Infrastructure & Demand Integration

Transportation Committee Workshop on Transportation Fuel Infrastructure Issues

Transportation Committee Workshop

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Transportation Energy Demand Forecast Post Processing Assumptions

- California will use “fair share” portion of the RFS2 renewable volume obligations – no use of RIN credits
- Significant downward revisions to the cellulosic biofuels portion of the RFS2 requirements anticipated but not assumed for purposes of calculating demand for specific types of renewable fuels
- E10 will remain the upper limit for low-level ethanol blends throughout the forecast period – no use of E15
- Current carbon intensities (CI) of transportation fuels assumed to remain unchanged over the forecast period
  - Recognize that the Indirect Land Use Change or ILUC portion for certain fuel pathways under the LCFS could be revised at a later date – ultimate impact on total CI values uncertain at this time

Renewable Fuels Standard (RFS2) – Increased Demand for Ethanol and Biodiesel

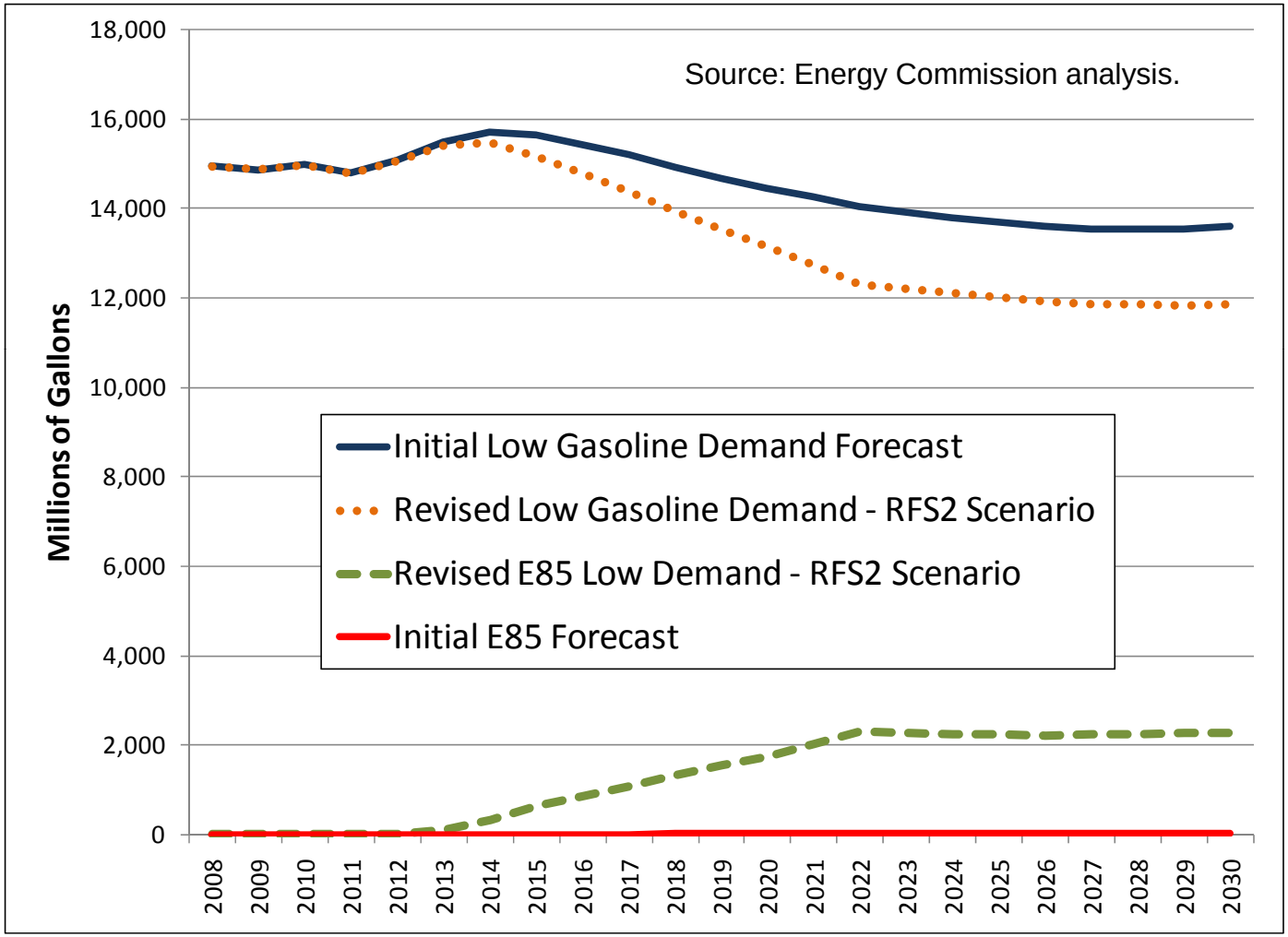
- Federal standard (RFS2) *mandates* increased use of renewable fuel – both ethanol and biodiesel
- Obligated parties include refiners, importers, and blenders
- Companies can generate Renewable Identification Number (RIN) credits for excess renewable fuel use or purchase credits
- Program is not a "per-gallon" regulation
- Regulation impacts can include:
  - Increased demand for & production of ethanol
  - Increased demand for ethanol feedstock such as corn
  - Displacement of gasoline
  - Need for expanded renewable fuel infrastructure

