

# Ethanol in Pipelines

## Roadmap meeting

### Producer and End User Perspective

Dublin, OH  
October 26, 2007

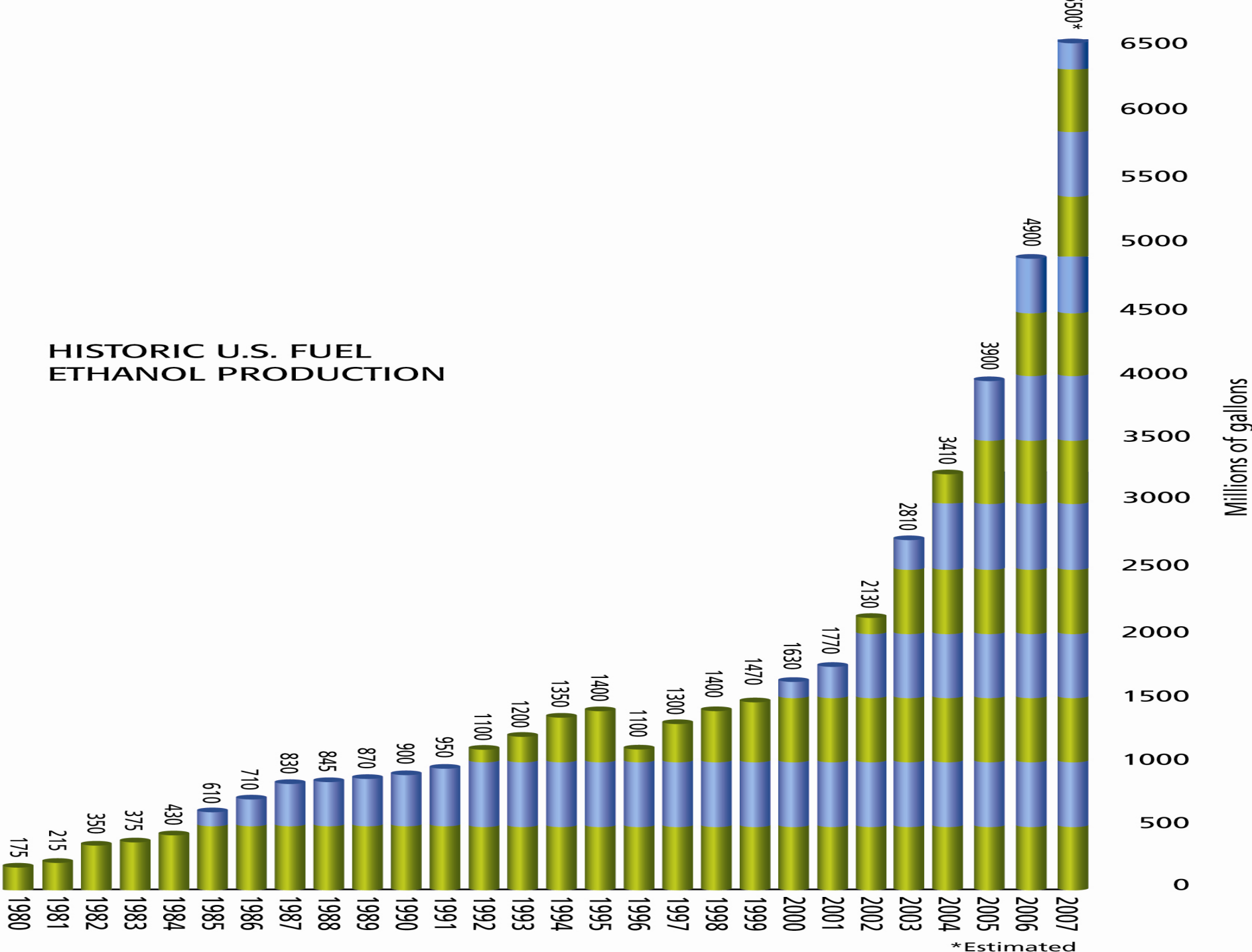
Chuck Corr  
Archer Daniels Midland



