



# Lead Commissioner Workshop on Advanced Ethanol Production in California

August 1, 2012

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*California Energy Commission*

Please note that this WebEx session is being recorded.



# Workshop Overview

- Purpose and structure of the workshop
- Primary questions of interest
- Public comments
- California Ethanol Producer Incentive Program (CEPIP) review
- Ethanol plant profitability
- Potential crush spread formula modifications
- Ethanol oversupply
- Ethanol “blend wall” – efforts to raise level to E15
- Increasing corn costs
- Drought continues
- AB118 strategic goals & biofuel investments



# Purpose & Structure of Workshop

- Discuss advanced biofuel (ethanol) and the California Ethanol Producer Incentive Program (CEPIP) funding and the future role and prospects of biofuel production in California
- Gather information to assist Commissioners and staff to:
  - Evaluate policy and market drivers of commercial ethanol production,
  - Assess project and industry economics, and
  - Understand the policy implications and investments needed to spur the commercialization of advanced biofuel production in California
- Three moderated panels
  - Corn ethanol production and co-products
  - Biofuel market outlook and government policies
  - Advanced biofuel production projects in California and tie-in to existing ethanol plants



## Primary Questions of Interest

- How do CEPIP funds for corn ethanol production plants accelerate commercial-scale production of advanced biofuels in California?
- When will commercial-scale, low carbon advanced biofuel production in California occur?
- What barriers impede efforts to achieve commercial-scale advanced biofuel production and what other financial incentive mechanisms might help to overcome the barriers?
- What is the contribution of corn ethanol plants in terms of jobs and economic development in California?



## Primary Questions of Interest

- What is the contribution of corn ethanol plants in fulfilling policy goals such as the Low Carbon Fuel Standard?
- How much additional funding is needed for CEPIP, if any, and how much is needed for each facility?
- To what extent and when will the growth of E15 blends or other factors affect nationwide ethanol pricing and diminish the need for CEPIP incentives?
- How does the recent heat wave in the Midwest affect corn pricing and the ethanol production “crush spread” price?



# Public Comments

- Lead Commissioner for Transportation will accept oral comments during the public comments portion of the workshop
- Comments may be limited to 5 minutes per speaker
- Any comments will become part of the public record in this proceeding
- Written comments should be submitted to the Dockets Unit by 5 p.m. on August 17, 2012
- Written comments will be also accepted at the workshop
- Two comment periods
  - Before lunch
  - Conclusion of panel discussions



# CEPIP Review

- Purpose of the program is to provide a process for California biorefiners to reduce their environmental footprint
- Program will result in reduced greenhouse gas emissions from California facilities
- Program will initiate a transition away from food crops and result in an increased use of local waste-based or energy crops
- Provide payments to California ethanol producers under specific unfavorable market conditions
- In return, require reimbursement by participants to the PIP Trustee of any outstanding PIP payment balances under specifically identified favorable market conditions
- No other program in the United States has these unique attributes



# CEPIP Review

- The 2008-2009 FY Investment Plan cycle allocated \$6 million for this funding solicitation
- Three California facilities participating in CEPIP
  - Aemetis Keyes facility
  - Calgren Pixley facility
  - Pacific Ethanol Stockton facility
- Nearly \$6 million CEPIP payments to date
  - Initial payment occurred January 2011
  - Initial funding exhausted within three months
  - No additional funding provided beyond initial solicitation
- No reimbursement for CEPIP payments to date
  - Sustained unfavorable market conditions
  - Excess domestic ethanol supply & high feedstock costs



# Ethanol Plant Profitability

- Ethanol plant profitability dictated by changing market conditions
  - Corn prices (costs) primarily impacted by
    - End-of-season inventory levels
    - New crop projections
  - Ethanol prices (revenue) primarily impacted by
    - Excess production capacity
    - Changing demand
- Additional revenue streams provide important income
  - Wet distillers grain (WDG)
  - Corn oil
- Ethanol plant profitability has recently declined
  - Has resulted in temporary closure of some U.S. ethanol plants
  - Nearly 9 percent of U.S. production capacity



# Ethanol Crush Spread

- Ethanol “crush spread” is one measure of fluctuating profitability
  - Essentially a difference between ethanol revenue and corn costs
  - One bushel of corn can be converted to 2.74 gallons of ethanol
- Current crush spread formula

Formula: [OPIS Ethanol - (CBOT Corn/2.74)] **Cents per Gallon**  
OPIS Ethanol = Average of Daily Los Angeles Ethanol Railcar Prices  
CBOT Corn = Average of the Daily Month-Ahead Values  
CBOT = Chicago Board of Trade

- Formula does not account for additional revenue and costs
  - WD revenue far exceeds natural gas costs



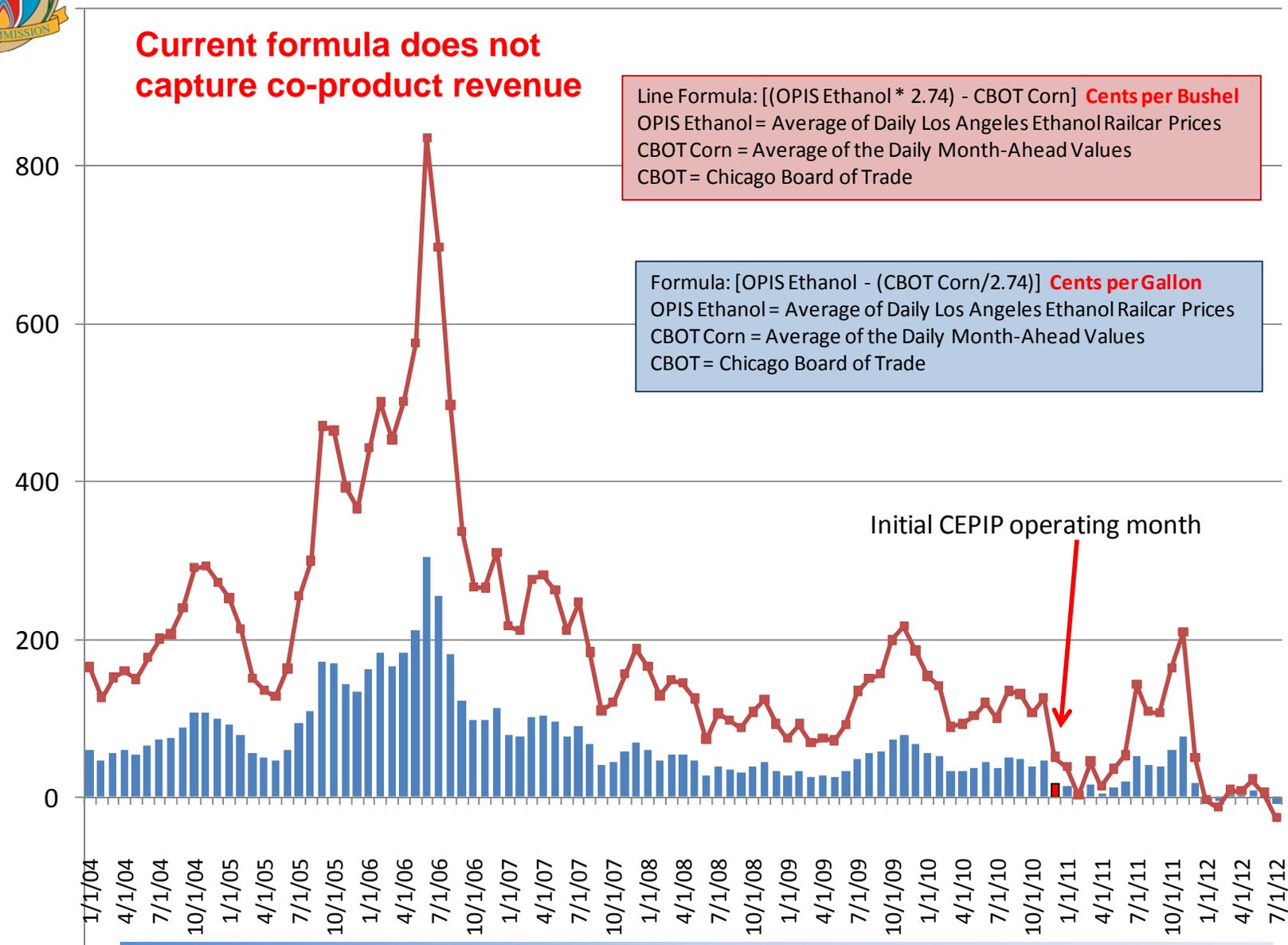
# CA Ethanol Crush Spread – Under Pressure

