



Federal Renewable Fuels Standard (RFS2) Proportional Share Analysis & Implications

Role of Alternative Fuels in California's Transportation Energy Future

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Transportation Energy Demand Forecast Post Processing Assumptions

- California assumed to use “proportional share” of the RFS2 renewable volume obligations – no use of RIN credits
- Staff has elected to use a lower projection of cellulosic and other advanced biofuel target volumes as forecast by the Energy Information Administration (EIA), rather than the higher levels previously set by Congress
- E10 will remain the upper limit for low-level ethanol blends throughout the forecast period – no use of E15



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) - Current

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 0.0065	0.20 0.294	0.65 1.15	0.95
2011	13.95	12.60	0.25 0.0066	0.30 0.543	0.80	1.35
2012	15.20	13.20	0.50 0.0035 - 0.0126	0.50 0.987 - 0.997	1.00	2.00
2013	16.55	13.80	1.00	0.75	1.00 1.28	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
2023	36.00	15.00	16.00	4.00	1.00	21.00
2024	36.00	15.00	16.00	4.00	1.00	21.00
2025	36.00	15.00	16.00	4.00	1.00	21.00
2026	36.00	15.00	16.00	4.00	1.00	21.00
2027	36.00	15.00	16.00	4.00	1.00	21.00
2028	36.00	15.00	16.00	4.00	1.00	21.00
2029	36.00	15.00	16.00	4.00	1.00	21.00
2030	36.00	15.00	16.00	4.00	1.00	21.00

Progress of cellulosic biofuels is lagging Congressional expectations

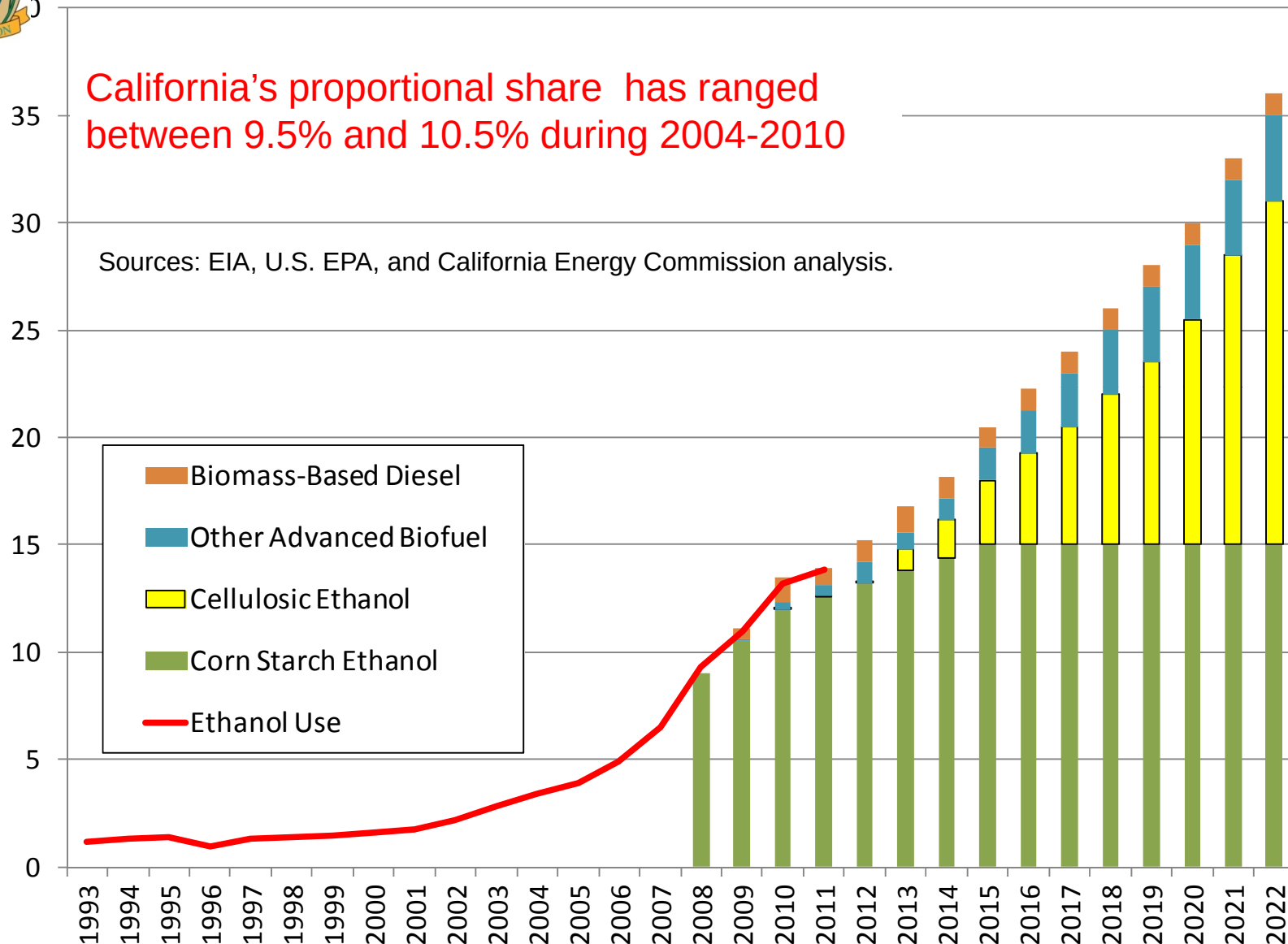


U.S. Ethanol Use – Current RFS2 Obligations

California's proportional share has ranged between 9.5% and 10.5% during 2004-2010

Sources: EIA, U.S. EPA, and California Energy Commission analysis.

