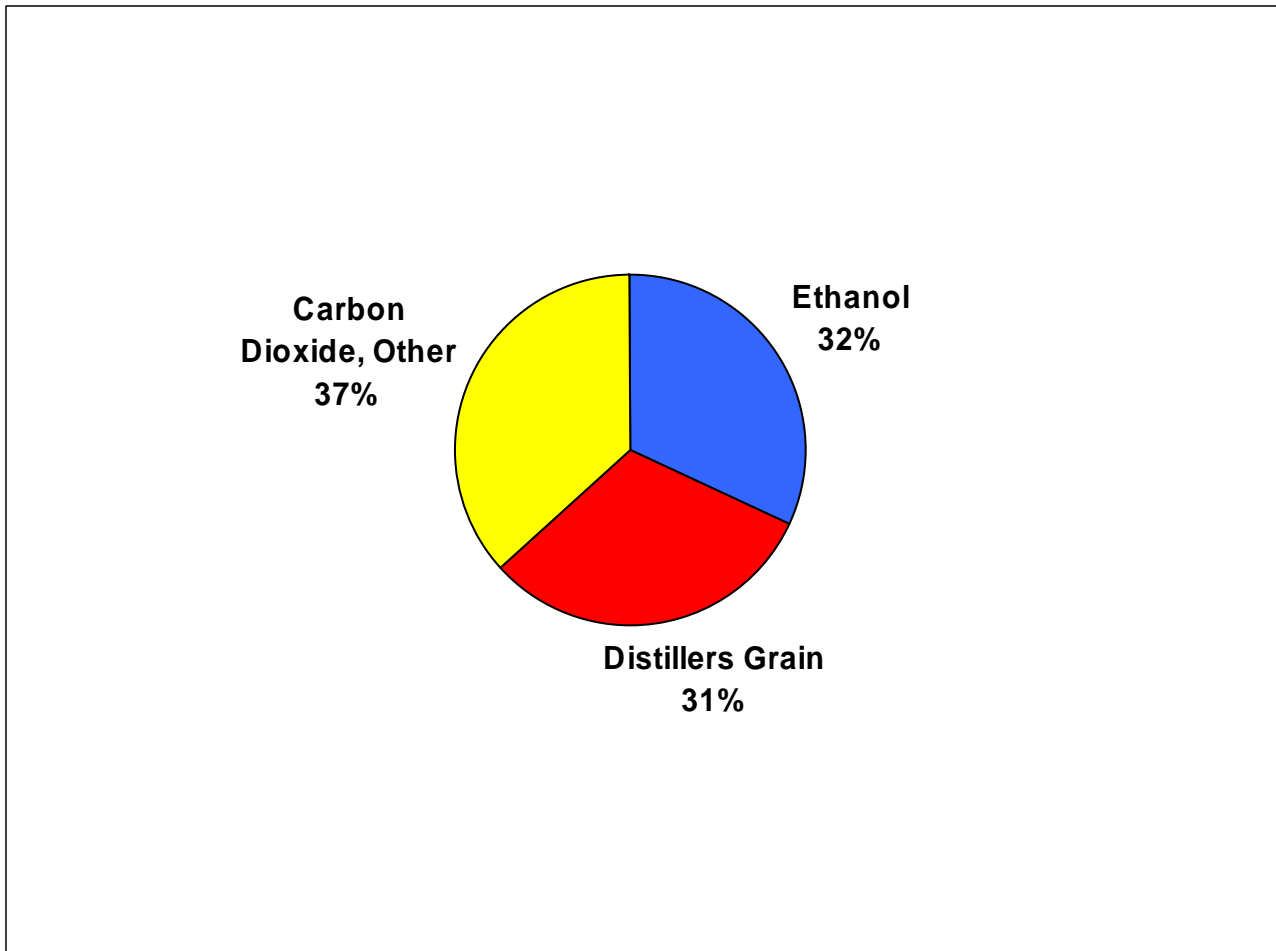


1 bushel = 2.7 gallons + 17 pounds

Corn                      Ethanol                      Feed



# Corn-Ethanol Process Output by Weight







# Transportation Equivalence

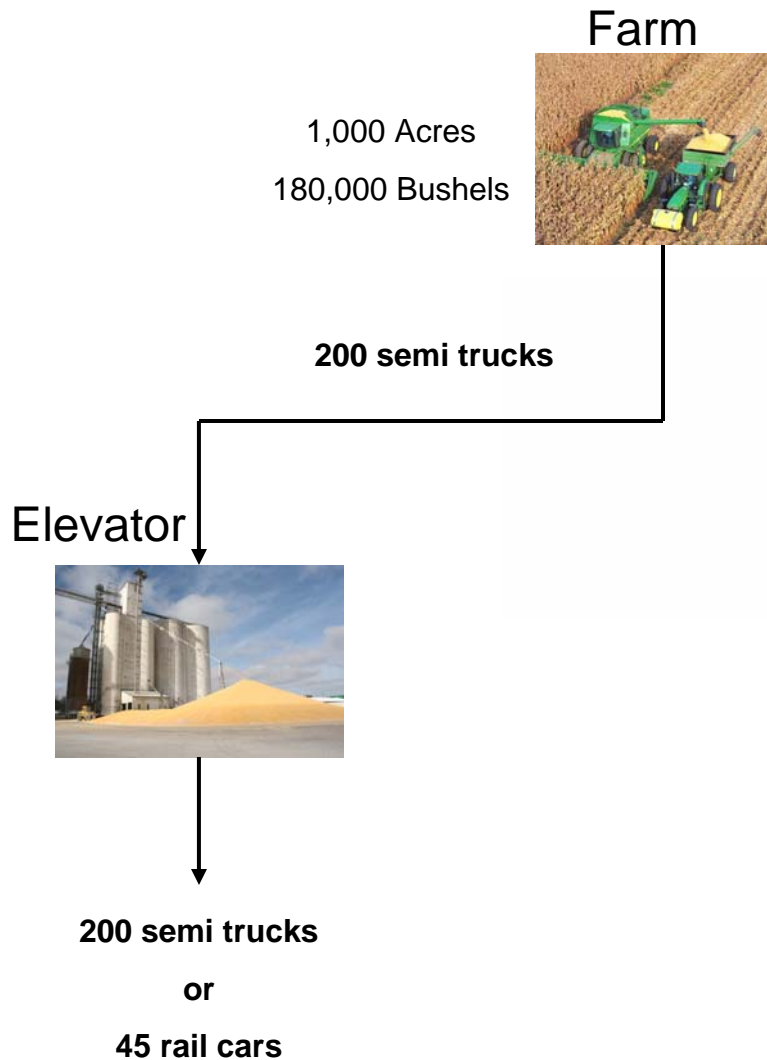
1 semi truck = 900 bushels of corn  
= 8,000 gallons of ethanol  
= 25 tons of feed

1 rail car = 4,000 bushels of corn  
= 30,000 gallons of ethanol  
= 100 tons of feed

|         |                   |             |
|---------|-------------------|-------------|
| Corn    | 1 rail car = 4.4  | semi trucks |
| Ethanol | 1 rail car = 3.75 | semi trucks |
| Feed    | 1 rail car = 4    | semi trucks |