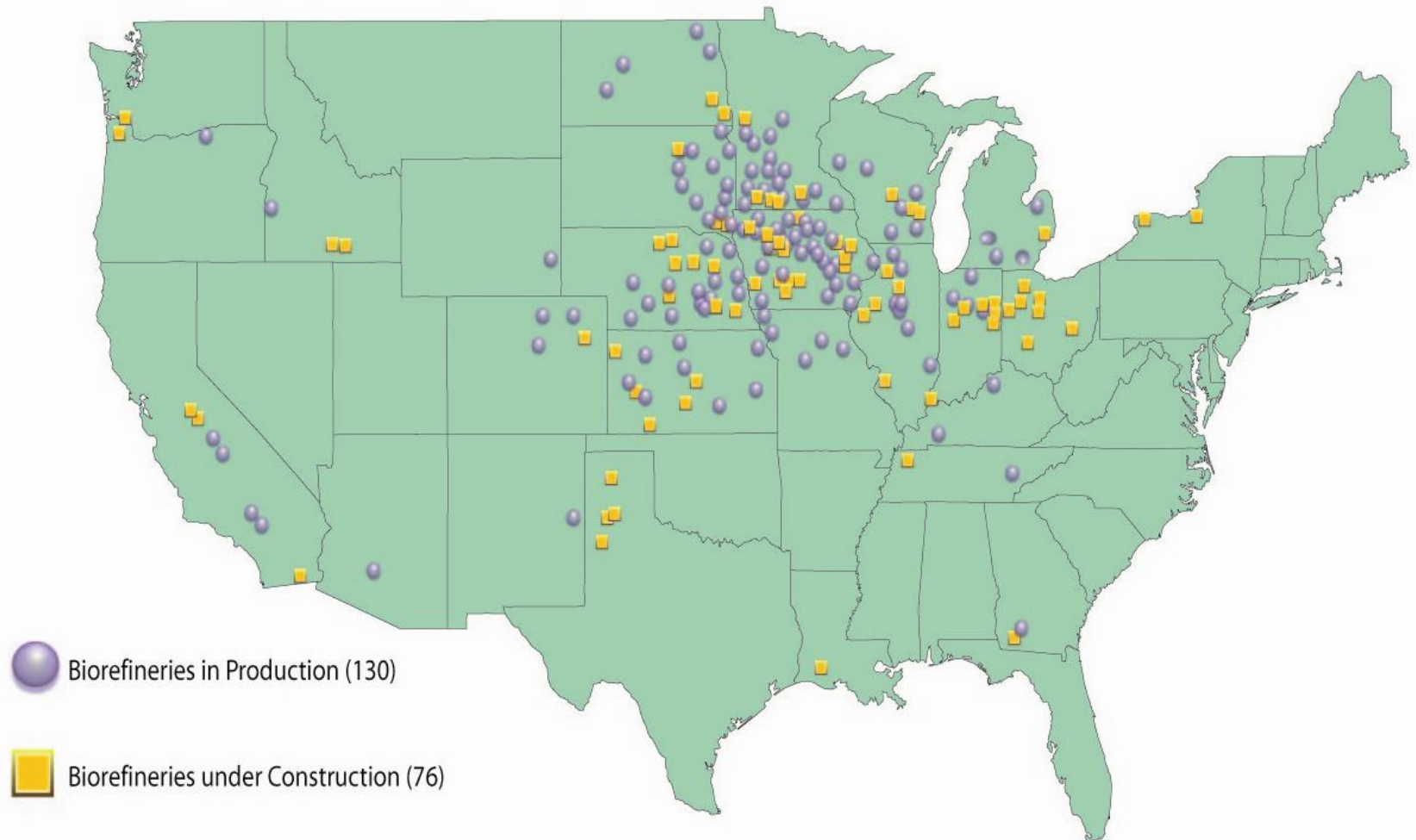
# Industry Objective To Safely Produce & Deliver

- A liquid energy product
- Quality needed
- Volumes needed
- Where needed
- When needed
- Optimum flexibility
- Cost efficiently