Renewable Fuels Standard (RFS2)

Year	Total Renewable Fuel Requirement Bil. Gallons	Starch Derived Biofuel Bil. Gallons	Advanced Biofuels			
			Cellulosic Biofuels Bil. Gallons	Other Advanced Biofuels Bil. Gallons	Biomass Based Diesel Bil. Gallons	Total Advanced Biofuels Bil. Gallons
2008	9.00	9.00				0.00
2009	11.10	10.50		0.10	0.50	0.60
2010	12.95	12.00	0.10	0.20	0.65	0.95
2011	13.95	12.60	0.25	0.30	0.80	1.35
2012	15.20	13.20	0.50	0.50	1.00	2.00
2013	16.55	13.80	1.00	0.75	1.00	2.75
2014	18.15	14.40	1.75	1.00	1.00	3.75
2015	20.50	15.00	3.00	1.50	1.00	5.50
2016	22.25	15.00	4.25	2.00	1.00	7.25
2017	24.00	15.00	5.50	2.50	1.00	9.00
2018	26.00	15.00	7.00	3.00	1.00	11.00
2019	28.00	15.00	8.50	3.50	1.00	13.00
2020	30.00	15.00	10.50	3.50	1.00	15.00
2021	33.00	15.00	13.50	3.50	1.00	18.00
2022	36.00	15.00	16.00	4.00	1.00	21.00