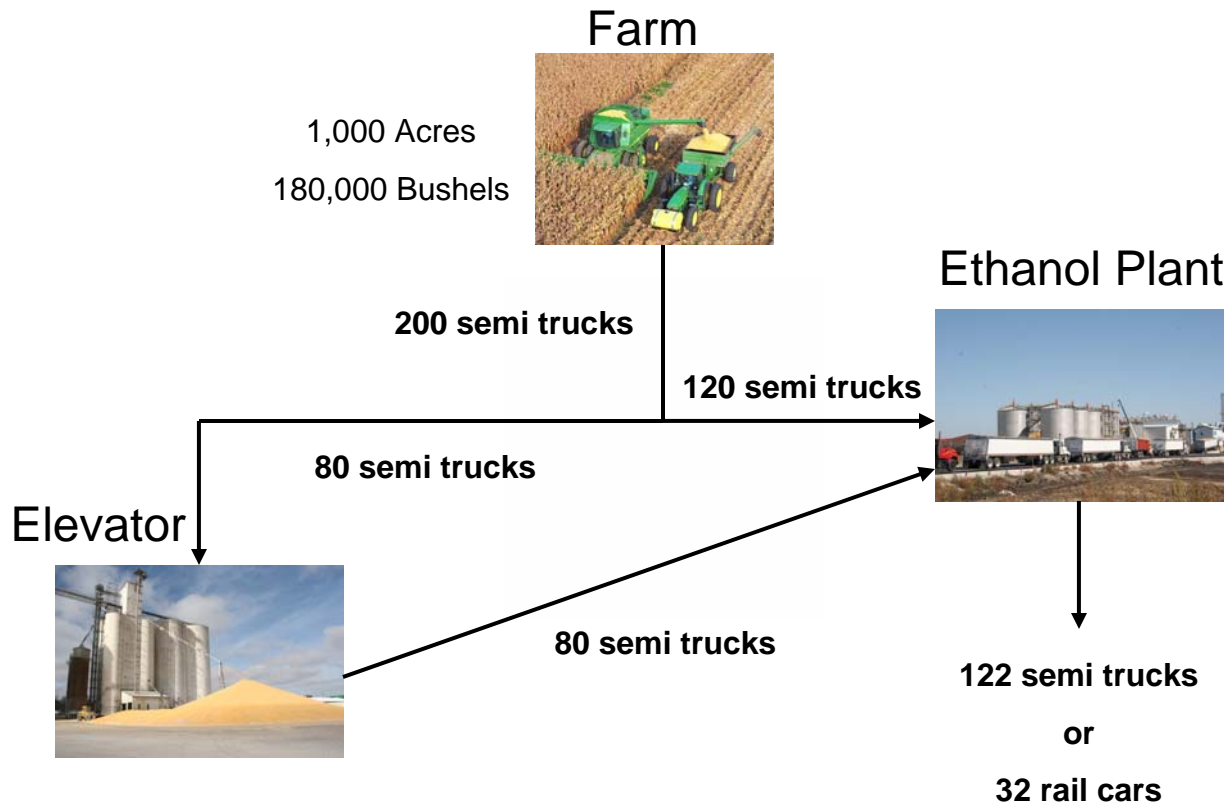


# Grain Flows before Ethanol





# Grain Flows after Ethanol



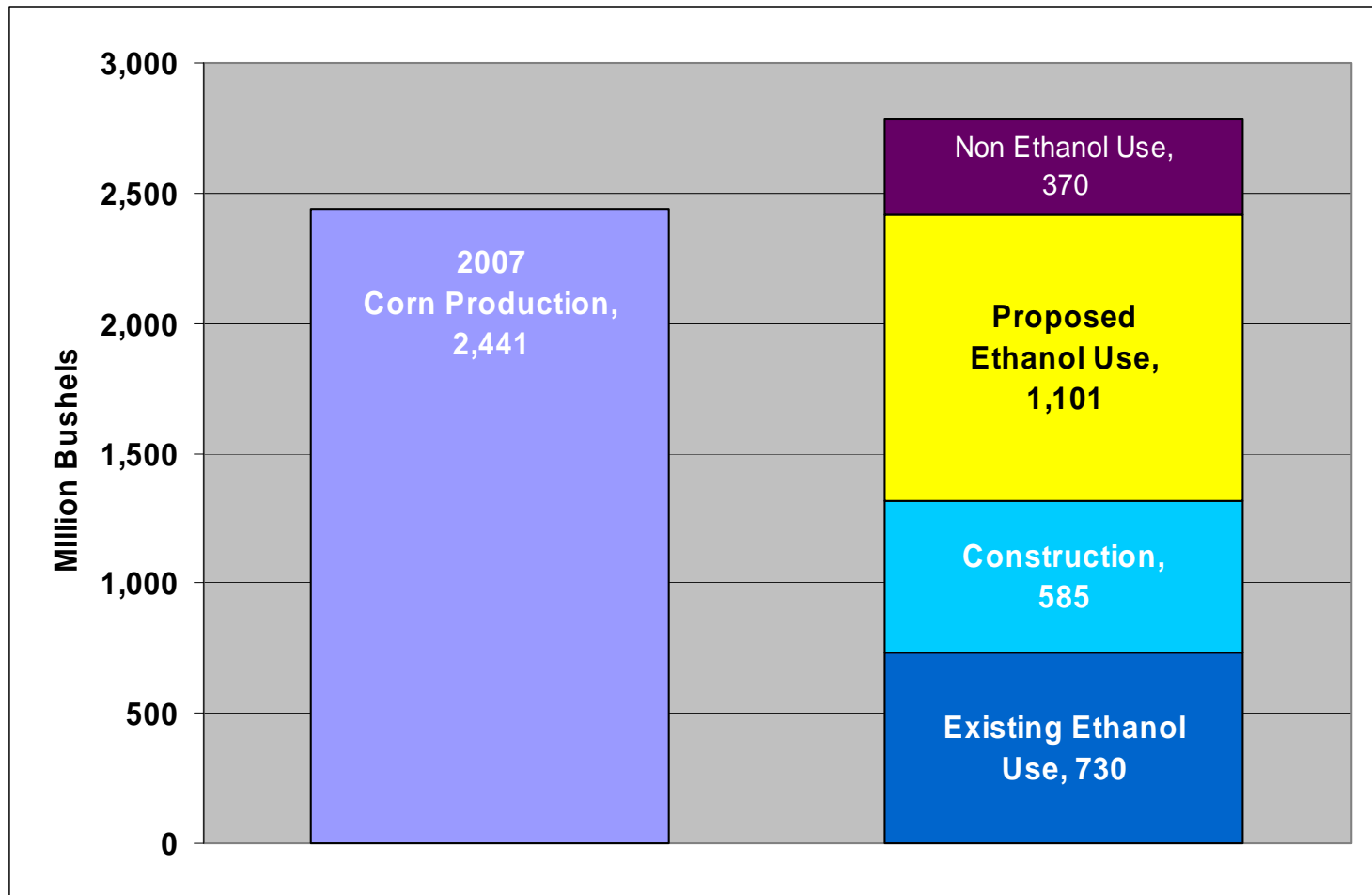


# Inbound Requirements for Ethanol

|                        | 100 Million<br>Gallon | For Existing<br>Plants | For Existing &<br>Planned Sites |