# HISTORIC U.S. FUEL ETHANOL PRODUCTION

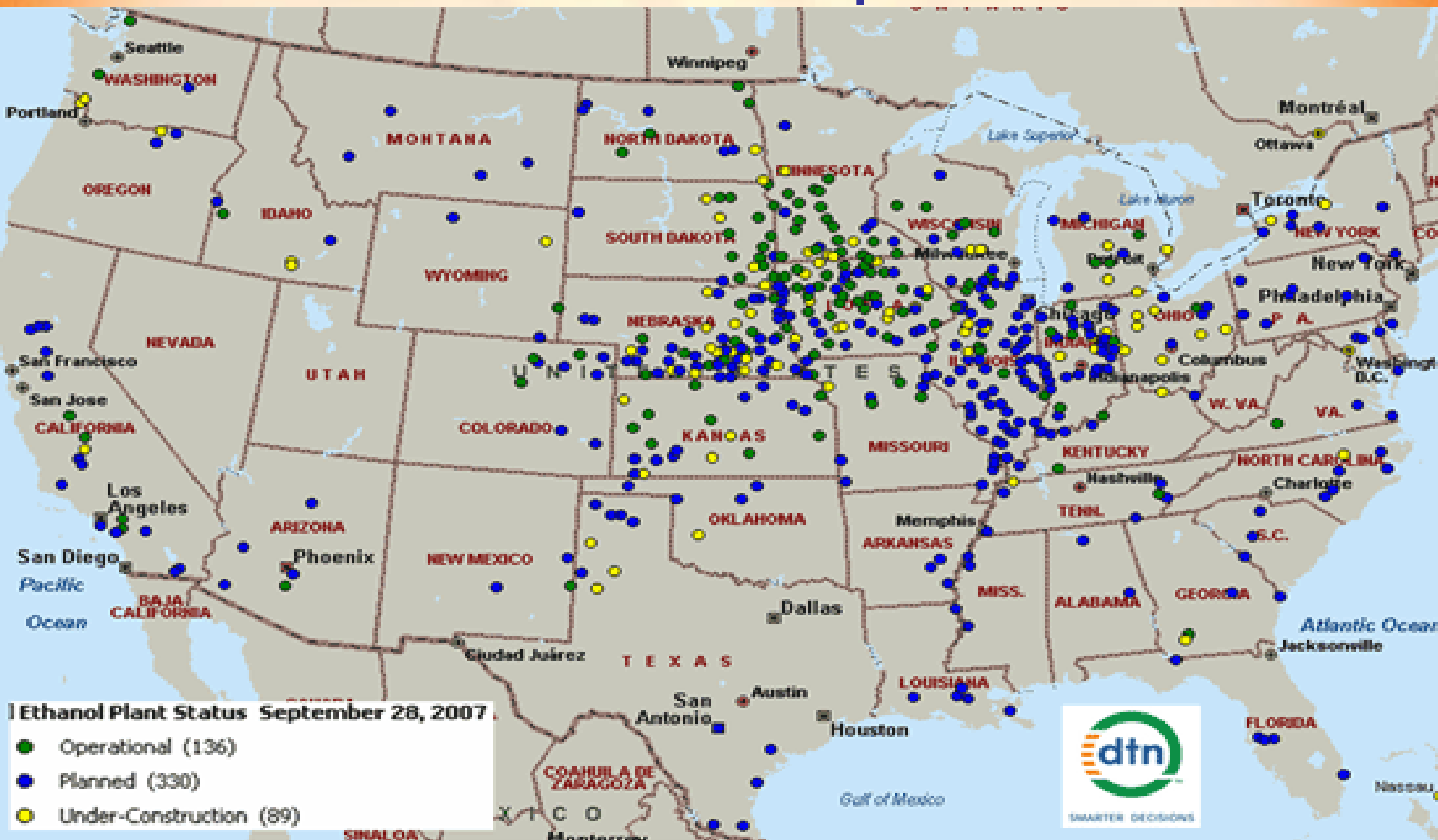


# U.S. Ethanol Biorefinery Locations



Source: Renewable Fuels Association  
10.4.07

# US Ethanol Expansion



\*Alaska has one ethanol plant in the planning stage

\*Hawaii has two ethanol plants in the planning stage

# Geography

- Most Ethanol produced in Midwest
- Most petroleum refined in the Gulf Coast
- Both away from major markets
- Current refined products pipelines - wrong location or flow direction



# Volume Affects Mode

- **Petroleum Transportation**

- Wooden barrels
- Rail cars of barrels
- ....
- Rail Tank cars
- Pipelines

- **Ethanol Transportation**

- Tank trucks
- Rail cars
- Barges
- Unit Trains
- Pipelines

# Pipeline Type

- Multiproduct Pipeline
  - Geographic issues
  - Compatibility of materials, existing products
  - Capacity for ethanol
- Dedicated Pipeline
  - New or existing pipe – From and To?
  - Materials (nonmetallic)
  - Sizing of pipeline & infrastructure
- Combination
  - Dedicated feeders to multiproduct trunk



# Stress Corrosion Cracking

- Dissolved oxygen
  - May act as light switch
- Saturated with oxygen – some SCC
- Deaerated – No SCC
  - Extreme lab conditions
- **Can dissolved oxygen be controlled below the critical level?**