Billions of Gallons



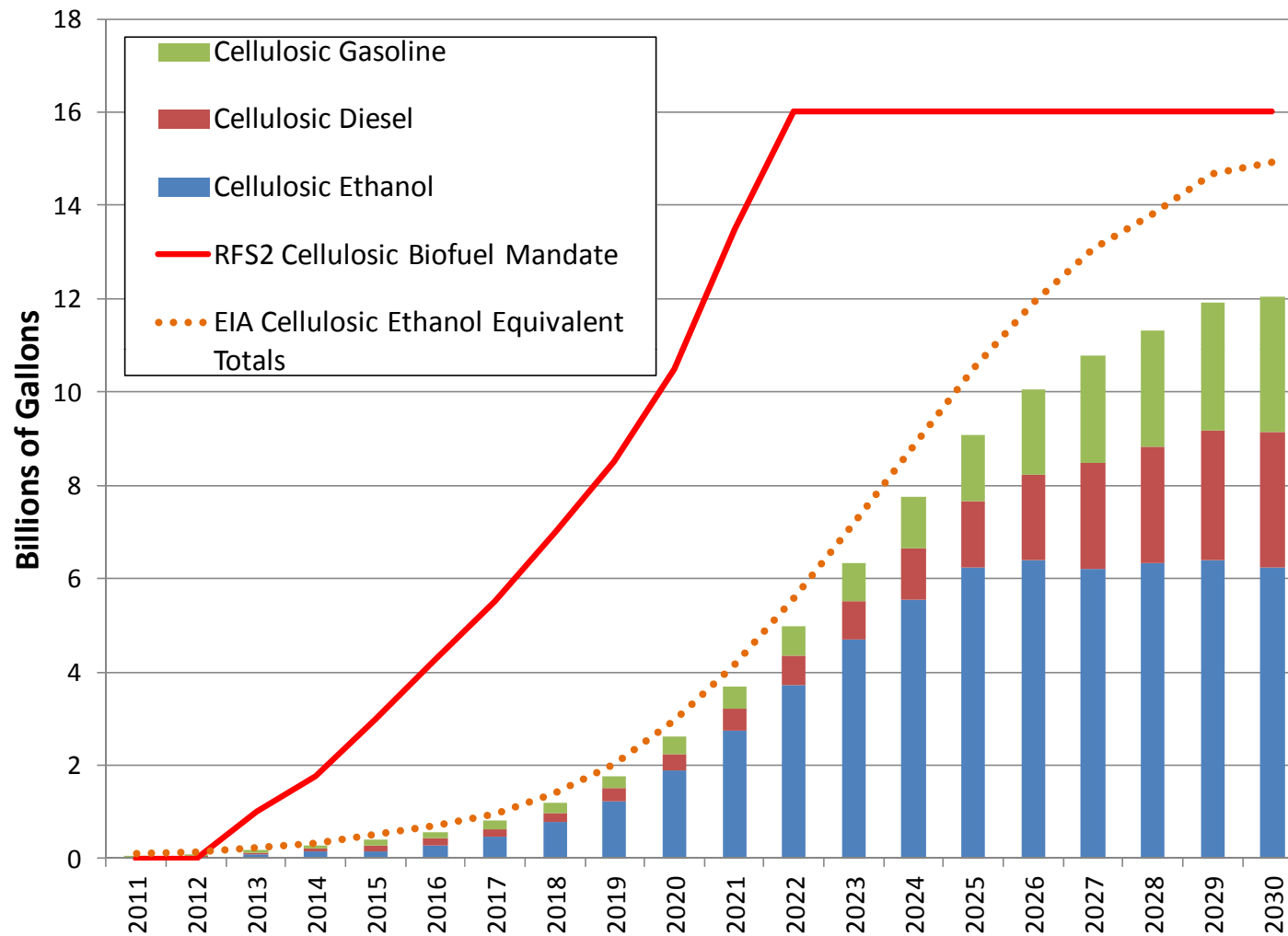


Renewable Fuels Standard (RFS2) - Revised

Year	Total Renewable Fuel Requirement Bil. Gallons	Starch Derived Biofuel Bil. Gallons	EIA AEO 2011 Extended Policy Case Consumption Estimate			
			Energy Commission Low Petroleum Demand Scenario			
			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 0.0065	0.20 0.294	0.65 1.15	0.95
2011	13.95	12.60	0.25 0.0066	0.30 0.543	0.80	1.35
2012	14.86	13.20	0.103	0.56	1.00	1.66
2013	15.93	13.80	0.18	0.67	1.28	2.13
2014	16.65	14.40	0.27	0.70	1.28	2.25
2015	17.80	15.00	0.40	1.12	1.28	2.80
2016	18.19	15.00	0.57	1.34	1.28	3.19
2017	18.87	15.00	0.81	1.78	1.28	3.87
2018	19.64	15.00	1.19	2.17	1.28	4.64
2019	20.12	15.00	1.77	2.07	1.28	5.12
2020	20.76	15.00	2.61	1.87	1.28	5.76
2021	20.89	15.00	3.68	0.93	1.28	5.89
2022	23.54	15.00	4.96	2.29	1.28	8.54
2023	25.03	15.00	6.35	2.41	1.28	10.03
2024	26.58	15.00	7.75	2.56	1.28	11.58
2025	28.10	15.00	9.08	2.73	1.28	13.10
2026	29.27	15.00	10.07	2.92	1.28	14.27
2027	30.22	15.00	10.78	3.16	1.28	15.22
2028	30.95	15.00	11.32	3.34	1.28	15.95
2029	31.77	15.00	11.92	3.57	1.28	16.77
2030	31.98	15.00	12.03	3.67	1.28	16.98



RFS2 Cellulosic Biofuel Availability Low Demand



Sources: EIA, U.S. EPA, and California Energy Commission analysis.

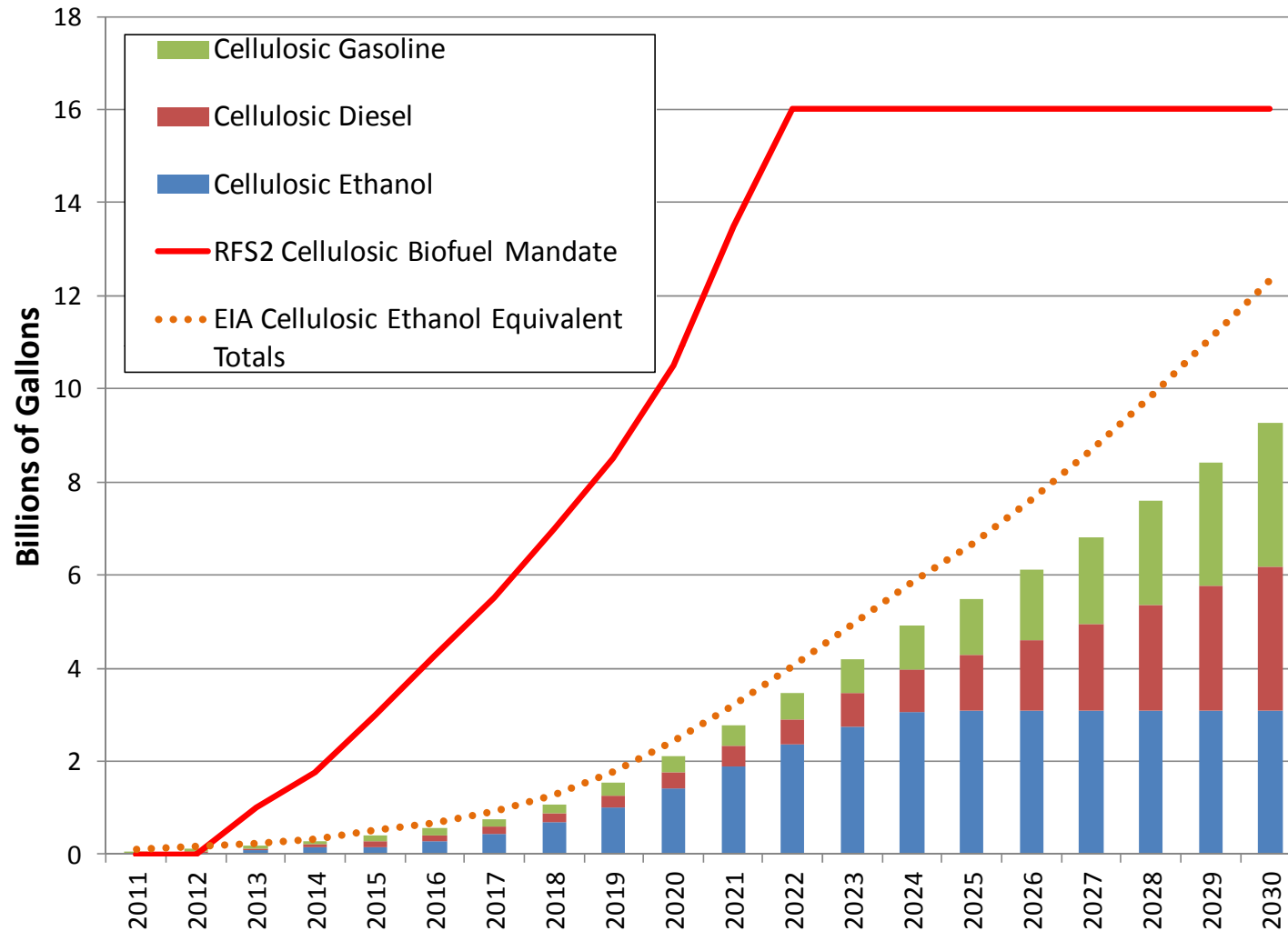


Renewable Fuels Standard (RFS2) - Revised

Year	Total Renewable Fuel Requirement Bil. Gallons	Starch Derived Biofuel Bil. Gallons	EIA AEO 2011 Low Oil Price Policy Case			
			Energy Commission High Petroleum Demand Scenario			
			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 0.0065	0.20 0.294	0.65 1.15	0.95
2011	13.95	12.60	0.25 0.0066	0.30 0.543	0.80	1.35
2012	14.47	13.20	0.006	0.26	1.00	1.27
2013	15.74	13.80	0.18	0.49	1.28	1.94
2014	16.55	14.40	0.27	0.60	1.28	2.15
2015	17.88	15.00	0.41	1.20	1.28	2.88
2016	18.37	15.00	0.55	1.53	1.28	3.37
2017	19.14	15.00	0.77	2.09	1.28	4.14
2018	19.90	15.00	1.08	2.54	1.28	4.90
2019	20.39	15.00	1.53	2.57	1.28	5.39
2020	21.39	15.00	2.10	3.01	1.28	6.39
2021	21.13	15.00	2.77	2.08	1.28	6.13
2022	22.33	15.00	3.47	2.57	1.28	7.33
2023	23.08	15.00	4.19	2.61	1.28	8.08
2024	23.93	15.00	4.92	2.73	1.28	8.93
2025	24.58	15.00	5.48	2.82	1.28	9.58
2026	25.33	15.00	6.10	2.94	1.28	10.33
2027	26.19	15.00	6.82	3.10	1.28	11.19
2028	27.07	15.00	7.59	3.20	1.28	12.07
2029	28.02	15.00	8.42	3.32	1.28	13.02
2030	28.97	15.00	9.25	3.44	1.28	13.97



RFS2 Cellulosic Biofuel Availability High Demand



Sources: EIA, U.S. EPA, and California Energy Commission analysis.