|------------------------|-----------------------|------------------------|---------------------------------|
| Corn (bu)              | 37.0<br>million       | 730 million            | 2,417 million                   |
| Acres<br>Harvested     | 205,800               | 4.1 million            | 13.4 million                    |
| Semi Trucks            | 41,200                | 811,500                | 2.7 million                     |
| Semi Trucks<br>per Day | 160                   | 3,120                  | 10,330                          |



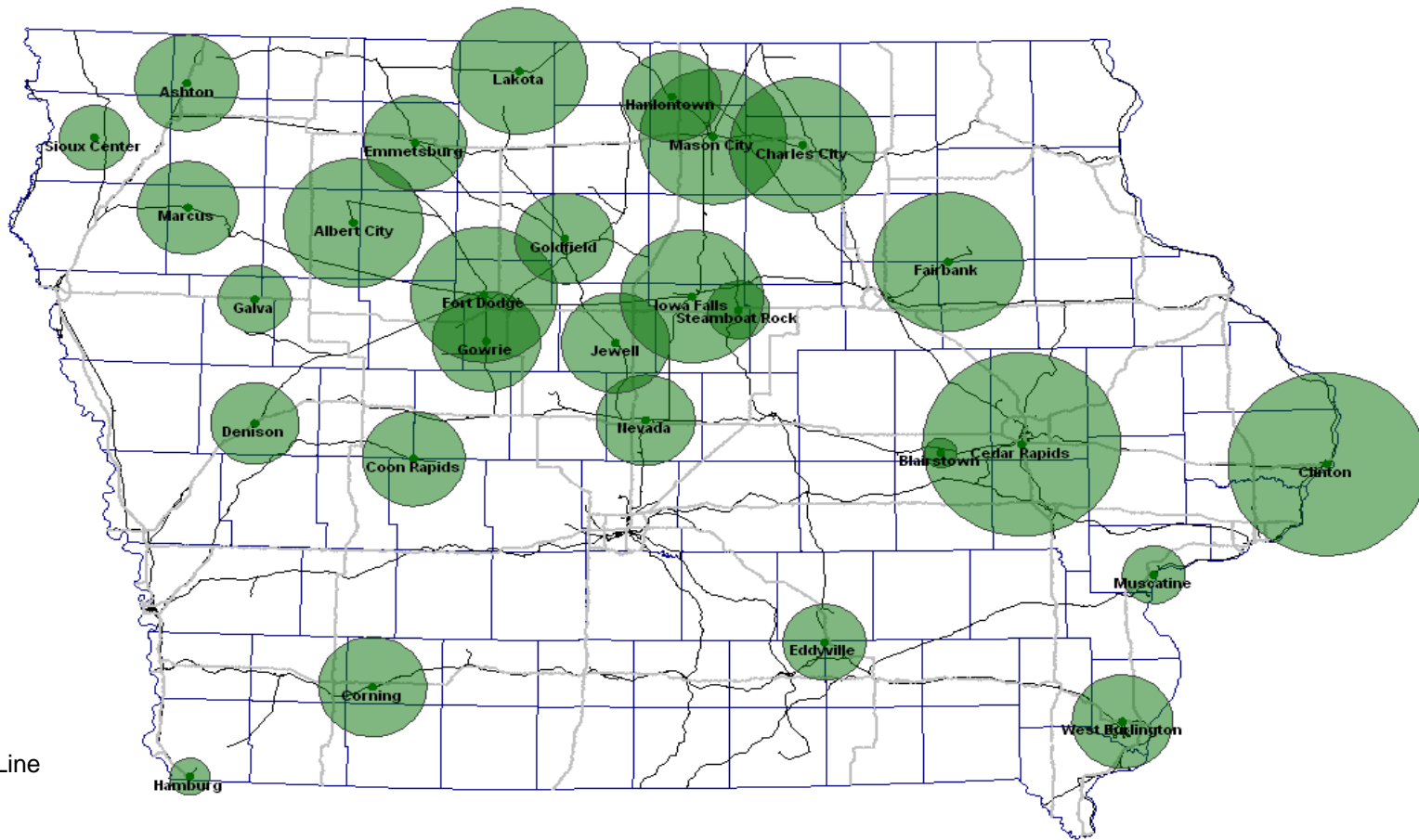
# Ethanol's Share of Iowa's Corn Production