**Current formula does not capture co-product revenue**

Line Formula:  $[(\text{OPIS Ethanol} * 2.74) - \text{CBOT Corn}]$  **Cents per Bushel**  
 OPIS Ethanol = Average of Daily Los Angeles Ethanol Railcar Prices  
 CBOT Corn = Average of the Daily Month-Ahead Values  
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Formula:  $[\text{OPIS Ethanol} - (\text{CBOT Corn}/2.74)]$  **Cents per Gallon**  
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Crush Spreads (Cents Per Gallon & Bushel)

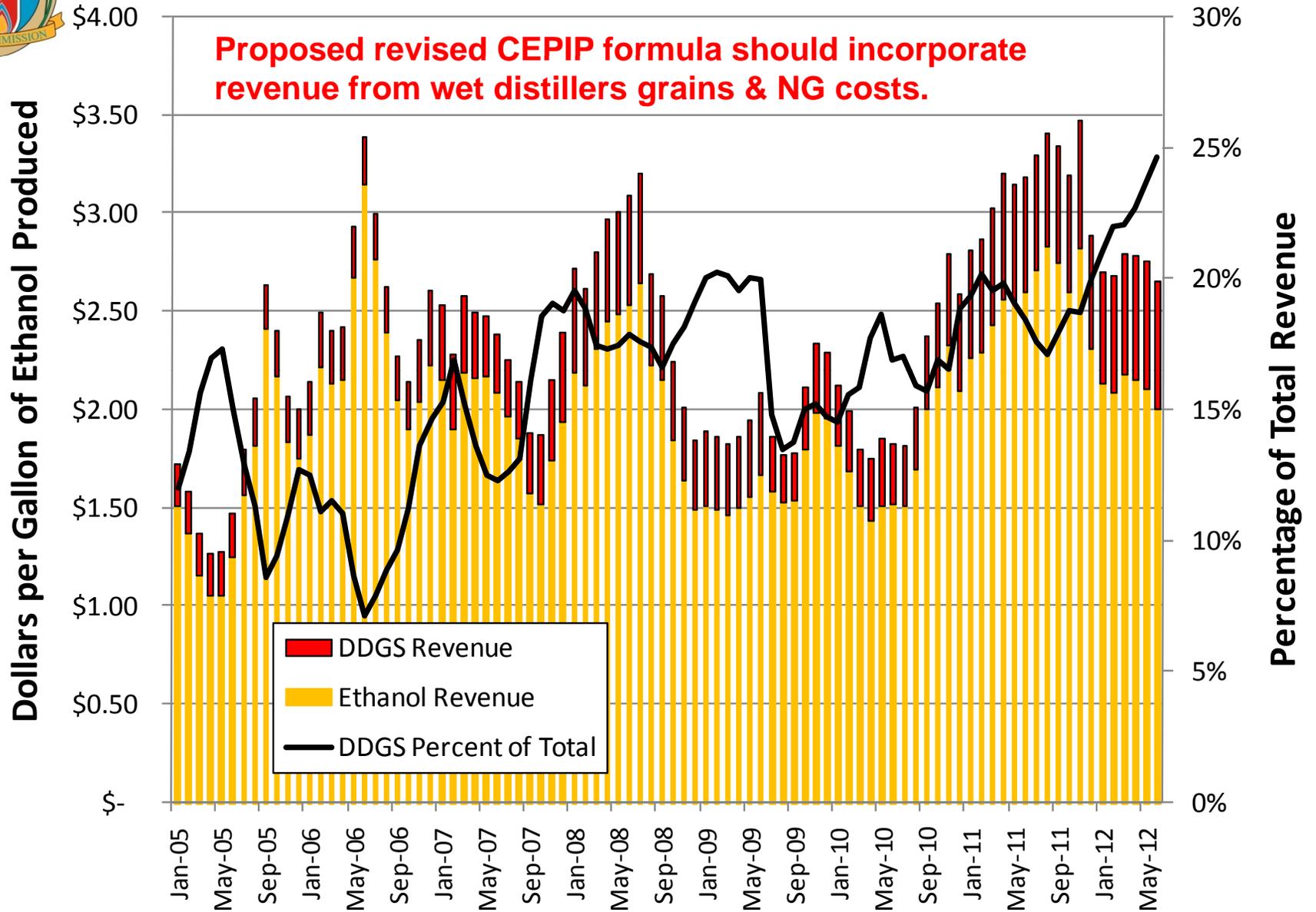


Initial CEPIP operating month

8/1/2012



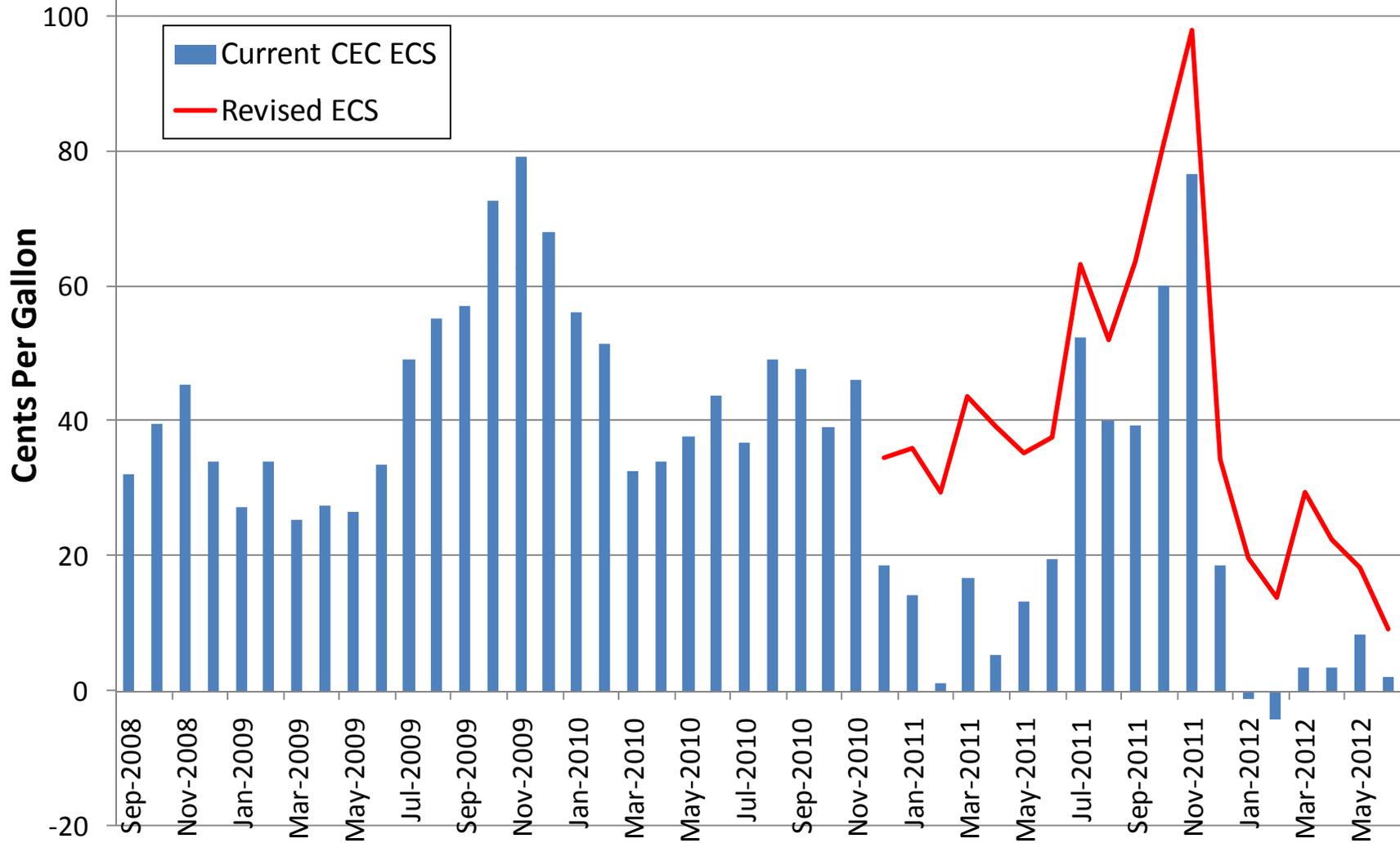
# U.S. Growing Importance of DGS Revenue