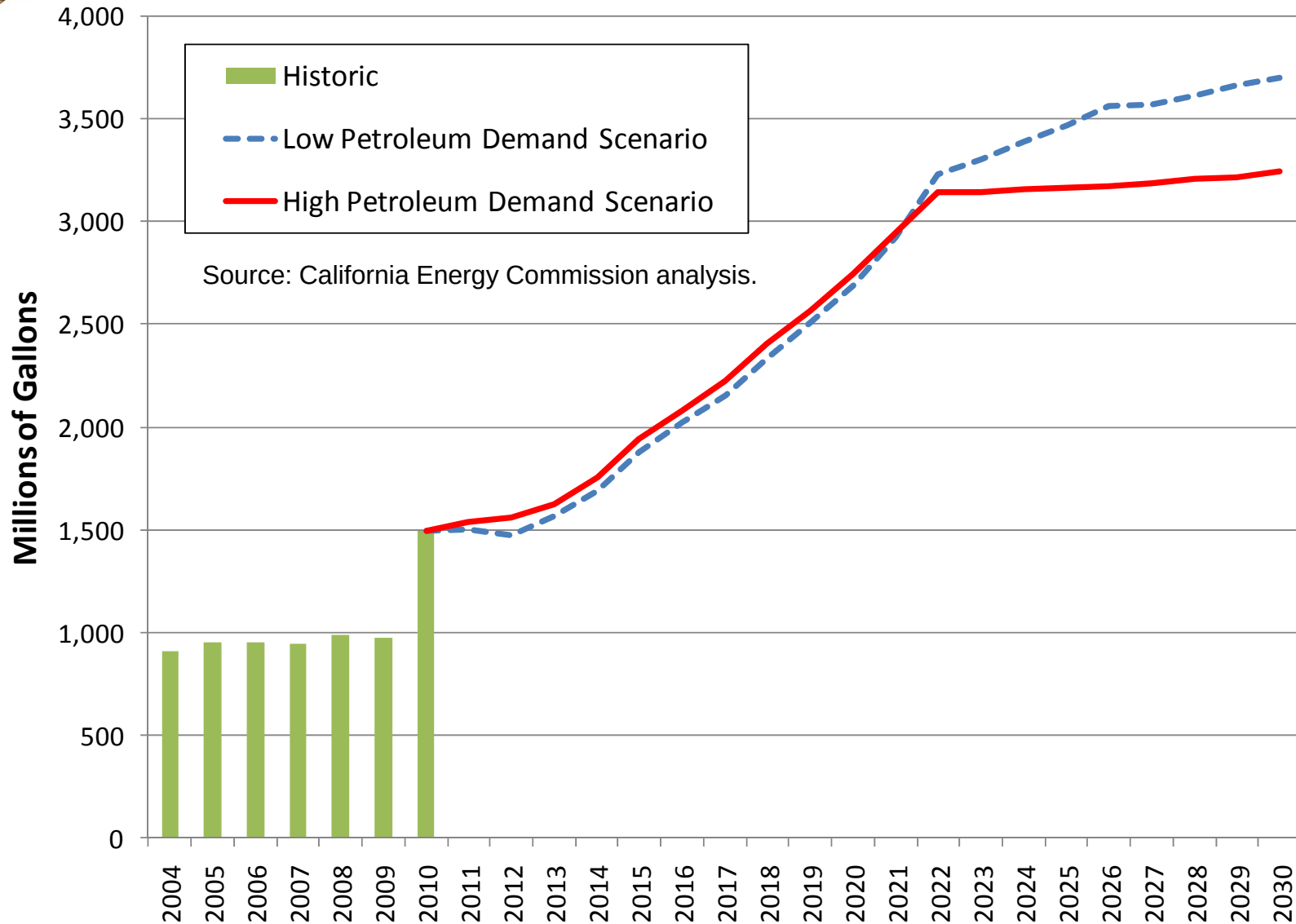


Revised EIA Cellulosic Biofuel Target Volumes

EIA AEO 2011 Extended Policy Case Consumption Estimate						EIA AEO 2011 Low Oil Price Policy Case				
Energy Commission Low Petroleum Demand Scenario						Energy Commission High Petroleum Demand Scenario				
Year	Ethanol Equivalent Biofuels Bil. Gallons	Cellulosic Ethanol Bil. Gallons	Cellulosic Diesel Bil. Gallons	Cellulosic Gasoline Bil. Gallons	Other Advanced Biofuels Bil. Gallons	Ethanol Equivalent Biofuels Bil. Gallons	Cellulosic Ethanol Bil. Gallons	Cellulosic Diesel Bil. Gallons	Cellulosic Gasoline Bil. Gallons	Other Advanced Biofuels Bil. Gallons
2010	0.121	0.000	0.040	0.040	0.182	0.121	0.000	0.040	0.040	0.182
2011	0.111	0.004	0.035	0.035	0.340	0.111	0.004	0.035	0.035	0.323
2012	0.144	0.022	0.041	0.041	0.559	0.157	0.022	0.045	0.045	0.261
2013	0.222	0.087	0.045	0.045	0.674	0.222	0.087	0.045	0.045	0.488
2014	0.321	0.17	0.05	0.05	0.70	0.318	0.17	0.05	0.05	0.60
2015	0.512	0.17	0.11	0.11	1.12	0.523	0.17	0.12	0.12	1.20
2016	0.708	0.29	0.14	0.14	1.34	0.691	0.28	0.14	0.14	1.53
2017	0.973	0.48	0.17	0.17	1.78	0.928	0.44	0.16	0.16	2.09
2018	1.391	0.78	0.20	0.20	2.17	1.277	0.68	0.20	0.20	2.54
2019	2.030	1.24	0.26	0.26	2.07	1.789	1.01	0.26	0.26	2.57
2020	2.970	1.89	0.36	0.36	1.87	2.433	1.43	0.33	0.33	3.01
2021	4.149	2.74	0.47	0.47	0.93	3.210	1.89	0.44	0.44	2.08
2022	5.589	3.71	0.63	0.63	2.29	4.035	2.35	0.56	0.56	2.57
2023	7.172	4.70	0.83	0.83	2.41	4.917	2.74	0.72	0.72	2.61
2024	8.841	5.56	1.09	1.09	2.56	5.851	3.05	0.93	0.93	2.73
2025	10.513	6.23	1.43	1.43	2.73	6.676	3.10	1.19	1.19	2.82
2026	11.899	6.40	1.83	1.83	2.92	7.608	3.10	1.50	1.50	2.94
2027	13.066	6.21	2.29	2.29	3.16	8.675	3.10	1.86	1.86	3.10
2028	13.820	6.33	2.50	2.50	3.34	9.843	3.10	2.25	2.25	3.20
2029	14.676	6.40	2.76	2.76	3.57	11.081	3.10	2.66	2.66	3.32
2030	14.929	6.24	2.90	2.90	3.67	12.333	3.10	3.08	3.08	3.44