# Draw Area

## Existing Ethanol Plants



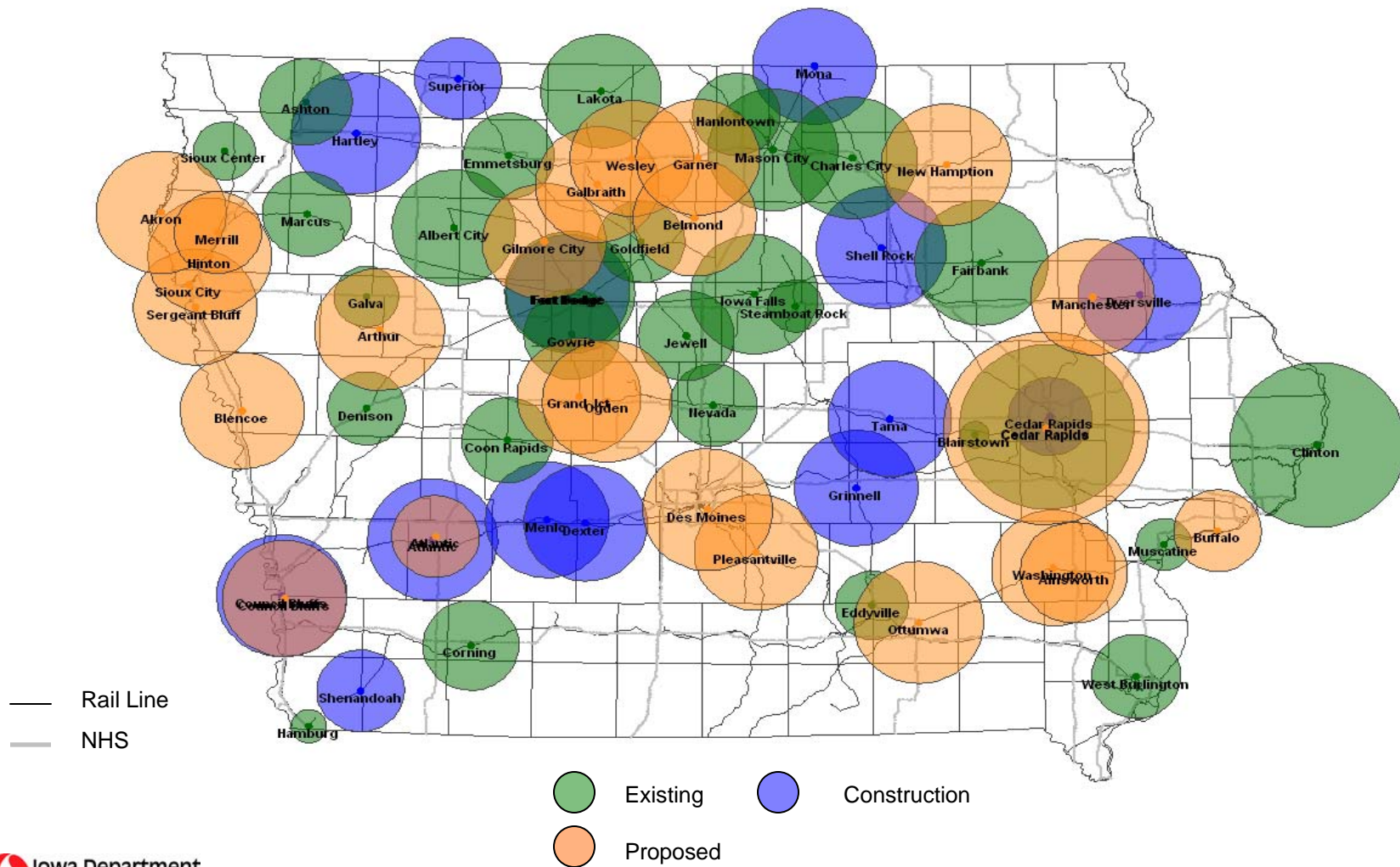
— Rail Line  
- - NHS





# Draw Area

## Existing, Under Construction & Proposed Plants







# Outbound Requirements for Ethanol

|              |              | 100 Million<br>Gallon | For Existing<br>Plants | For Planned<br>Sites |
|--------------|--------------|-----------------------|------------------------|----------------------|
| Corn         | All by rail  | 9,260 cars            | 182,600 cars           | 421,700 cars         |
| Ethanol      | All by rail  | 3,330 cars            | 65,700 cars            | 151,800 cars         |
| DDGs         |              | 3,150                 | 62,100                 | 143,400              |
| <b>Total</b> |              | <b>6,480 cars</b>     | <b>127,800 cars</b>    | <b>295,200 cars</b>  |
| Ethanol      | 65% by rail  | 2,170 cars            | 42,700 cars            | 98,700 cars          |
| DDGs         | 56% by rail  | 1,760                 | 34,800                 | 80,300               |
| <b>Total</b> |              | <b>3,930 cars</b>     | <b>77,500 cars</b>     | <b>179,000 cars</b>  |
| Ethanol      | 35% by truck | 4,375 semis           | 86,300 semis           | 199,200 semis        |
| DDGs         | 44% by truck | 5,541                 | 109,300                | 252,300              |
| <b>Total</b> |              | <b>9,916 semis</b>    | <b>195,600 semis</b>   | <b>451,500 semis</b> |
| Per Day      |              | 38                    | 752                    | 1,672                |