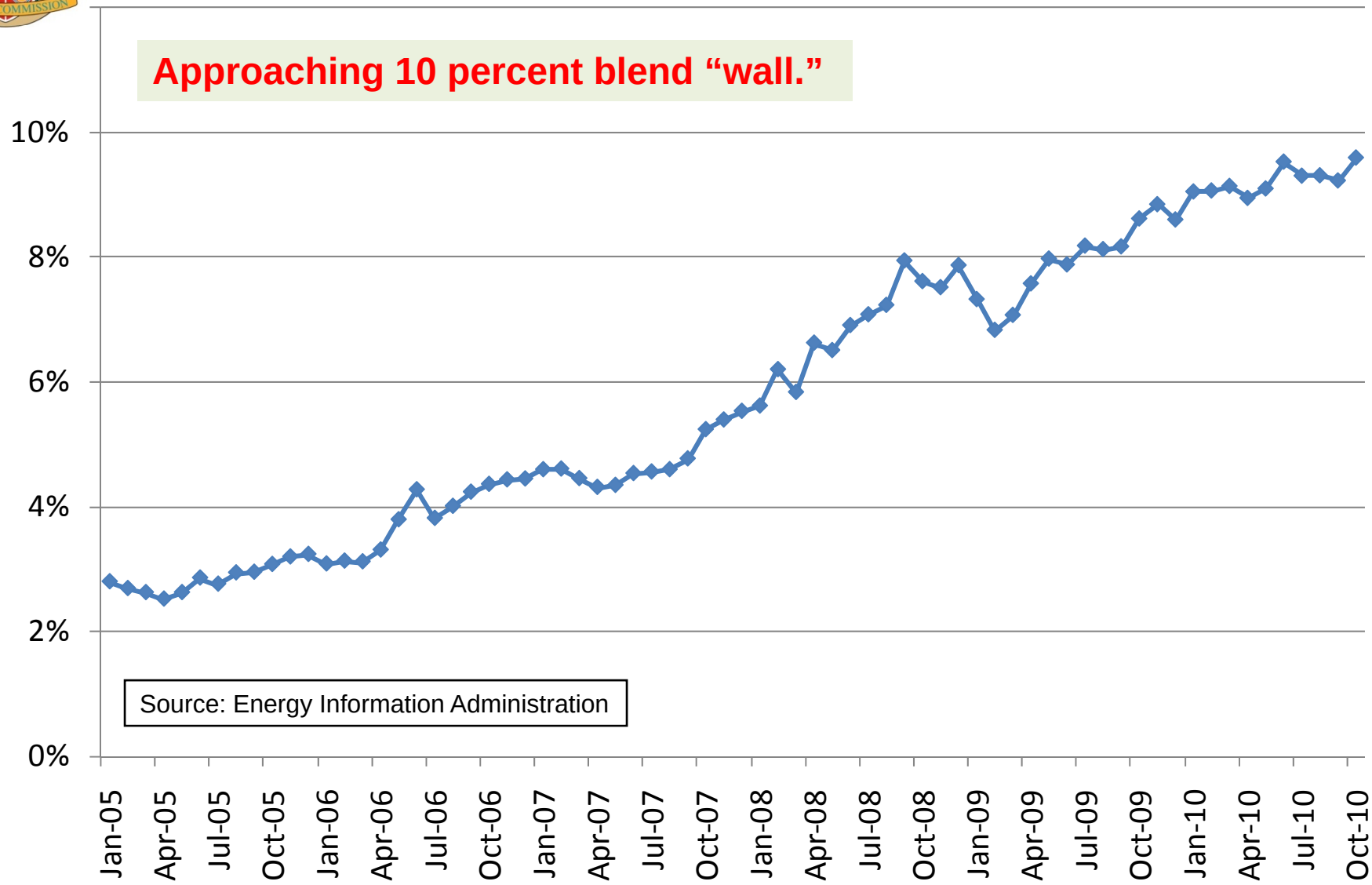
Cellulosic requirement downgraded to 6.0 million gallons for 2011.