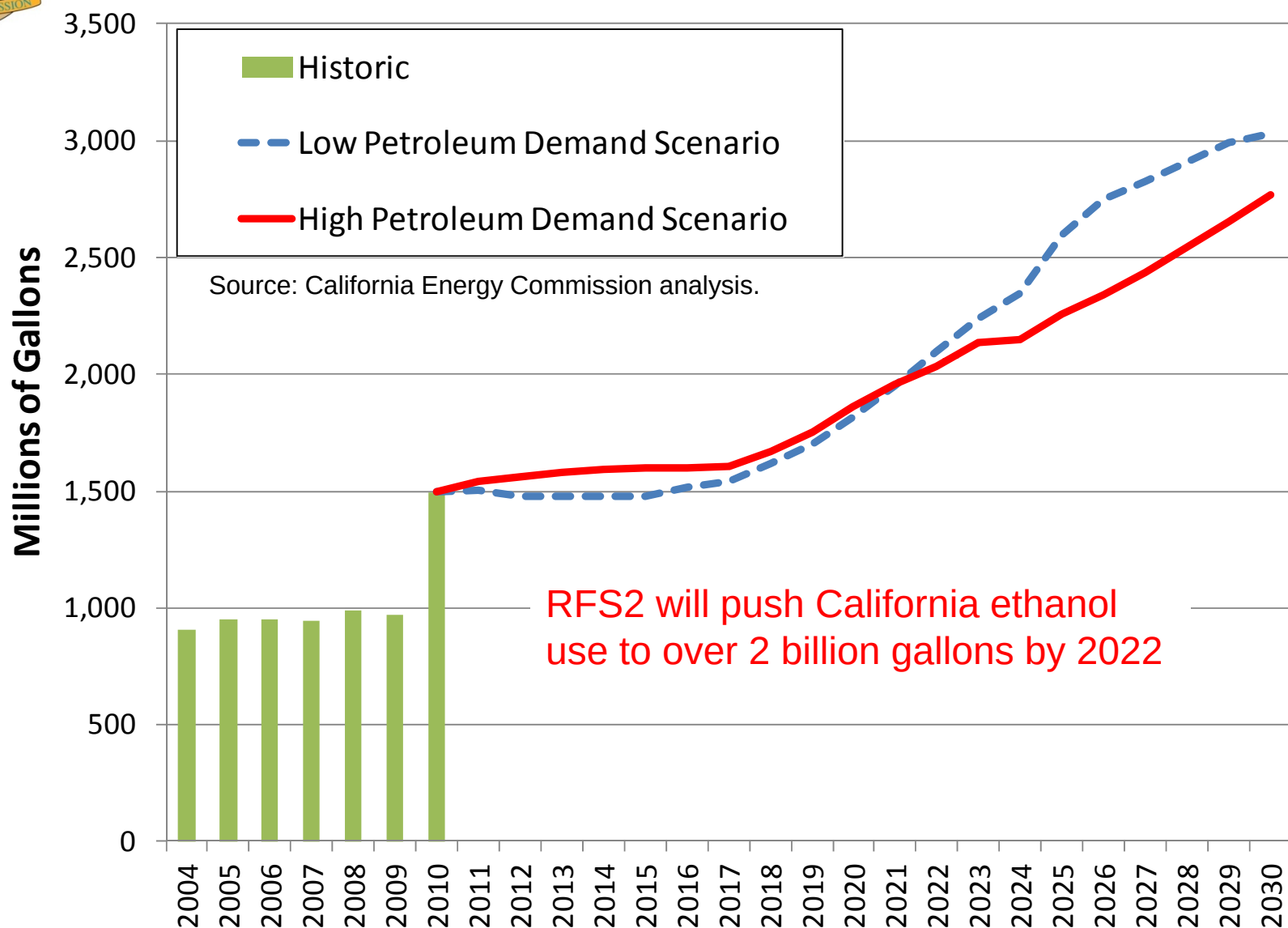


California Ethanol Demand - Previous



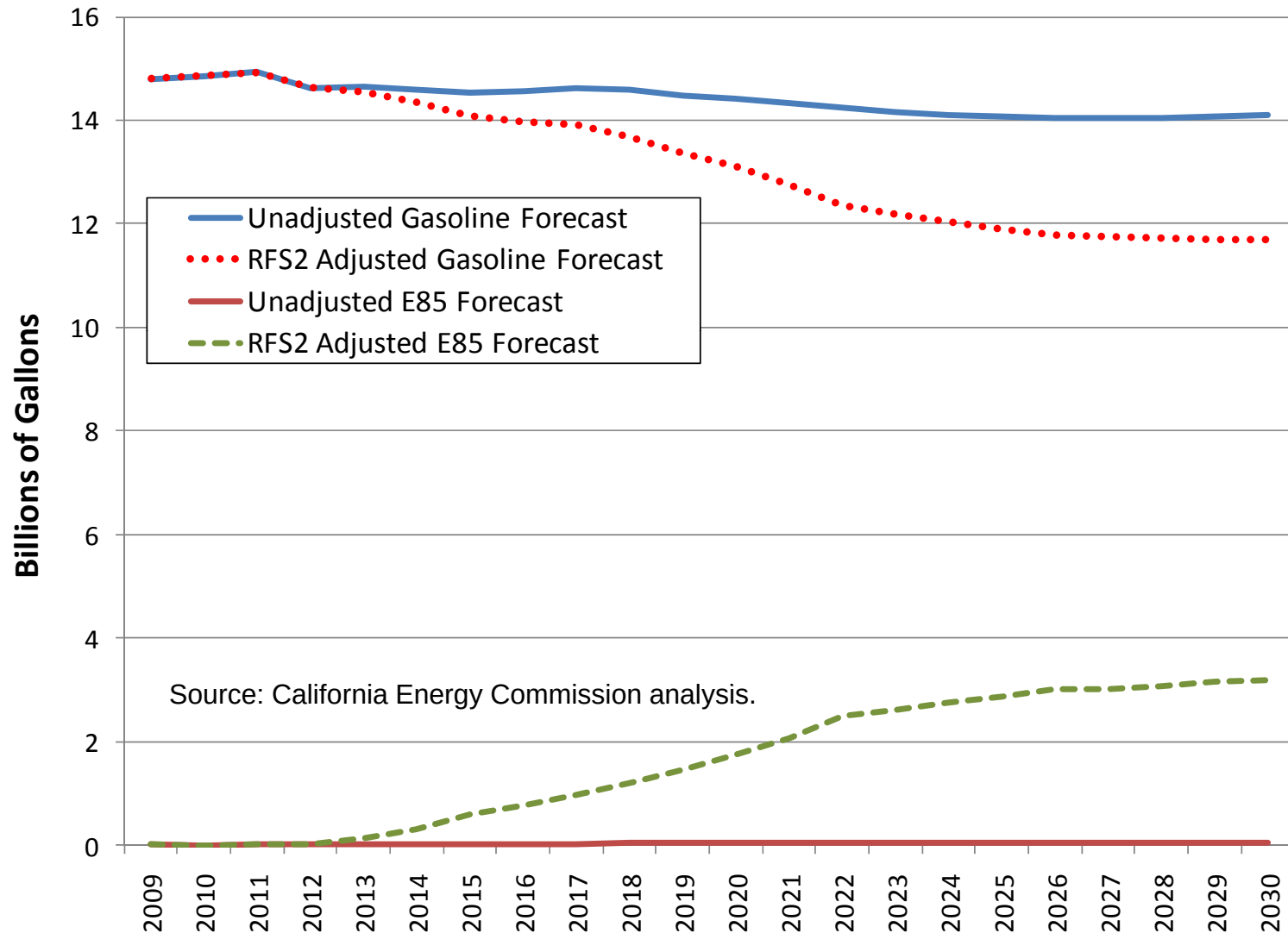


California Ethanol Demand - *Revised*



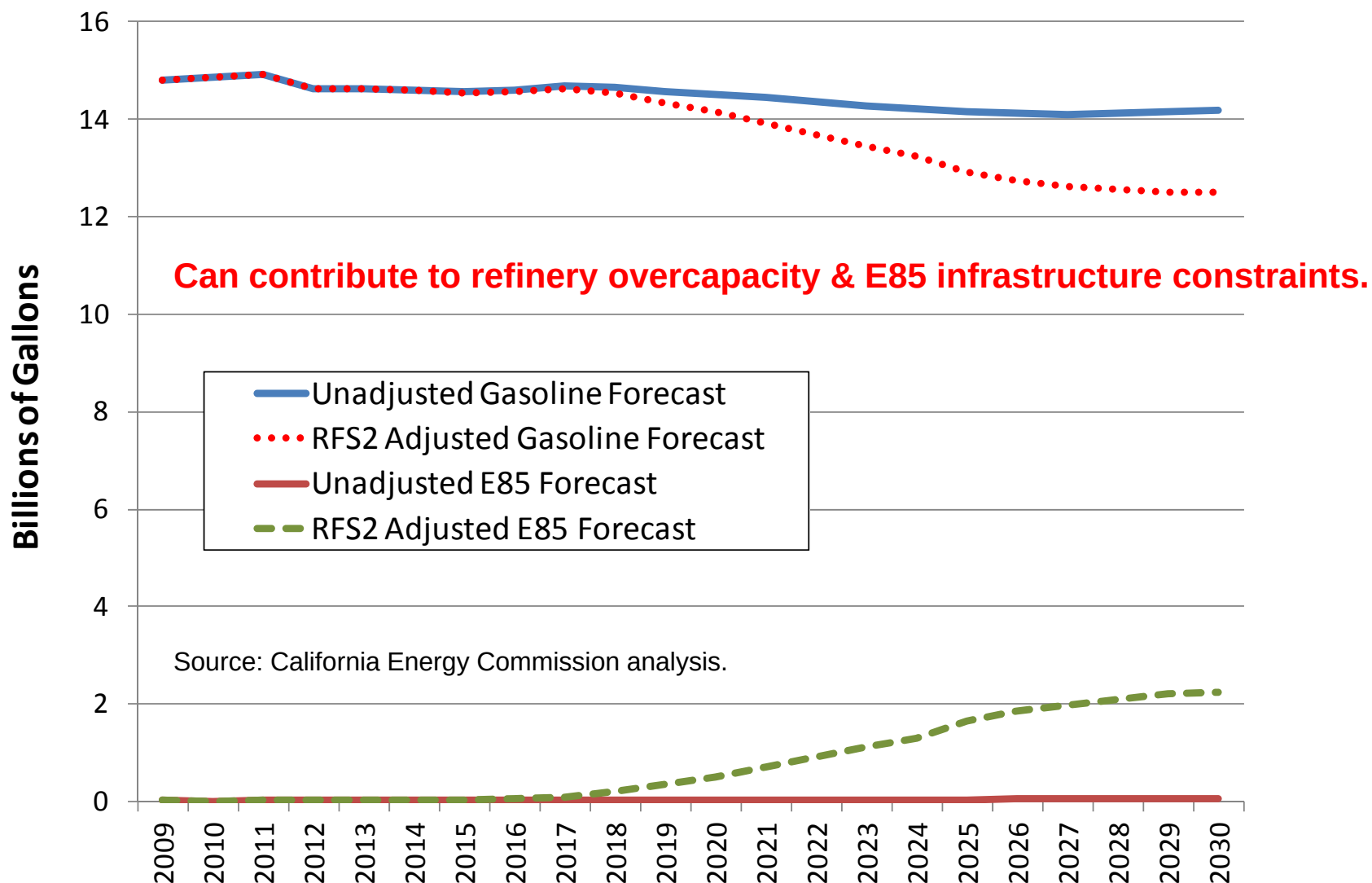


RFS2 Impact on CA Gasoline Use in the Low Petroleum Demand Scenario - Previous



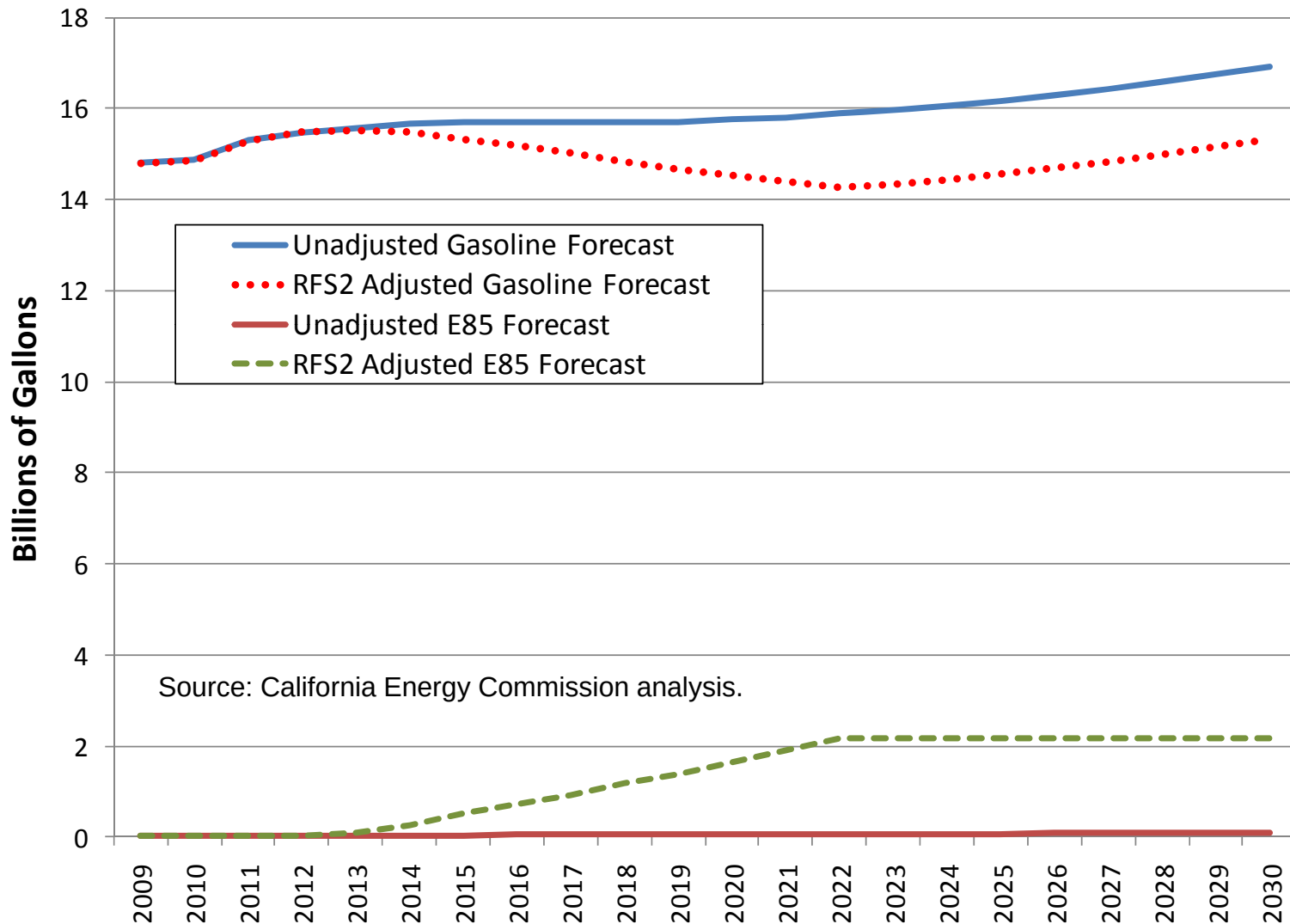


RFS2 Impact on CA Gasoline Use in the Low Petroleum Demand Scenario - *Revised*



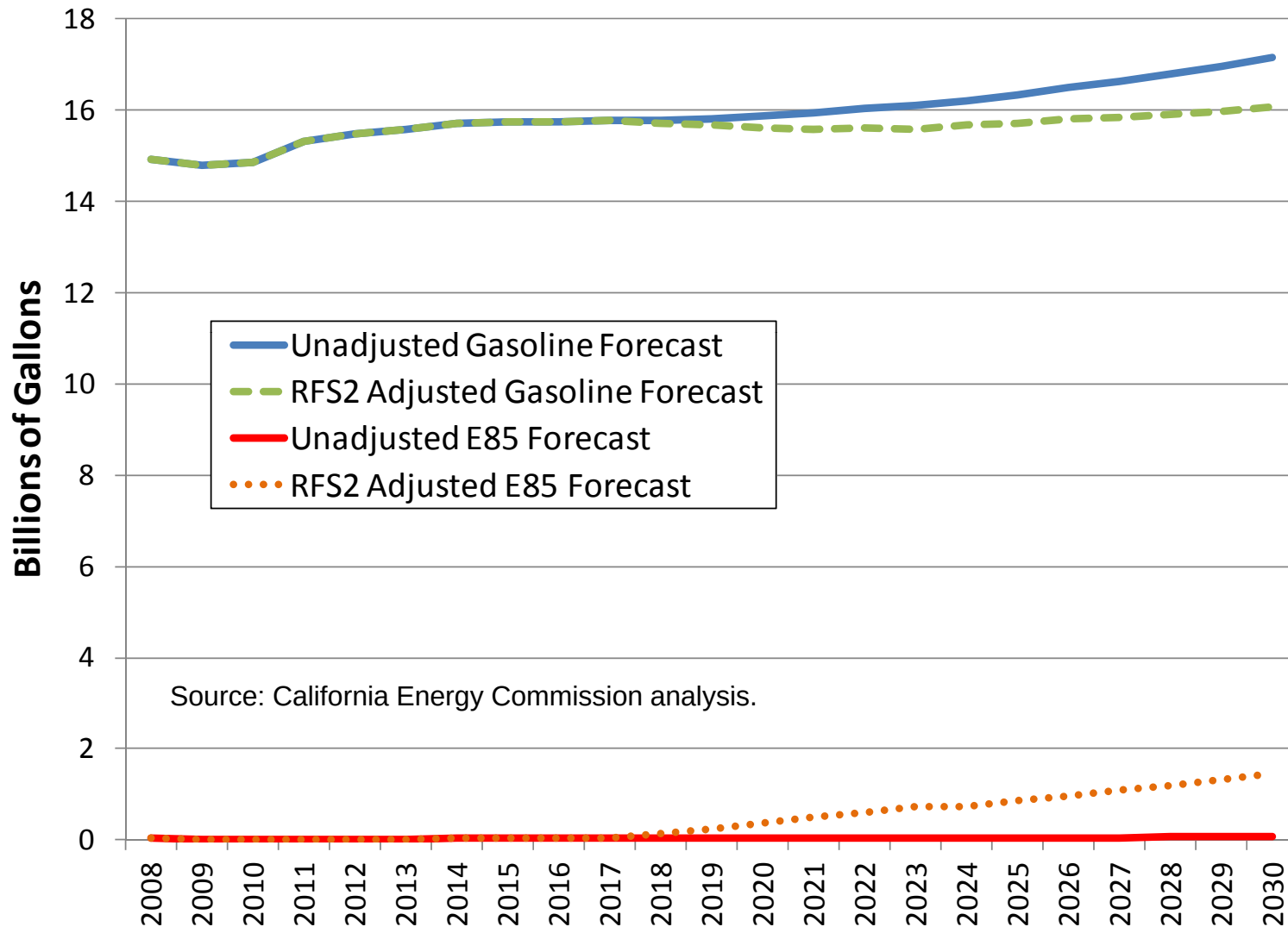


RFS2 Impact on CA Gasoline Use in the High Petroleum Demand Scenario - Previous



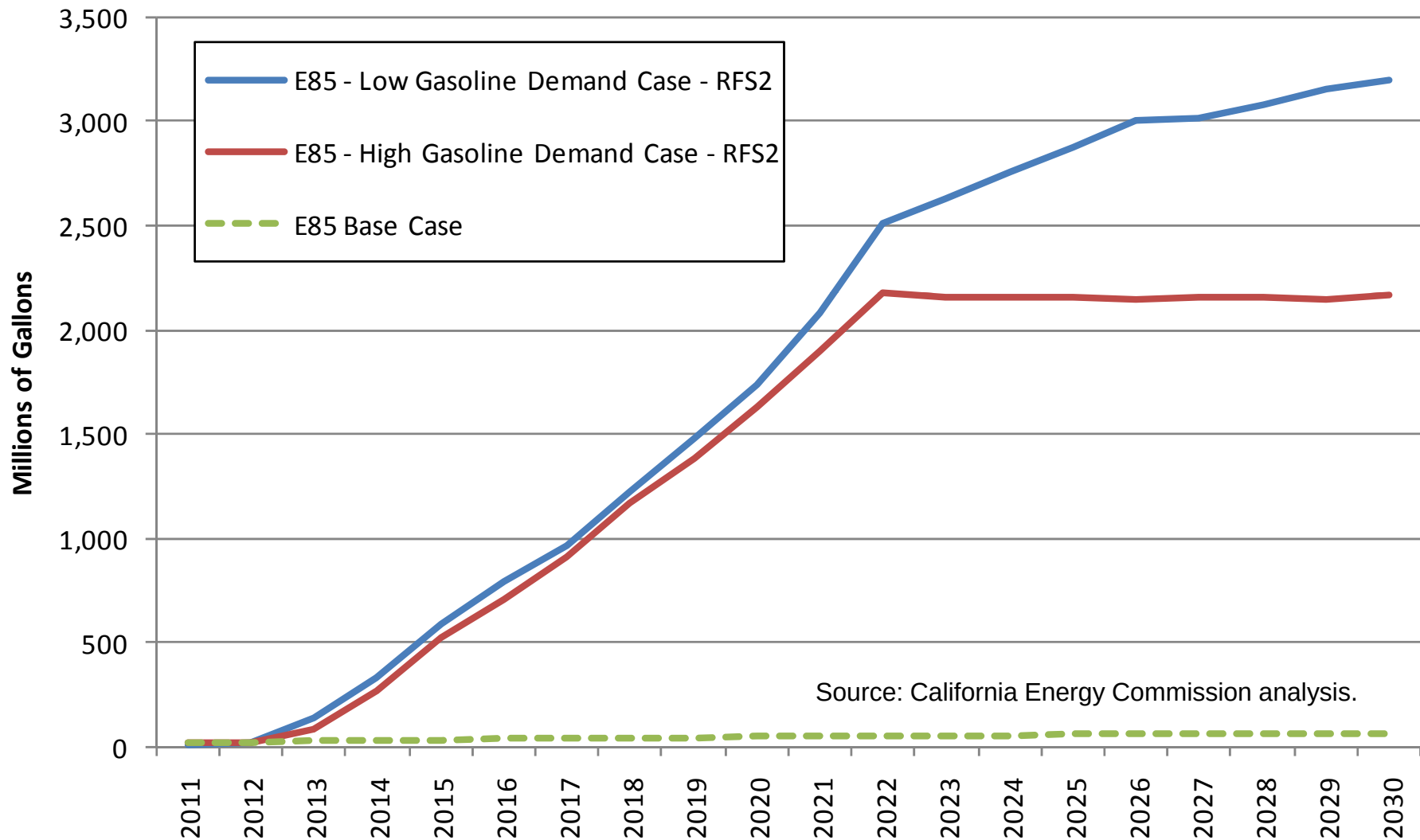


RFS2 Impact on CA Gasoline Use in the High Petroleum Demand Scenario - *Revised*



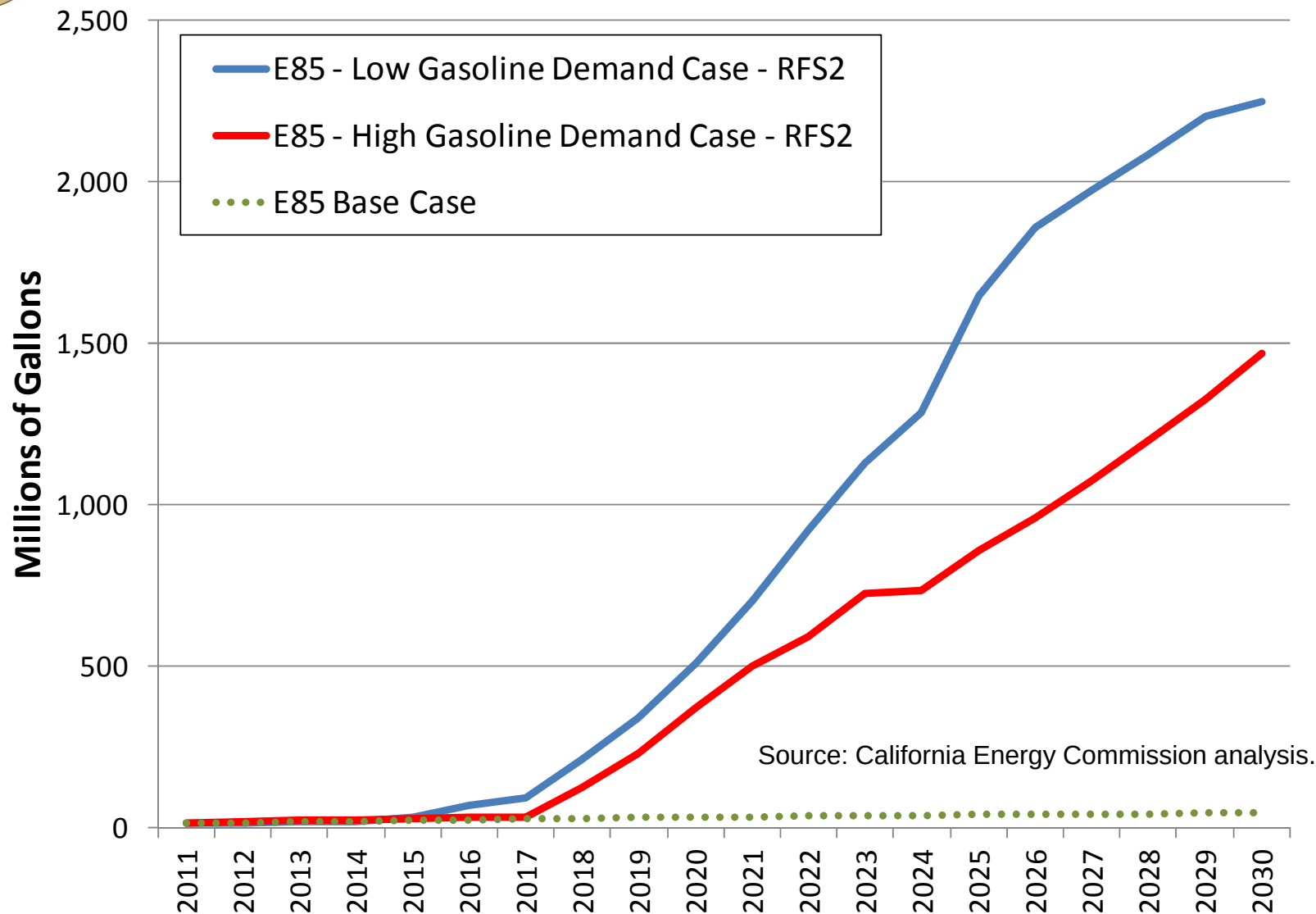