# Ethanol Crush Spread – Revised Formula

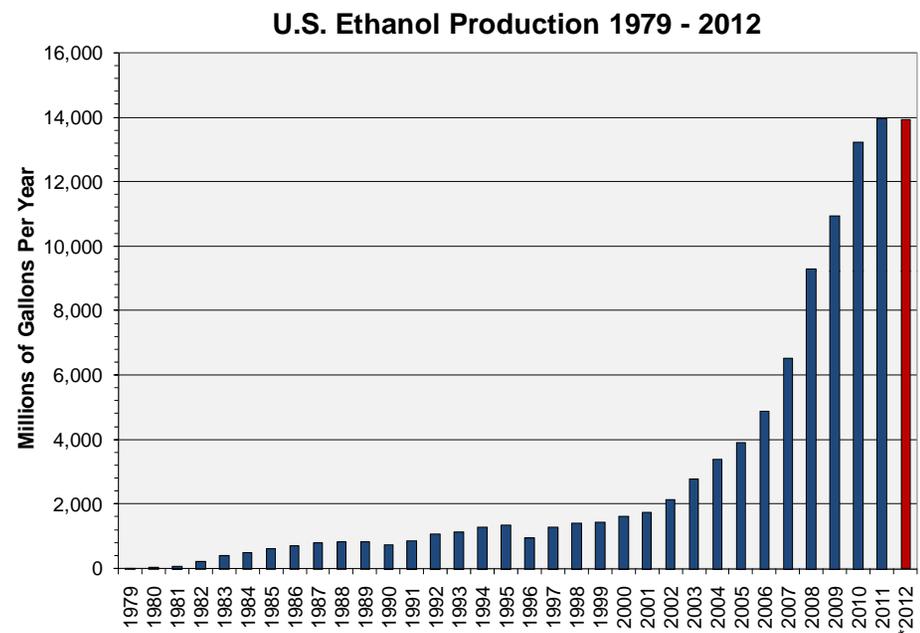
More accurately reflects profitability of California ethanol producers.





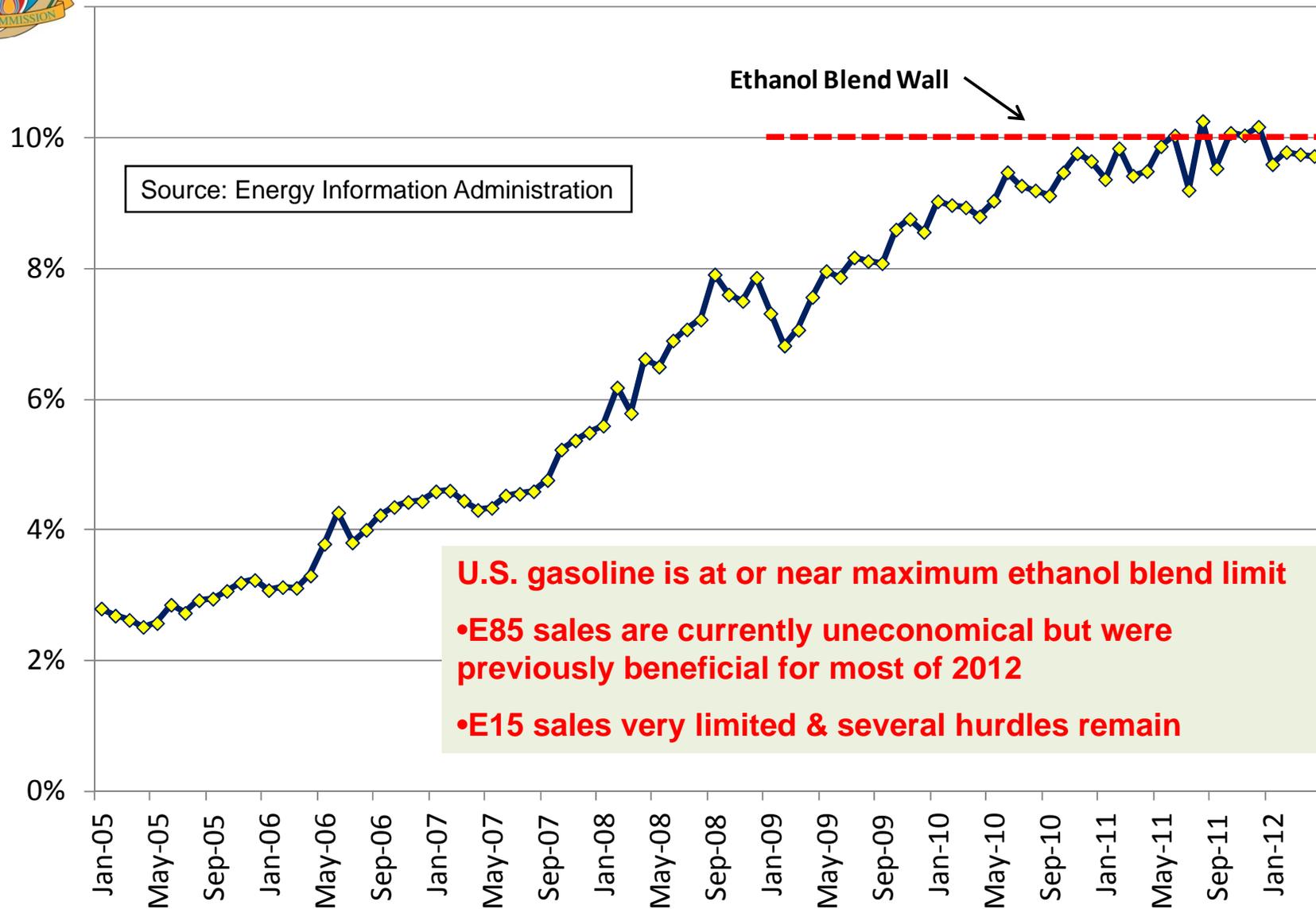
# Ethanol Oversupply

- Ethanol production in the United States has been growing
  - Federal and state mandates
  - Transition away from MTBE
- Will plateau
  - RFS2 limit
  - Declining gasoline demand
  - Current 10 percent limit
- Excess supply has resulted
  - Lower market-clearing prices
  - U.S. has transitioned to net exporter
- Negatively impacted ethanol producers' profitability