RFS2 Impact on CA Gasoline Demand Forecast
2009 Results Will Be Updated

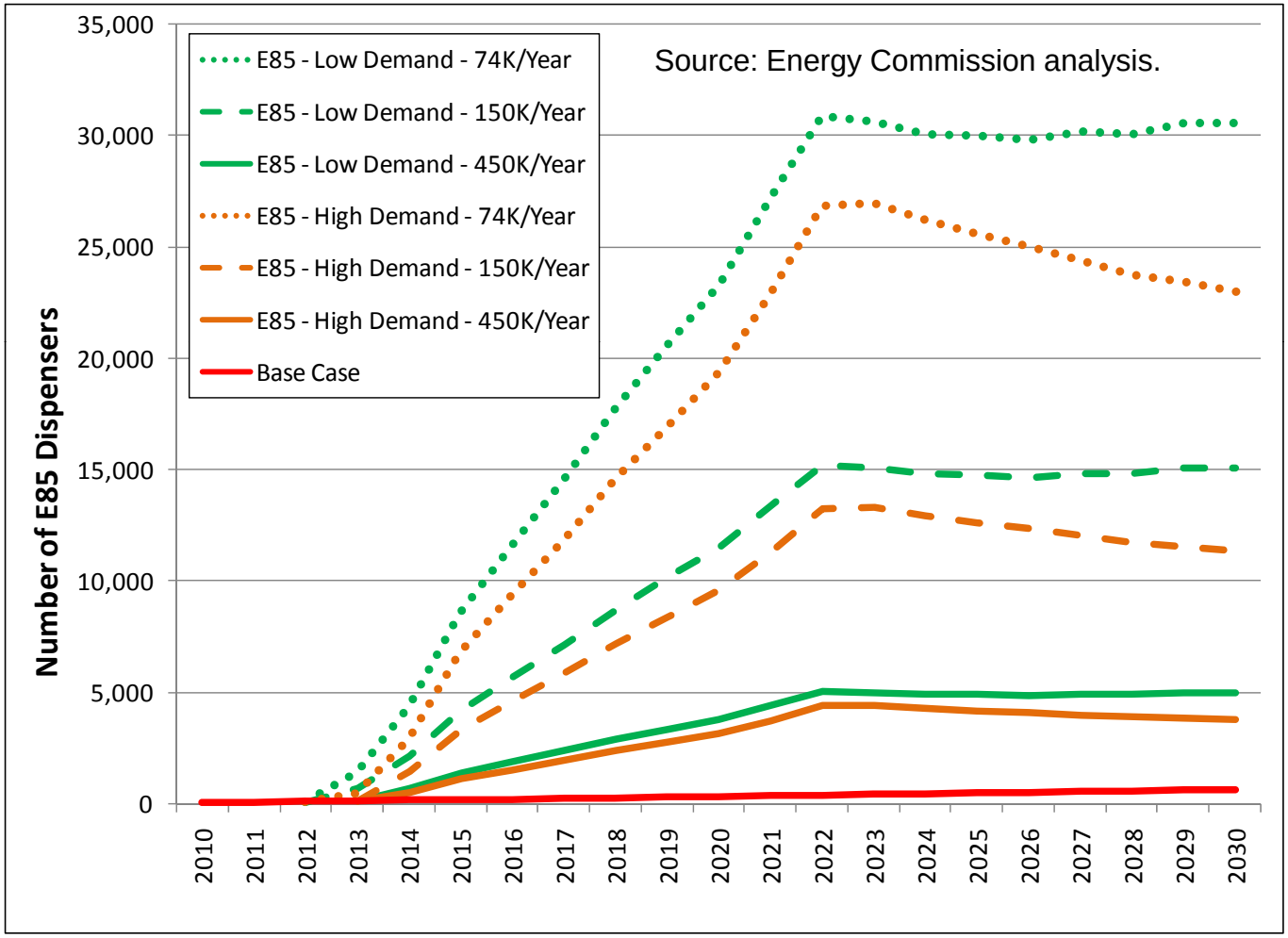


Can contribute to refinery overcapacity & E85 infrastructure constraints.

U.S. Ethanol Concentration in Finished Gasoline



RFS2 Impact on E85 Demand Forecast 2009 Results Will Be Updated



E15 not assumed to be available over the base case forecast period.