California E85 Demand Forecast - Previous



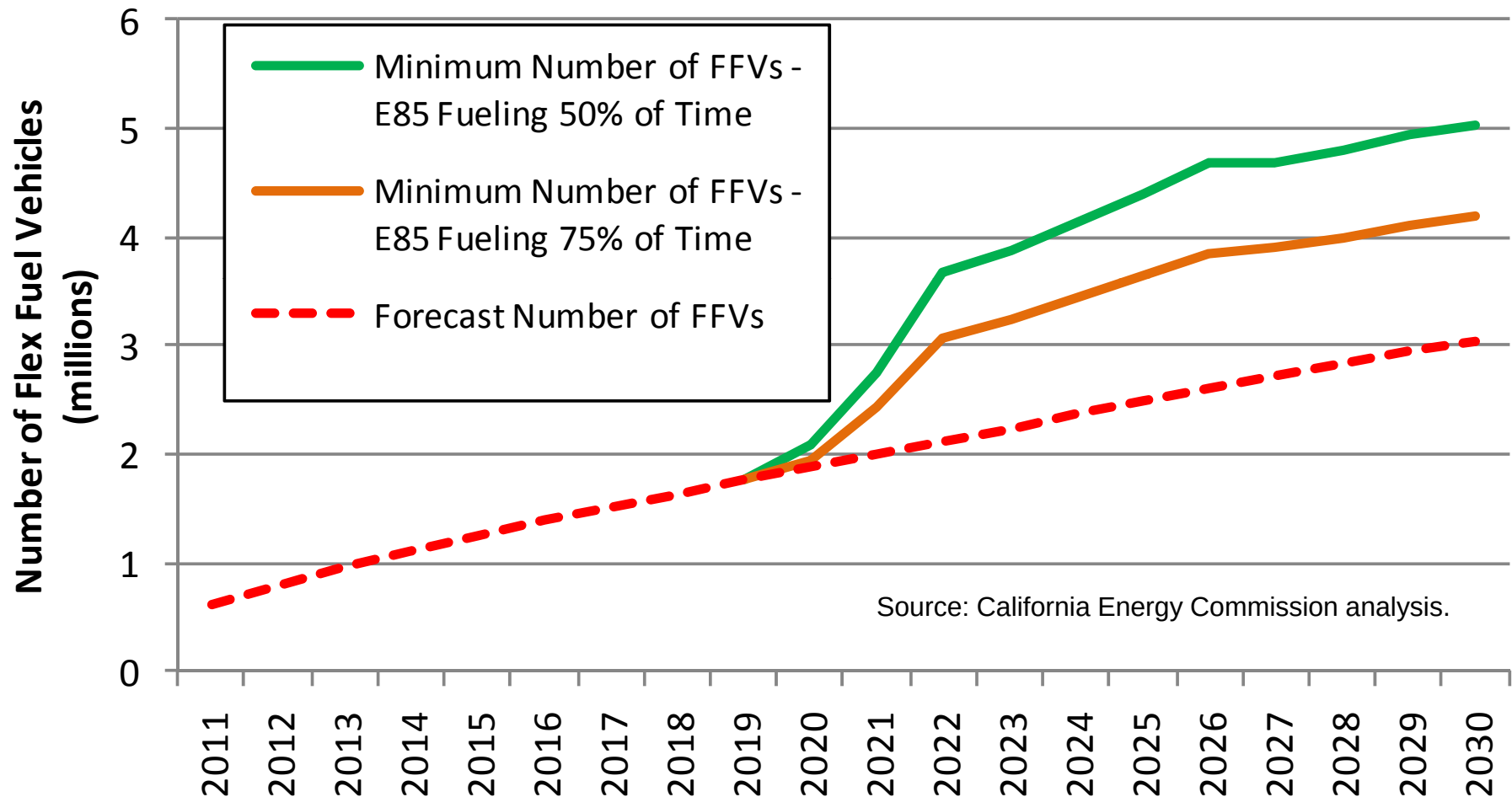


California E85 Demand Forecast - *Revised*





California FFV Forecast



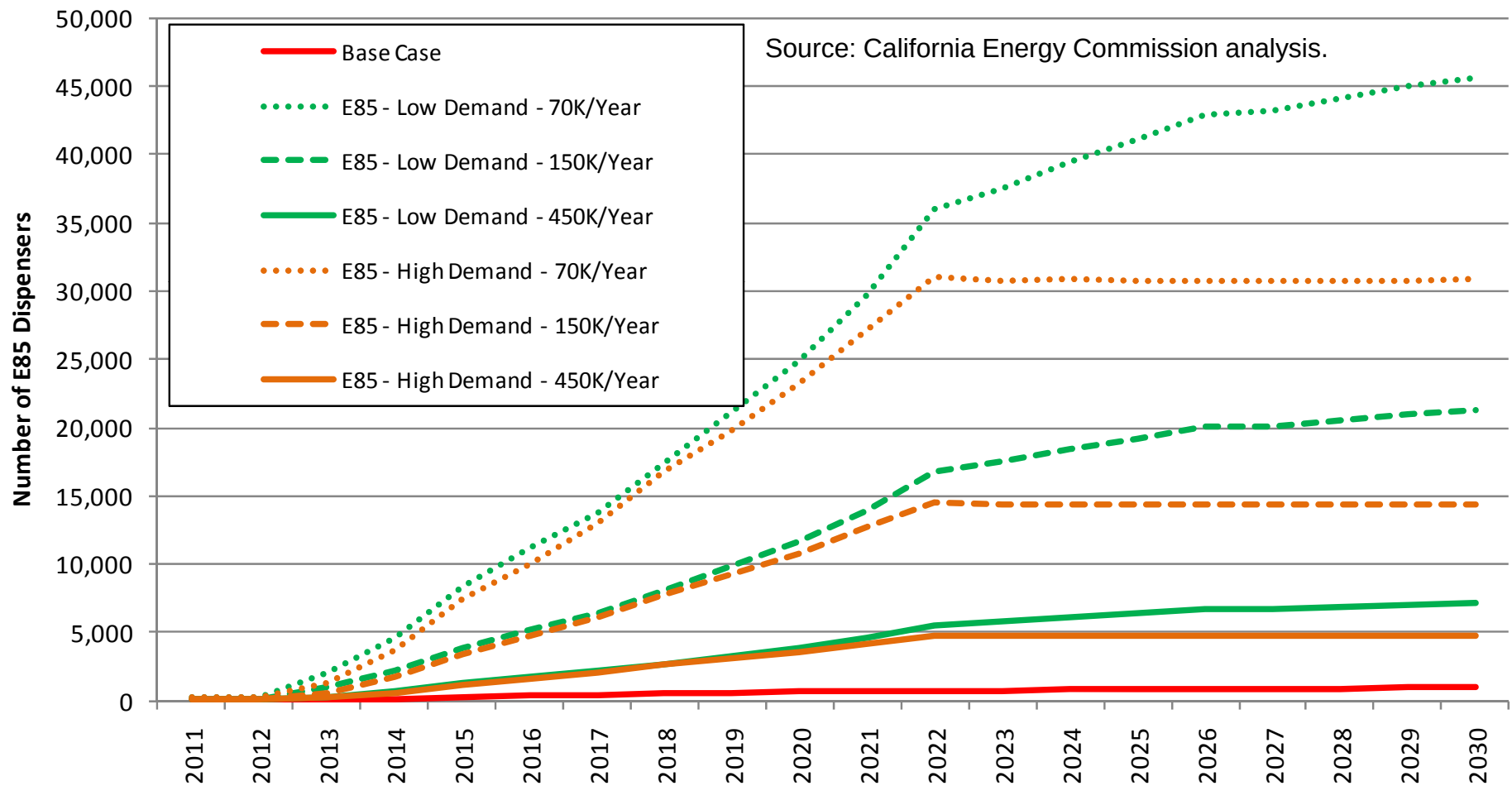


E85 Issues and Concerns - Vehicles

- The increased E85 consumption necessitated by the RFS2 mandate is contingent upon availability of adequate vehicles, refueling facilities, and appropriate fuel supplies at levels so substantial as to be unrealistic.
 - There is an increased risk that vehicle manufacturers will not build enough Flexible Fuel Vehicles to consume the greater E85 volumes, instead focusing on increased market penetration of more fuel-efficient