# U.S. Ethanol Concentration in Gasoline

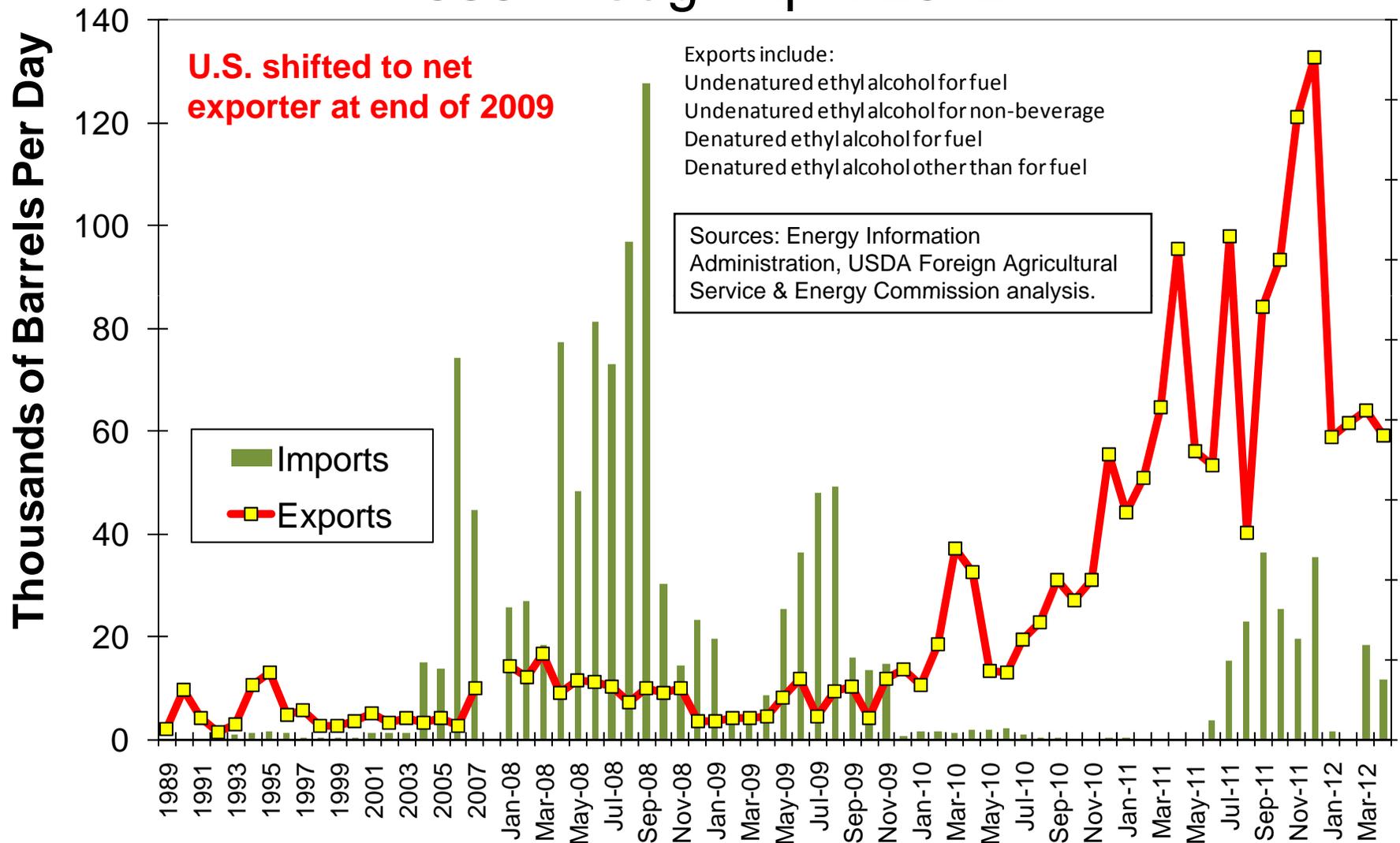


**U.S. gasoline is at or near maximum ethanol blend limit**

- E85 sales are currently uneconomical but were previously beneficial for most of 2012
- E15 sales very limited & several hurdles remain



# U.S. Imports & Exports Ethanol 1989 through April 2012





# Ethanol Blend Wall

- On March 6, 2009, Growth Energy and 54 ethanol producers requested U.S. EPA to allow for higher blends of ethanol in gasoline – greater than the 10 percent “blend wall”
- U.S. EPA issued decision of partial waiver approval on October 13, 2010 – not a requirement to use E15
- Approval limited to light-duty vehicles & medium-duty passenger vehicles, MY2001 and newer
  - 67.2 percent of existing car and light truck fleet for 2011
  - Excludes MY2000 and older vehicles, marine engines, motorcycles, heavy-duty vehicles, and non-road equipment

TABLE VI.C.3-1—PROJECTED POPULATION OF CARS AND LIGHT TRUCKS BY MODEL YEAR IN 2011

Model year	Cars	Light trucks	Cars and trucks combined	Cumulative total
2000 and earlier .....	41,548,800	32,162,084	73,710,884	73,710,884
2001–2006 .....	46,567,413	38,594,752	85,162,165	158,873,049
2007–2011 .....	39,068,213	26,755,598	65,823,812	224,696,860
<b>Total .....</b>	<b>127,184,425</b>	<b>97,512,435</b>	<b>224,696,860</b>	

Source: EPA's vehicle certification data and Mobile Vehicle Emissions Simulator (MOVES) model.

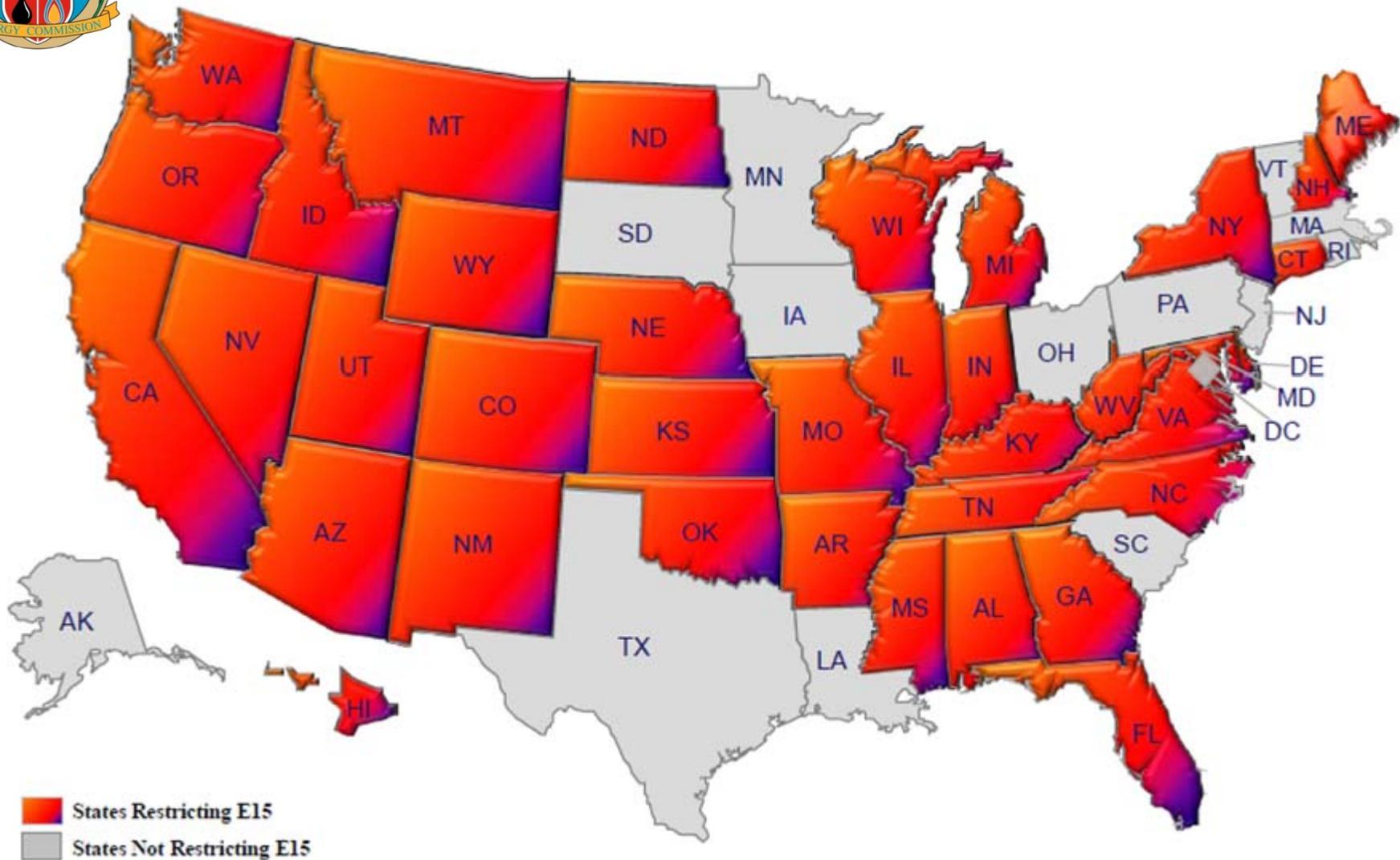


## E15 – Recent Events & Potential Demand

- U.S. EPA approves E15 misfueling mitigation plans – June 15
  - 56 E15 registration applications approved through July 13
- Retail E15 sales begin at service station – July 11
  - Zarco 66 station located in Lawrence, Kansas is first in nation
- Theoretical maximum incremental ethanol demand volume in excess of 4.0 billion gallons
  - 2011 ethanol use in U.S. approximately 13.1 billion gallons
  - 2011 exports exceeded 900 million gallons
    - Would require 25 percent penetration to eliminate exports
- Volume will not quickly approach this higher quantity for several reasons...



# 37 States With E15 Blending Restrictions



States Restricting E15  
States Not Restricting E15

Note: Does not include EPA RVP Waiver for Conventional Gasoline or Federal RFG  
\* Illinois adoption of 2010 HB 130 effective May 1, 2011 / Washington effective June 1, 2011

Herman & Associates  
www.HermanAssociates.com  
October 2010



# E15 – Specific State Restrictions

VOLUME BLENDING CAPS	OXYGEN CAPS	WAIVER CAPS* RVP T50 T V/L=20	ETHANOL MANDATE CAPS	ASTM D4814 (MOST CURRENT)	2010 NIST HB (MOST CURRENT)	LOW-RVP WAIVER CAPS (SUMMER – SIPs)
Arizona Arkansas California Delaware Florida Illinois (Effective May 1, 2011) Maine Missouri Nevada New Hampshire New York North Dakota Oklahoma Tennessee Virginia Washington (Effective June 1, 2011) West Virginia Wisconsin	Arizona California Michigan Missouri	Alabama Arizona Arkansas California Colorado Connecticut Florida Georgia Illinois Iowa Kentucky Maine Maryland Michigan Mississippi Missouri Nevada New Hampshire New Mexico North Carolina North Dakota Oklahoma Tennessee Utah Virginia West Virginia	Florida (Effective December 31, 2010) Hawaii Missouri Montana Oregon	Arkansas California Colorado Connecticut Delaware Illinois Kansas Kentucky Louisiana Maine Mississippi Missouri Montana Nevada New Hampshire New Mexico New York (Suffolk County) North Carolina Ohio (Summit County) South Carolina Tennessee Utah Virginia Washington West Virginia Wyoming	Arkansas Illinois (Effective May 1, 2011) Kansas Maine New Hampshire Virginia Washington (Effective June 1, 2011) West Virginia	Alabama Georgia Illinois Indiana Kansas Michigan Missouri Ohio Alabama (Birmingham & Shelby Counties) Georgia (Atlanta) Illinois (Madison, Monroe & St. Clair Counties) Indiana (Clark & Floyd Counties) Kansas (Kansas City (Johnson & Wyandotte Counties)) Michigan (Wayne, Oakland, Macomb, Livingston, St. Clair, Monroe, Washtenaw & Lenawee Counties) Missouri (Kansas City (Clay, Platte & Jackson Counties)) Ohio (Cincinnati / Dayton (Hamilton, Butler, Warren, Clermont, Montgomery, Miami, Greene & Clark Counties))