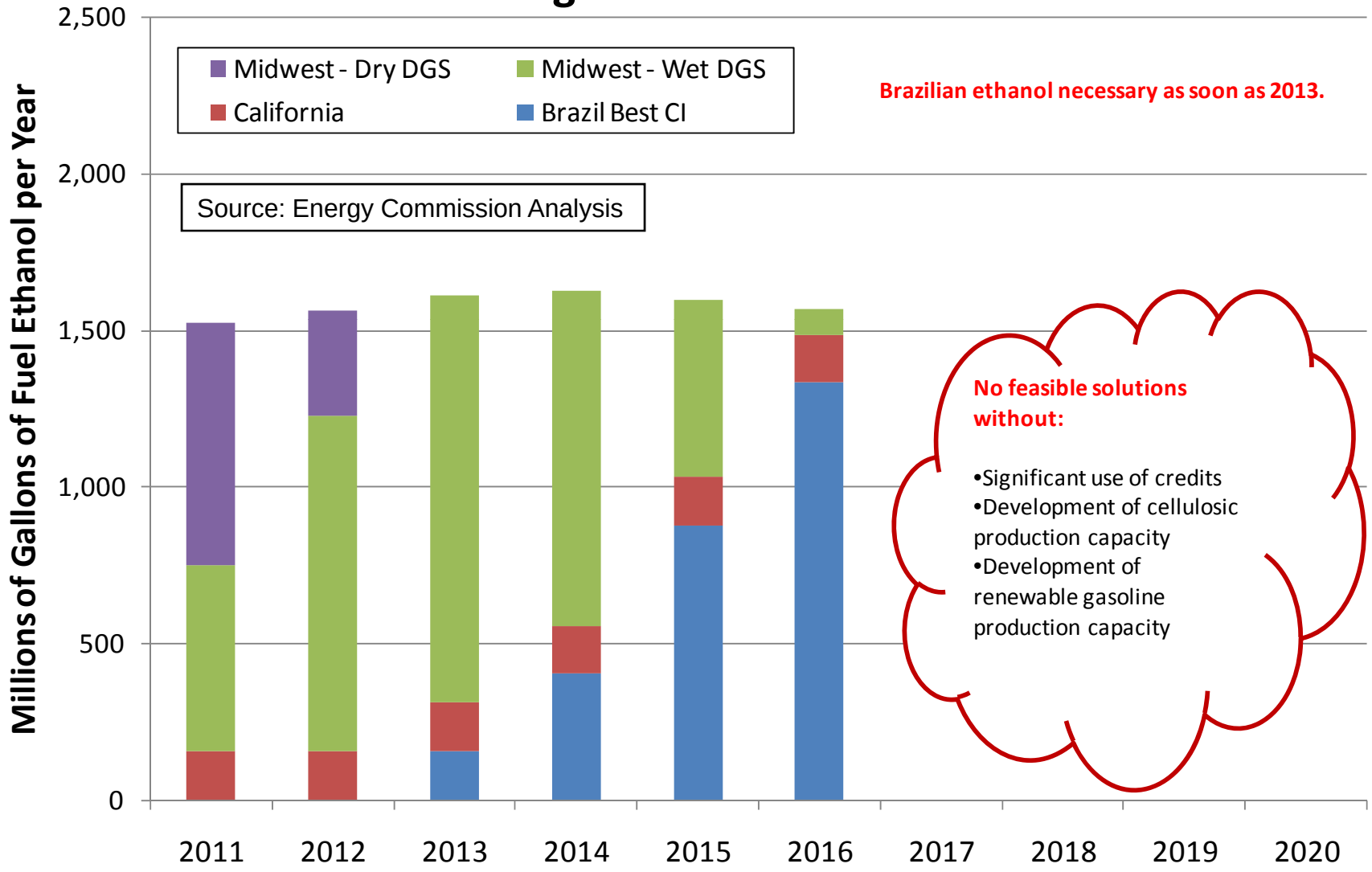
California LCFS - Overview

- California Air Resources Board regulation
- Designed to reduce the per-gallon carbon intensity of gasoline and diesel fuel – easier initially, then increasingly difficult
  - Does not apply to other transportation fuels such as jet fuel and bunker fuel
  - Does not apply to non-transportation fuel petroleum, e.g. lube oils
- LCFS compliance began January 1, 2011
  - However, regulation still not finalized
- Items that still need to be addressed
  - Credit trading system
  - Proposed screening for potential high-carbon intensity crude oils
  - Indirect Land Use Change impact reassessment – could be reduced by 50 percent