hybrids, electric cars, and even fuel cell vehicles that will be necessary to help achieve compliance with the more aggressive Corporate Average Fuel Economy (CAFE) standards.

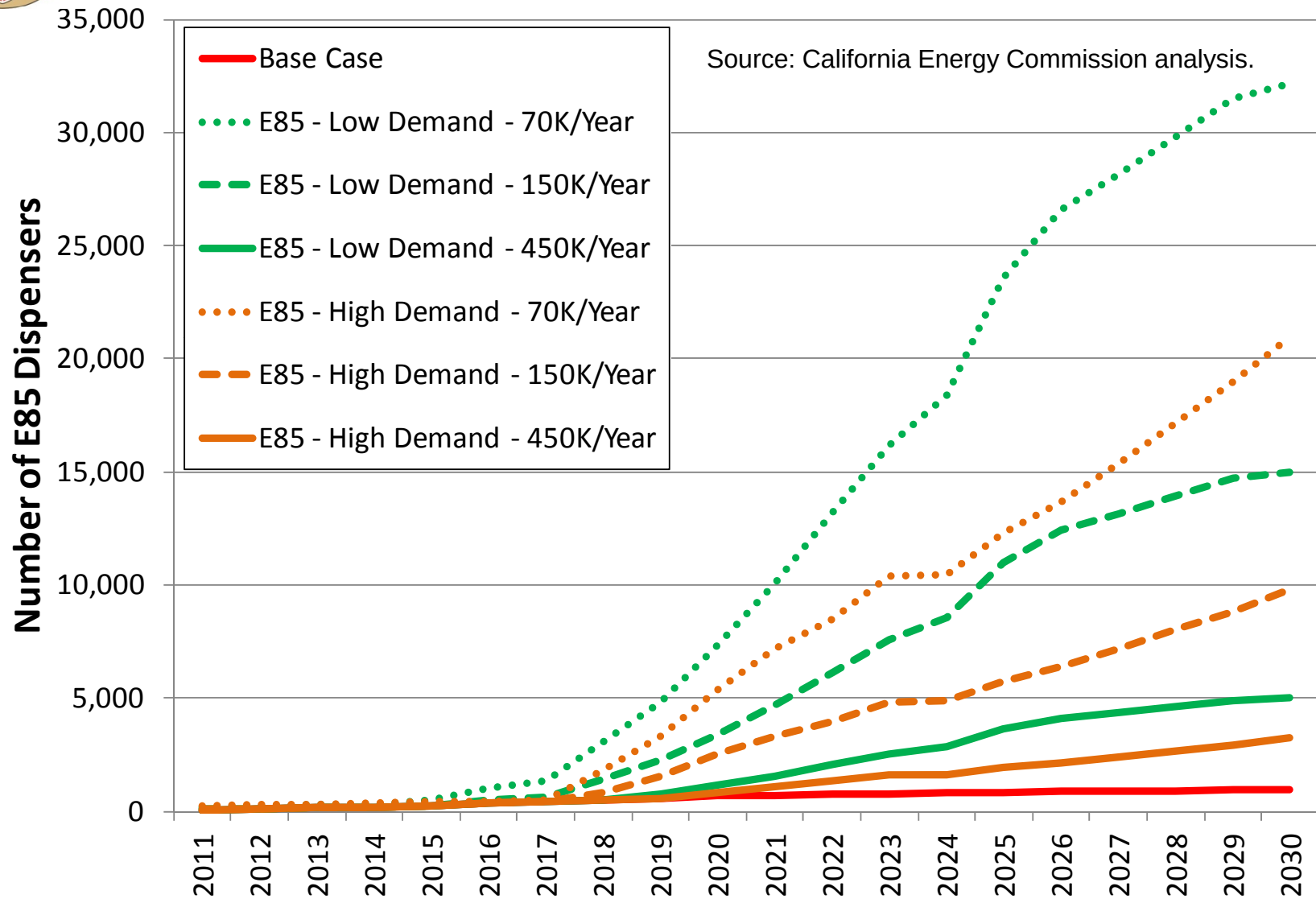


California E85 Dispenser Forecast - Previous





California E85 Dispenser Forecast - *Revised*





E85 Issues and Concerns - Dispensers

- The necessary E85 retail infrastructure requirements will be expensive and pose a difficult business proposition
 - In order to realize this RFS2-adjusted forecast, California's retail fueling infrastructure would require the installation of between 1,318 and 13,193 E85 dispensers by 2022 at a minimum cost of nearly \$440 million, although costs could climb to several billion dollars.
 - Retail gas station owners and operators have no obligations under the RFS2 regulations to offer E85 for sale and little to no financial incentive to make an investment somewhere between \$200,000 and \$400,000 when their annual pre-tax profits are on average less than \$40,000 per year.



E85 Issues and Concerns - Pricing

- E85 retail pricing requires discounted ethanol
 - A consumer who uses E85 in their FFV will experience between 23 and 28 percent lower fuel economy compared to gasoline that contains 10 percent ethanol. This means that a retail station owner would need to price E85 at least 23 percent lower than gasoline (E10).
 - Corn-based ethanol prices over the last couple of years have been sufficiently lower than gasoline to enable competitive E85 pricing. However, federal and state regulations will compel the use of more expensive types of ethanol (sugarcane & cellulosic) that are expected to be more (not less) expensive than Midwest ethanol and even gasoline.
 - This scenario decreases the likelihood that E85 could be competitively marketed in California on a consistent and widespread basis without the use of even lower retail tax treatment and/or additional revenue streams from Renewable Identification Number (RIN) credits and LCFS credits, once the use of less expensive ethanol is no longer feasible.