\*Note: Does not include EPA RVP Waiver for Conventional Gasoline or Federal RFG

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## E15 Waiver – Other Challenges Await

- Federal RFS Complex Model regulations would need to be revised – 1/3 of gasoline – proposed in waiver
- Rvp waiver for conventional gasoline during summer months would not be allowed – refiners would need to produce more expensive (lower Rvp) base gasoline
- Segregated storage and UL-approved dispensers required in most cases
- **No vehicle warranties allow ethanol blends in excess of 10 percent by volume**

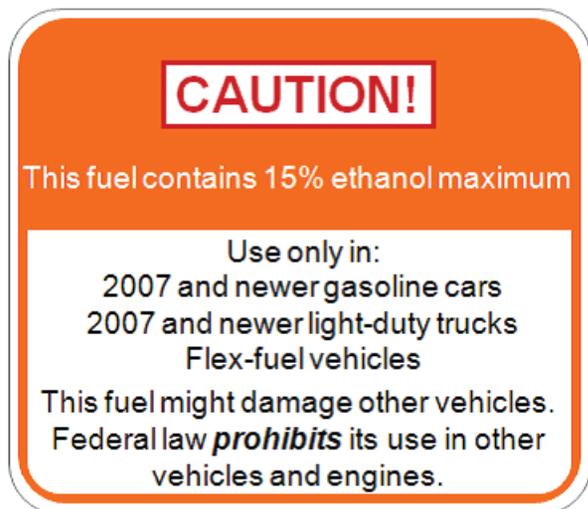




## E15 Waiver – Disincentives



- No liability protection provided by Congress against mis-fueling & potential vehicle damage claims for vehicles prior to MY2001
- Pump labels will not be sufficient to prevent mis-fueling by consumers
- Potential benefit of lower-cost ethanol blendstock unlikely to offset increased infrastructure costs, liability exposure and limited customer base





## E15 Waiver – Other Challenges Await

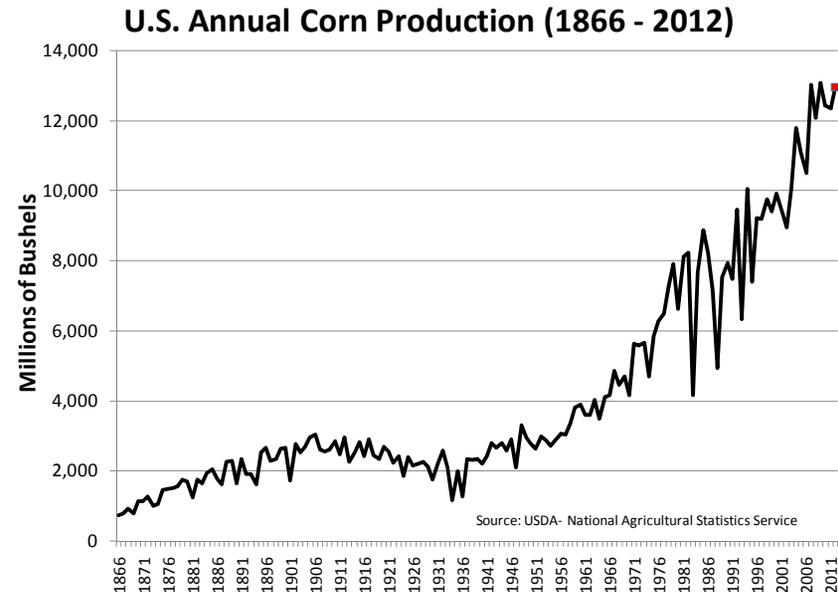
- California has its own reformulated gasoline regulations
- Predictive Model predicated on equations from CA vehicle testing of gasoline with ethanol no greater than 10 percent
- New testing of vehicles & development of new equations, assuming no deleterious emission impacts, would take time – at least three years
- Arizona & Nevada have similar challenges





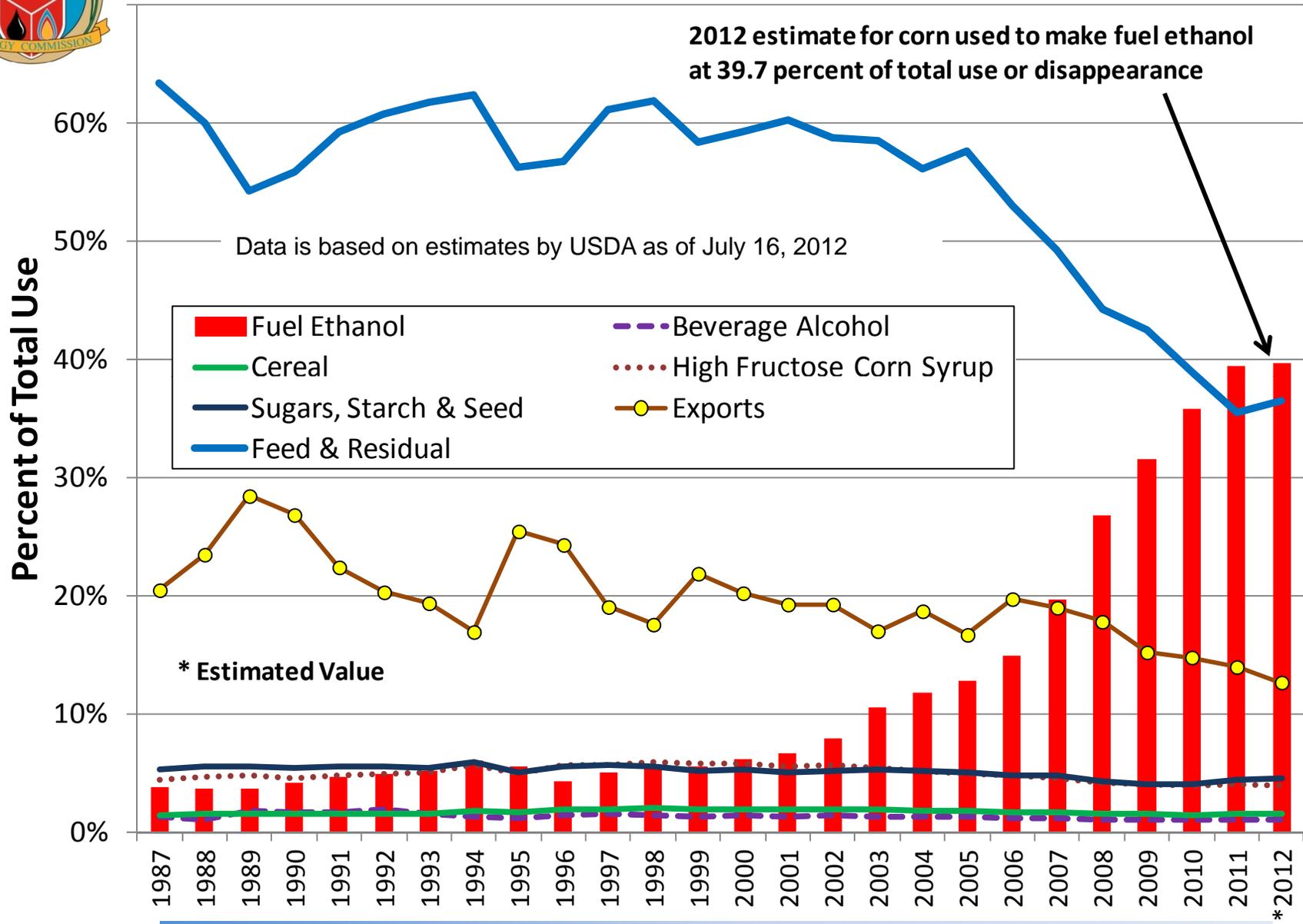
# Increasing Corn Costs

- Corn production in the United States has also been growing
  - Increased demand
  - Driven by higher ethanol use
- 2012 outlook declining
  - Robust early season projections
  - Weather conditions worsening
  - Worsening crop conditions
- Tightening supply has resulted
  - Yield & harvest volumes declining
  - Higher market-clearing prices
- Negatively impacted ethanol producers' profitability