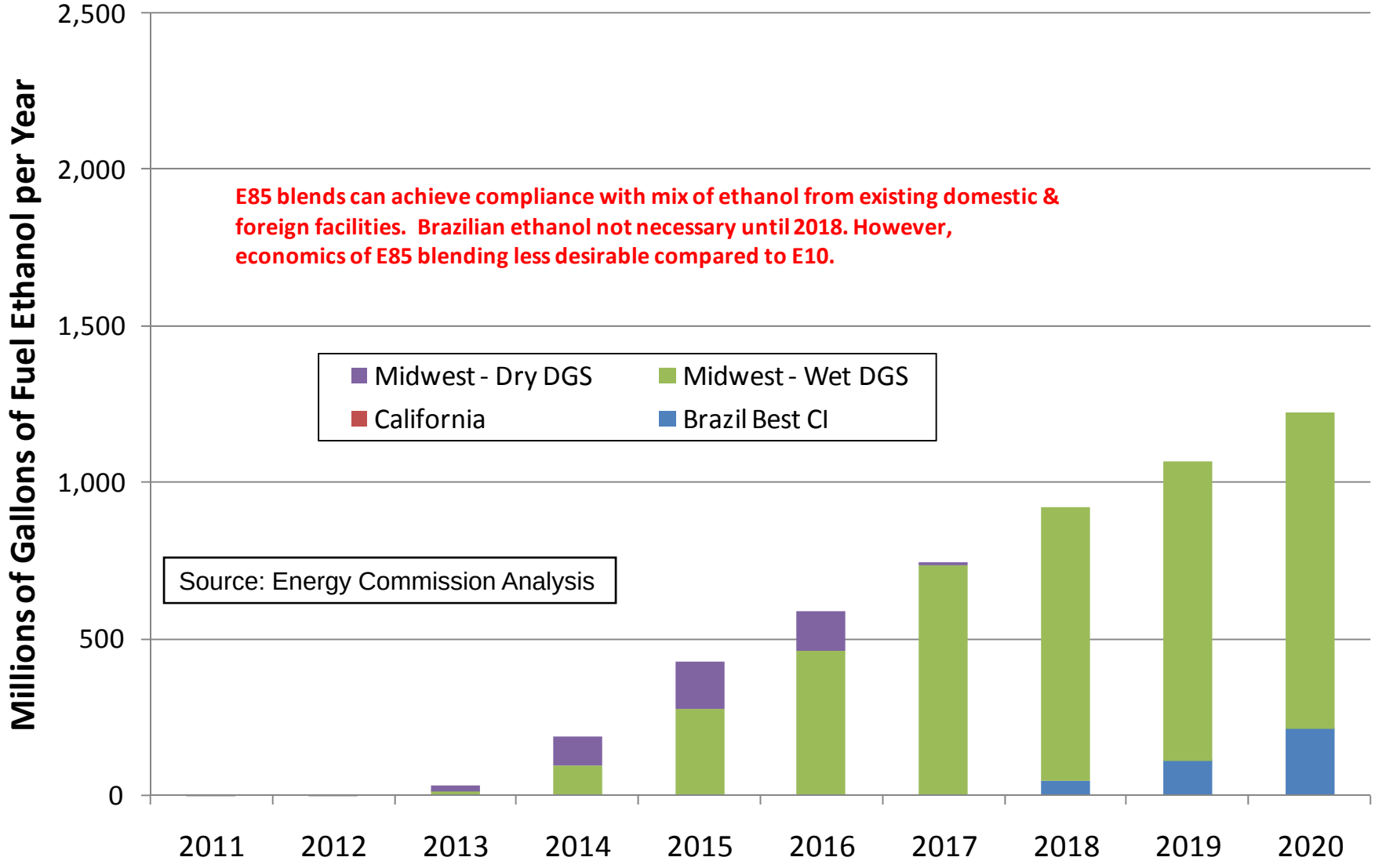
California LCFS – Preliminary Analysis

- CEC staff has performed initial analysis to determine what the expected mix of renewable fuels could be over the next 10 years
- Gasoline analysis – initial analysis complete
  - California continues to use E10 & E85 is used to comply with RFS2
  - Scenario – no credits generated each year
- Diesel analysis – not yet complete
  - Examining B5 and B10 upper blend limits
  - Attempting to quantify availability and credit trading mechanism for renewable diesel fuel – such as that produced by refineries
- Limiting factors emerge
  - Inadequate volumes of the renewable fuel with sufficiently low CI
  - Inability to comply during later years – no suitable blendstocks exist
- Gasoline & diesel fuel prices expected to increase
  - Magnitude of increase will depend on availability and price of biofuels

California LCFS - Ethanol Types
E10 - High Demand Forecast



California LCFS - Ethanol Types
E85 - High Demand Forecast



Gasoline Analysis – Concerns

- No feasible solution beyond 2016 for E10 without
  - Use of excess credits
  - Emergence of cellulosic ethanol
  - Emergence of renewable gasoline
- Brazilian ethanol supply availability uncertain
  - No Brazilian ethanol was exported to the United States during 2010
  - Gasoline & ethanol demand in Brazil growing fasted than the U.S.
  - Brazilian ethanol is expensive - $1.80 per gallon higher than CA price
- Cellulosic ethanol supply availability uncertain
  - Commercial scale production has not been achieved
    - Despite significant federal and venture capital investments
  - Federal government has significantly decreased the Renewable Fuels Standard requirement for cellulosic biofuels each of the last 2 years
    - Minimum requirement for 2012 scheduled to be 500 million gallons or 1.9 billion liters