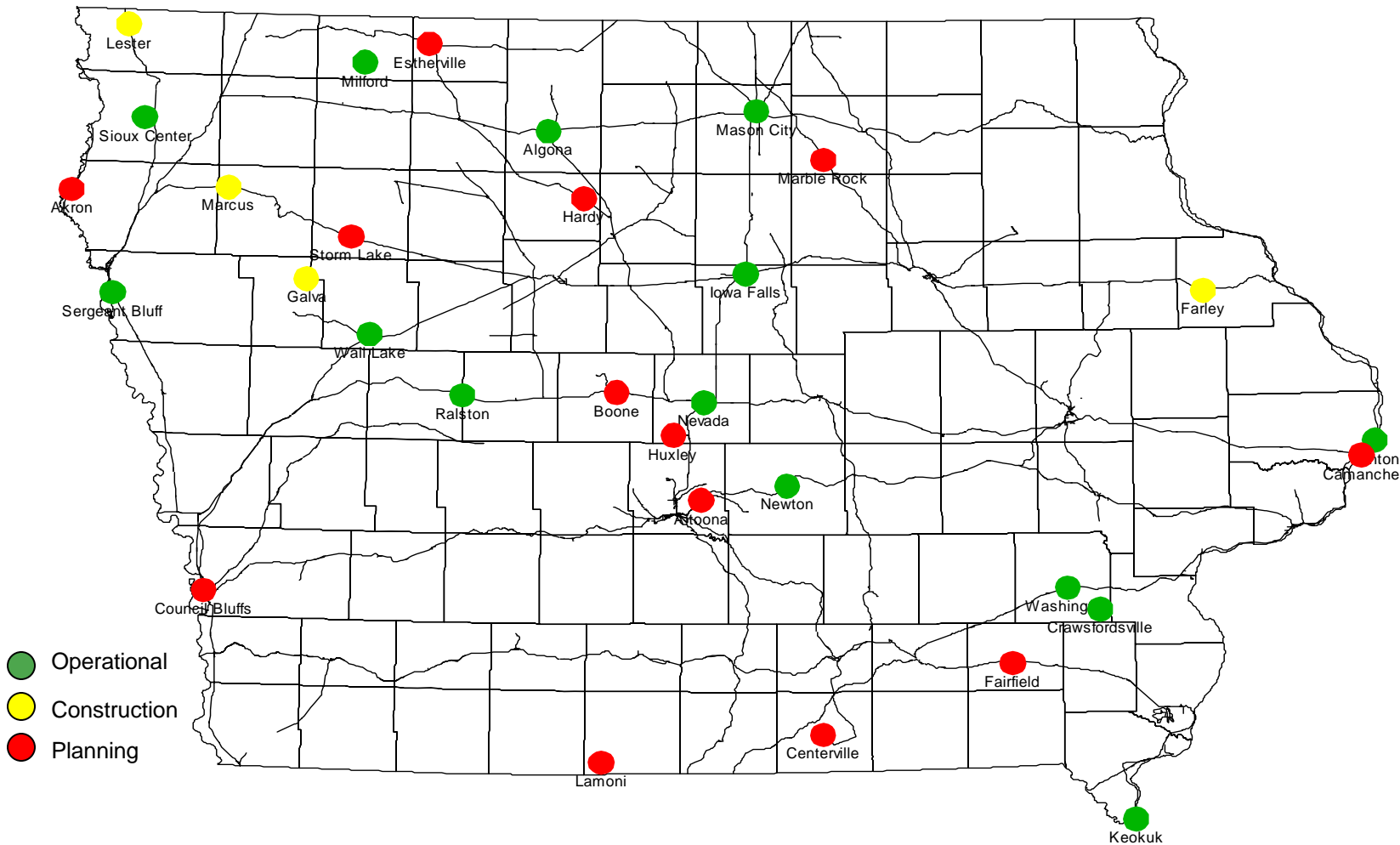
# Iowa's Biodiesel Facilities

| Year |                  | Number of Plants | Biodiesel Capacity<br>(million gallons) | Soybeans Required<br>(million bushels) |
|------|------------------|------------------|---|--|
| 2007 | Existing         | 14               | 318                                     | 223                                    |
|      | Expansion (1)    |                  | 30                                      | 21                                     |
|      | New Construction | 3                | 65                                      | 46                                     |
|      | Planning         | 13               | 490                                     | 343                                    |
|      | <b>Total</b>     | <b>30</b>        | <b>903</b>                              | <b>633</b>                             |