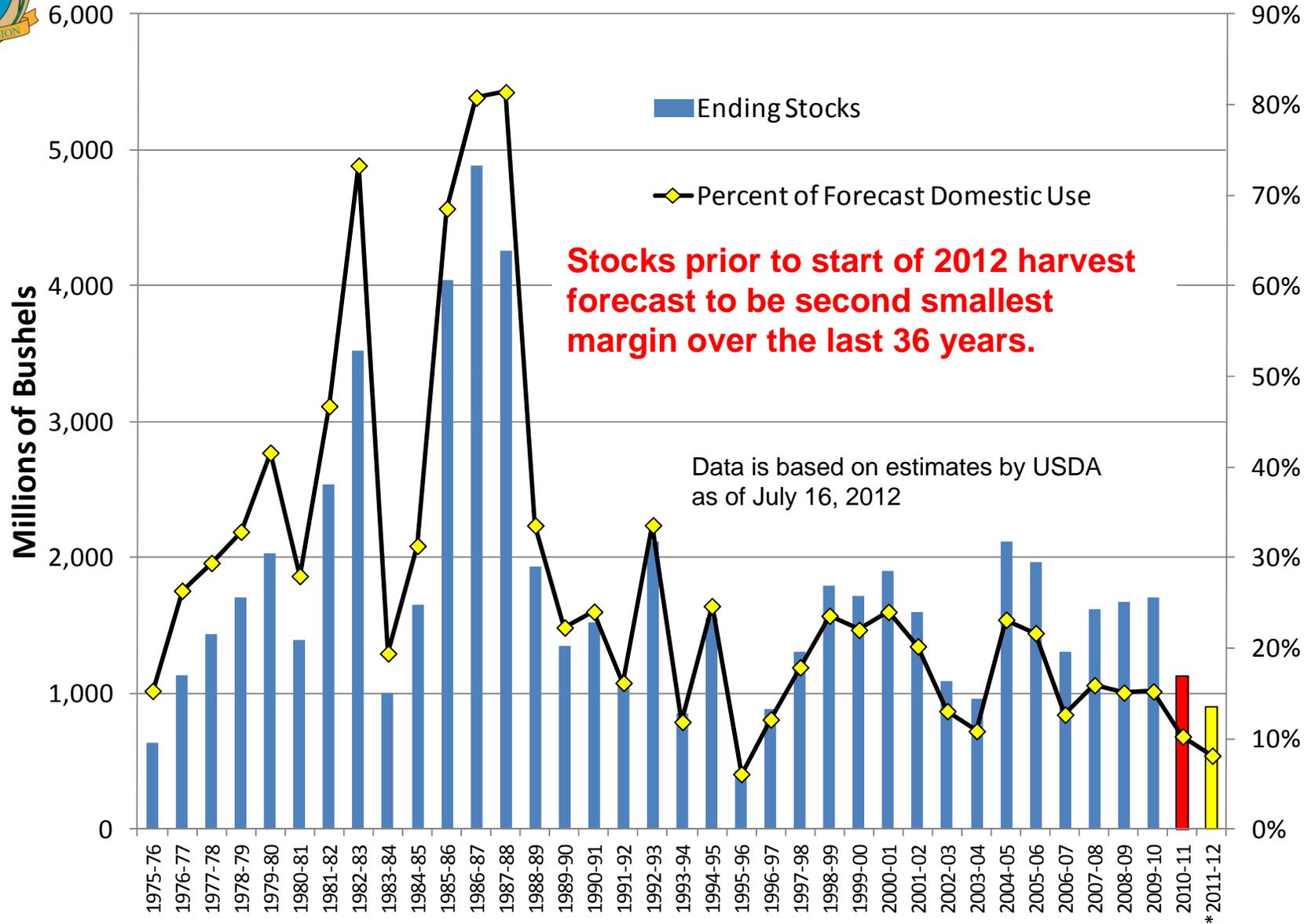


# U.S. Corn End Use – Percent of Supply





# U.S. Corn Ending Stocks





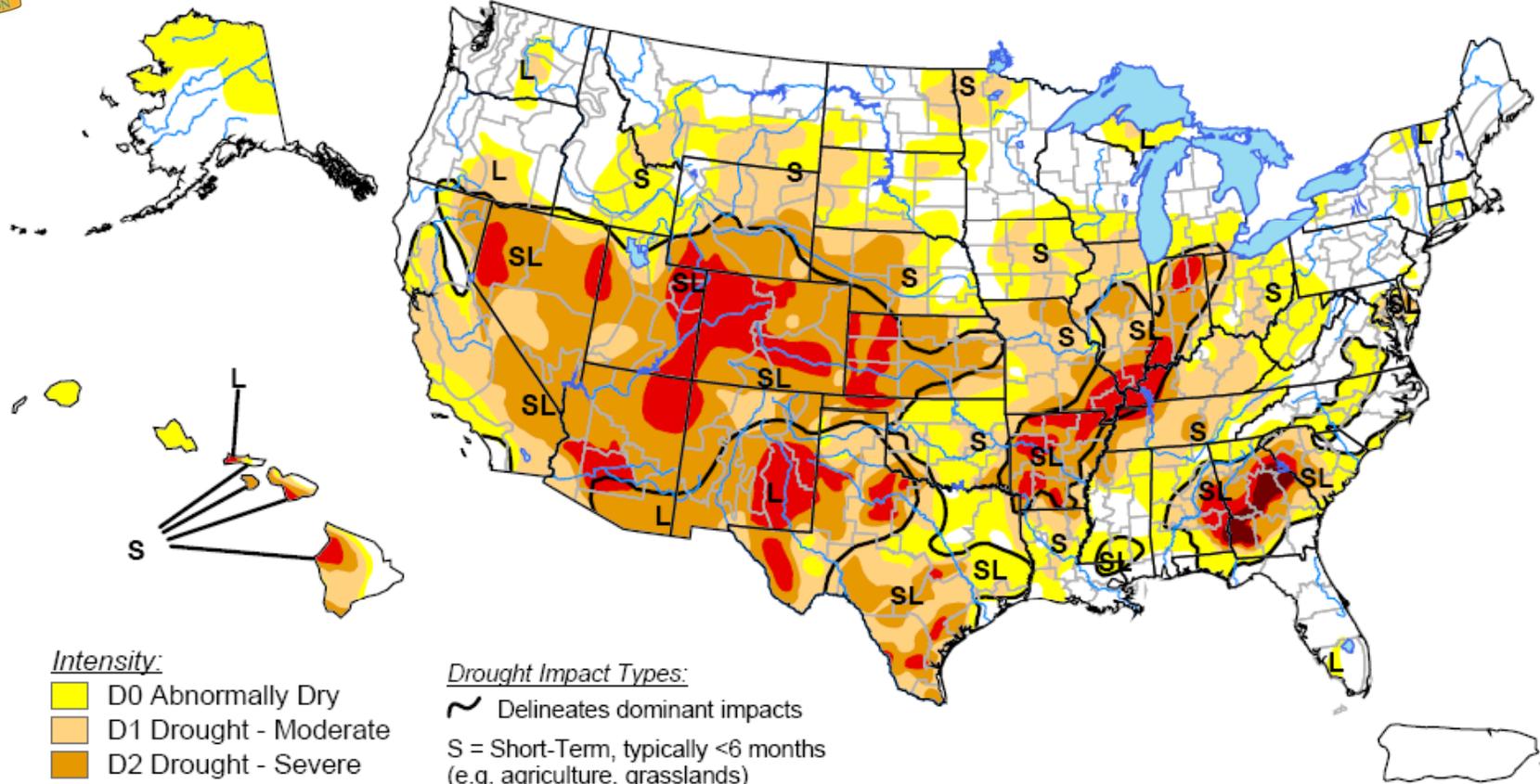
# Drought Continues





# U.S. Drought Monitor

June 26, 2012  
Valid 7 a.m. EDT



Intensity:

- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

Drought Impact Types:

- Delineates dominant impacts
- S = Short-Term, typically <6 months (e.g. agriculture, grasslands)
- L = Long-Term, typically >6 months (e.g. hydrology, ecology)