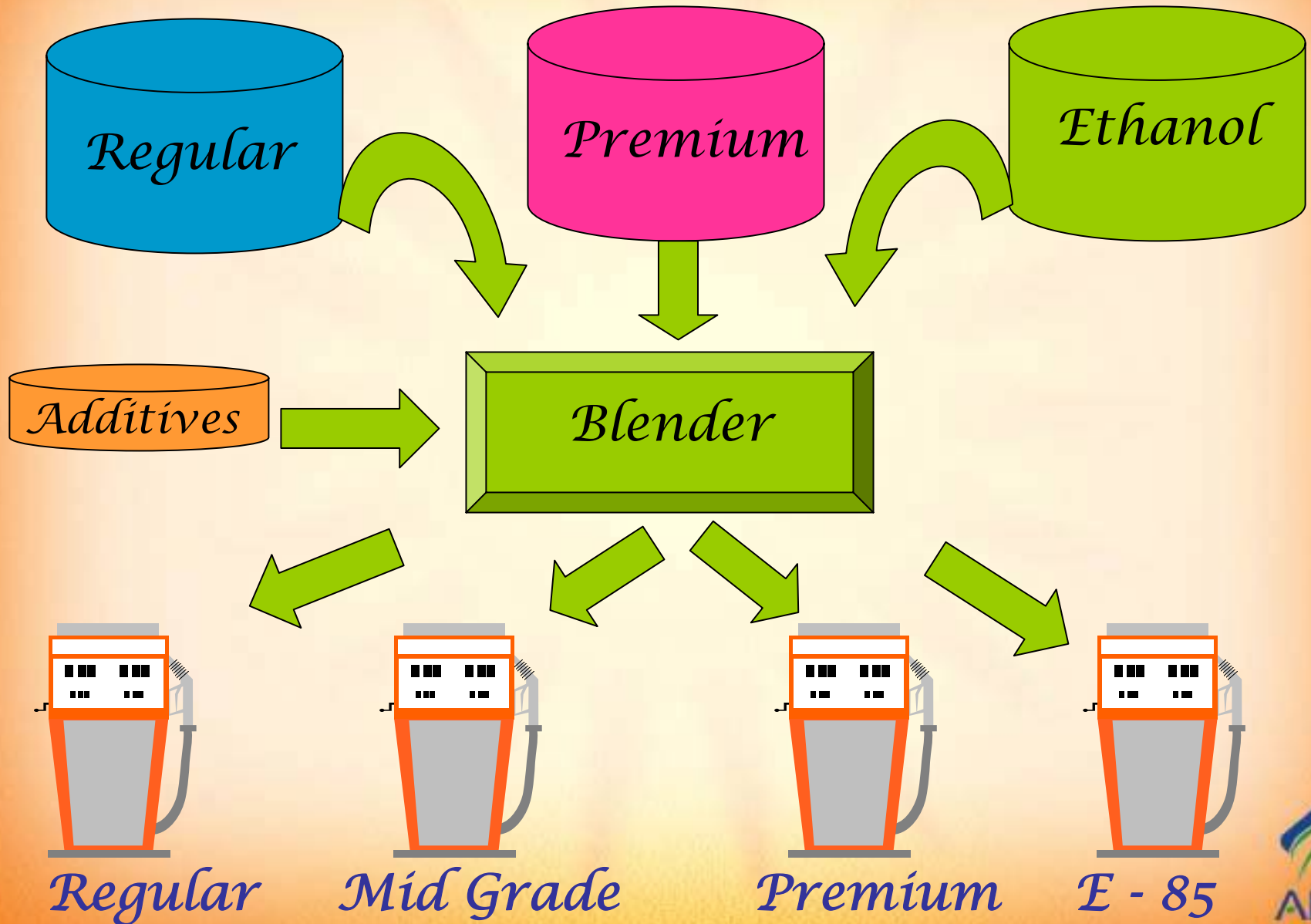
# Materials Compatibility

- Ask a terminal engineer
- Many terminals currently work with high and low ethanol concentrations
- Midwest terminals have years of excellent experience

# Flexibility to Blend

- The US will go beyond E10
- Terminals need the flexibility to blend beyond E10
  - E85
  - Enhanced blends (E10 to E20)?
- Must allow best economics for local markets

# Terminal Blending



# Ethanol in Pipelines

There are

**No Technical Barriers**

to moving ethanol in pipelines.

(But we do need more research  
to address the operating conditions)

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## Ethanol in Pipelines - Economics