Ethanol

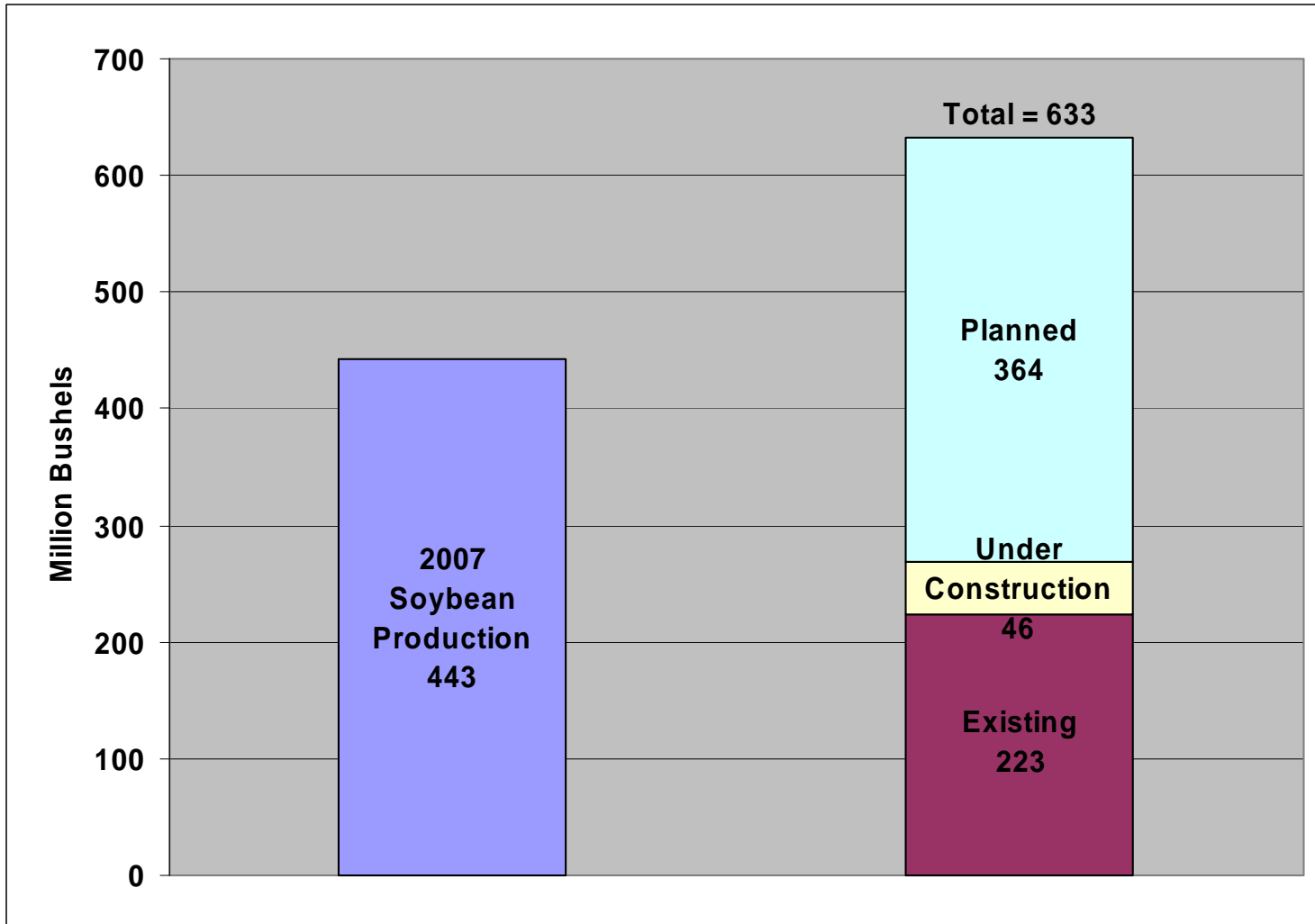
# Iowa's Biodiesel Facilities



- Operational
- Construction
- Planning



# Biodiesel's Share of Iowa's Soybean Production





# Cellulosic Feedstock

Corn Stocks



3 tons / acre  
117 gal / ton  
350 gal / acre

Corn Cobs



1 ton / acre  
80 gal / ton  
80 gal / acre

Miscanthus



15 tons / acre  
100 gal / ton  
1500 gal / acre

Switch Grass



7.5 tons / acre  
100 gal / ton  
750 gal / acre

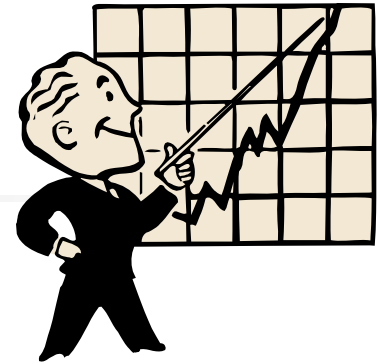
Sugar Cane



??? tons / acre  
??? gal / ton  
600 to 800 gal / acre



# Future Outlook



- Increasing corn production
- Shift to value adding activities
  - Livestock feeding, processing, ethanol, biodiesel
- Counties importing corn
- More truck movements to rail sites and local markets
- Fewer rail shipments
- Local road issues
- Cellulosic transportation requirements



# Questions

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