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

<http://droughtmonitor.unl.edu/>



Released Thursday, June 28, 2012

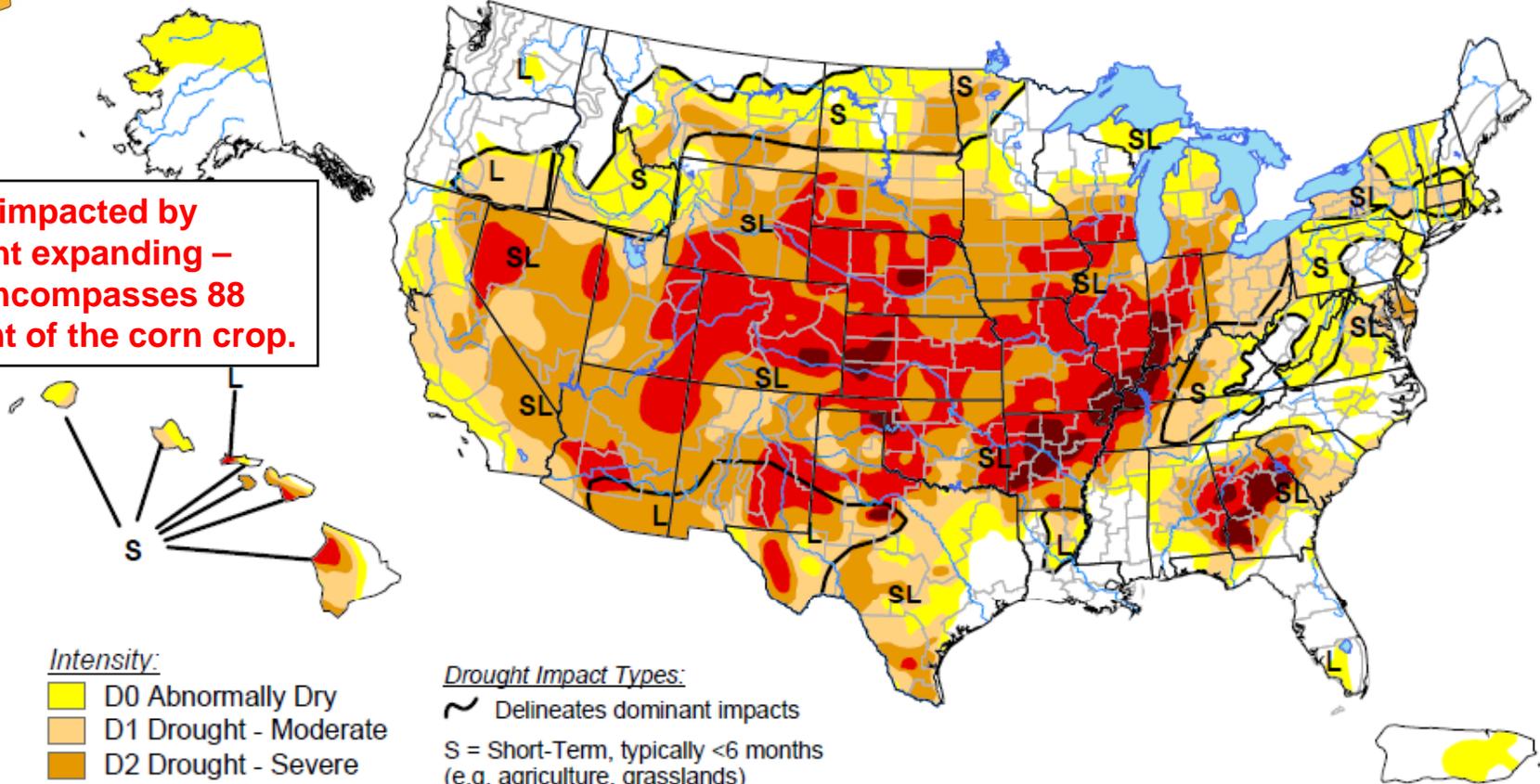
Author: Richard Heim/L. Love-Brotak, NOAA/NESDIS/NCDC



# U.S. Drought Monitor

July 24, 2012  
Valid 7 a.m. EDT

Areas impacted by drought expanding – now encompasses 88 percent of the corn crop.



Intensity:

- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
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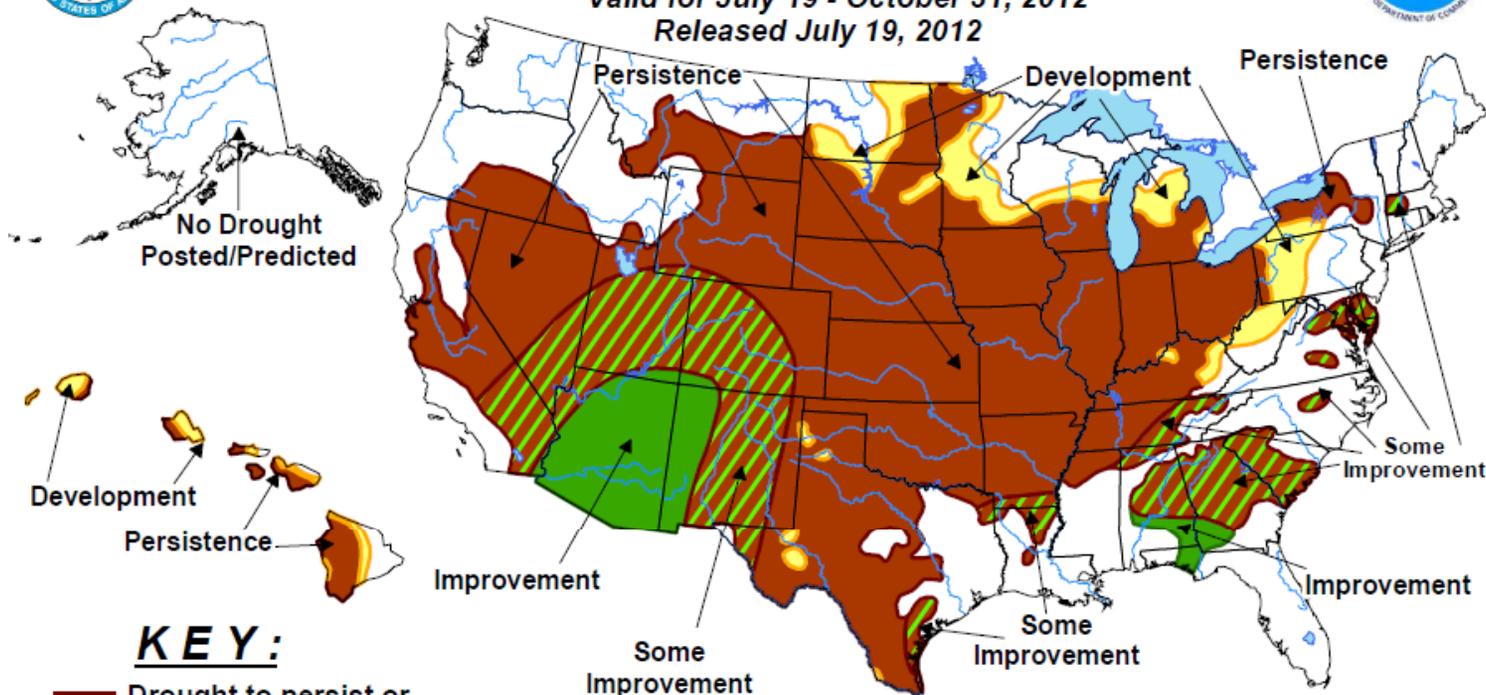


Released Thursday, July 26, 2012  
Author: Richard Heim, NOAA/NESDIS/NCDC



# Not Much Relief in Sight

## U.S. Seasonal Drought Outlook Drought Tendency During the Valid Period Valid for July 19 - October 31, 2012 Released July 19, 2012



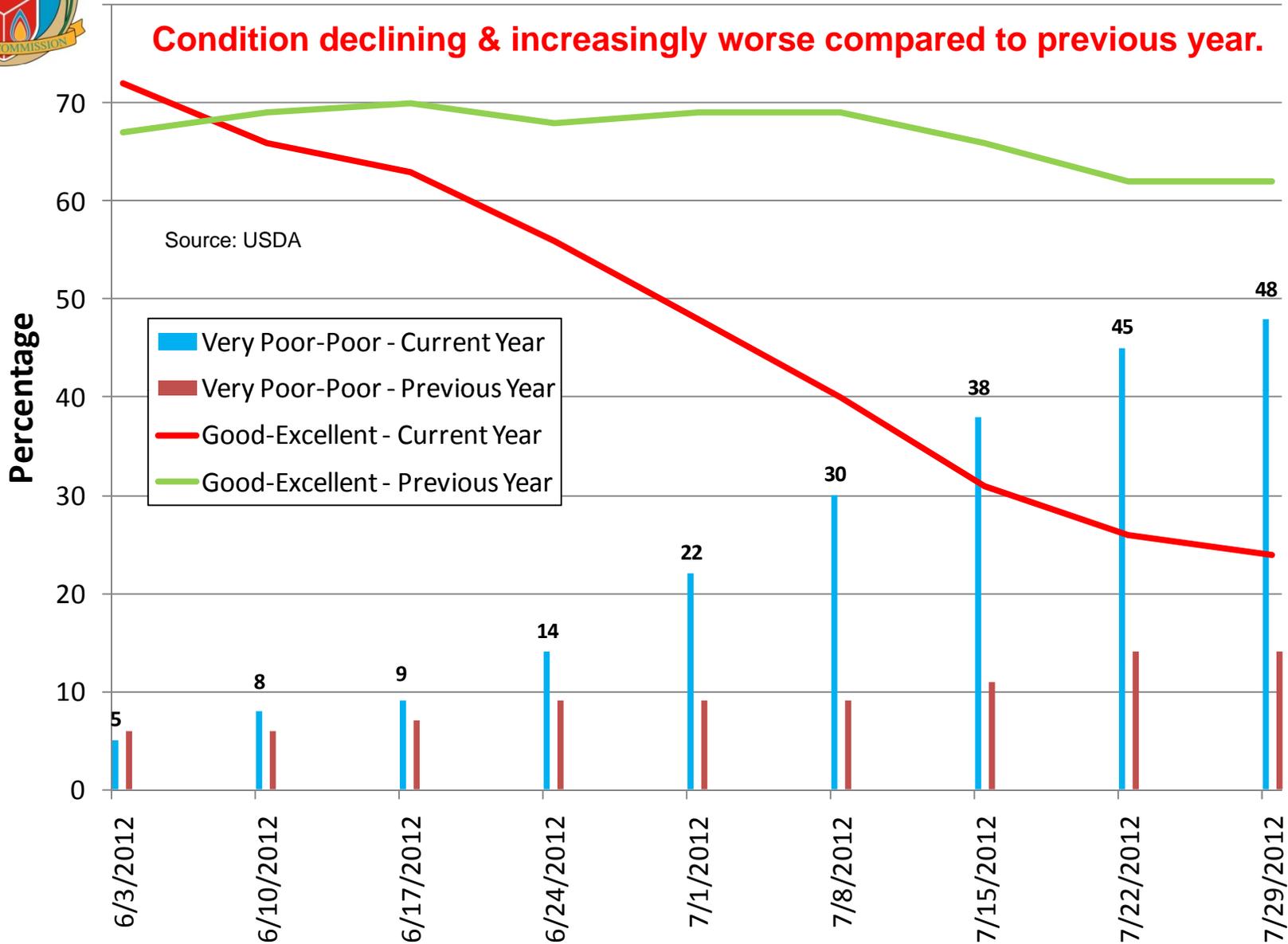
- KEY:**
- Drought to persist or intensify
  - Drought ongoing, some improvement
  - Drought likely to improve, impacts ease
  - Drought development likely

Depicts large-scale trends based on subjectively derived probabilities guided by short- and long-range statistical and dynamical forecasts. Short-term events -- such as individual storms -- cannot be accurately forecast more than a few days in advance. Use caution for applications -- such as crops -- that can be affected by such events. "Ongoing" drought areas are approximated from the Drought Monitor (D1 to D4 intensity). For weekly drought updates, see the latest U.S. Drought Monitor. NOTE: the green improvement areas imply at least a 1-category improvement in the Drought Monitor intensity levels, but do not necessarily imply drought elimination.



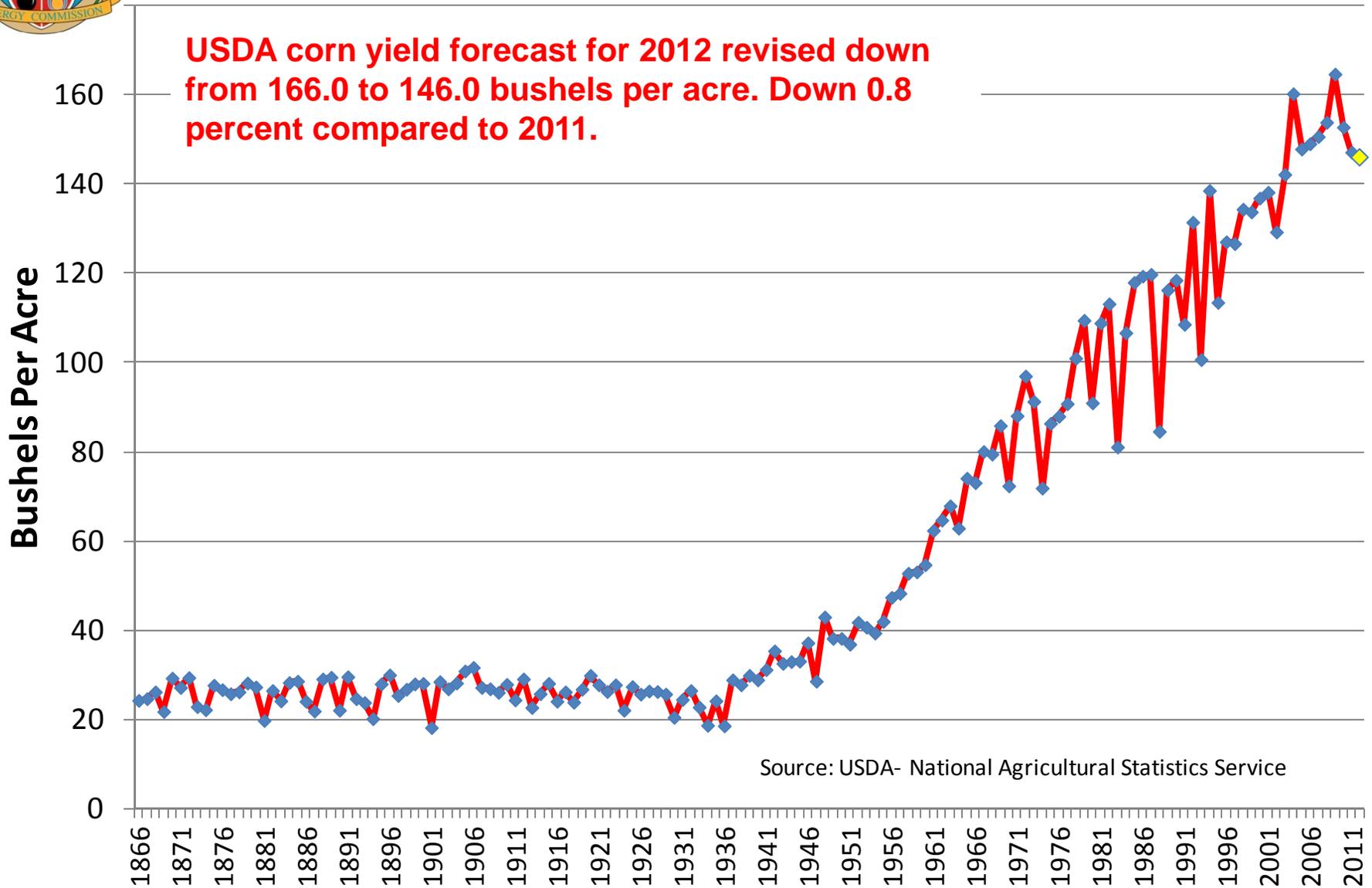
# U.S. Corn Crop Condition

**Condition declining & increasingly worse compared to previous year.**





# U.S. Annual Corn Yield (1866 - 2012)





# Corn Futures Price Exceeds \$8 per Bushel





# Alternative and Renewable Fuel and Vehicle Technology Program - Biofuels Investments

- AB 118 Strategic Goals
  - Build capacity of California firms to produce second and third generation biofuels using advanced process technologies and waste-based and alternative feedstocks
  - Move California away from initial investments in first generation corn- and soy-based biofuels
  - Leverage knowledge, technologies and feedstocks from current biofuel production base
- Resource Potential
  - California waste-based feedstock potential for 2.7 to 3.1 billion gallons of fuel per year according to the *UC Davis California Biomass Collaborative Report*



# Biofuels Investment Summary

- \$108 Million in Allocations over 4 Investment Plans
  - \$70.5 Million in Funding for 25 projects
- Biogas Production
  - 10 projects totaling \$41.3 million
- Biodiesel and Renewable Diesel
  - 8 projects totaling \$10.5 million
- Ethanol
  - 6 projects totaling \$12.6 million
- CEPIP
  - 3 grants totaling \$6 million



# Questions?

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