

December 17, 2014

Celebrating Seven Years of the Renewable Fuel Standard

Seven years ago this week, President George W. Bush signed into law the Energy Independence and Security Act of 2007 (EISA). On its way to the President's desk, the bill had passed the Senate on a vote of 86-6 and the House on a vote of 314-100. The centerpiece of EISA was a greatly expanded Renewable Fuel Standard (RFS). The new RFS required rapid growth in the consumption of renewable fuels, culminating in 36 billion gallons in 2022. In addition, the law required renewable fuels to meet certain environmental performance criteria and created specific categories for cellulosic and advanced biofuels.

In a signing ceremony at the Department of Energy, President Bush declared that, "Today, we make a major step with the Energy Independence and Security Act. We make a major step toward reducing our dependence on oil, confronting global climate change, expanding production of renewable fuels and giving future generations a nation that is stronger, cleaner and more secure."

Just seven years later, tremendous progress has been made toward achieving the original objectives of the expanded RFS. Renewable fuel production and consumption have grown dramatically. Dependence on petroleum—particularly imports—is down significantly. Greenhouse gas emissions from the transportation sector have fallen. The value of agricultural products is up appreciably. And communities across the country have benefited from the job creation, increased tax revenue, and heightened household income that stem from the construction and operation of a biorefinery.

Meanwhile, the doomsday outcomes threatened by opponents of the RFS simply have not materialized. Corn acres have fallen, agricultural land use continues to decline, the Gulf of Mexico "dead zone" continues to contract, deforestation rates continue to fall, and food price inflation continues to follow normal historical trends.

This brief analysis examines how the world has changed since passage of the expanded RFS in 2007. And while substantial progress has been made toward accomplishing the goals of EISA, the RFS has just gotten started. More work remains to be done, especially in terms of reducing petroleum imports and lowering prices at the pump. Indeed, we're only halfway through the revolutionary 15-year energy plan that became law seven years ago this week.

RENEWABLE FUEL PRODUCTION, CO-PRODUCT OUTPUT, AND ECONOMIC ACTIVITY

		2007	2014	% Change
Operational Corn Ethanol Plants ¹		110	210	91%
Commercial Cellulosic Ethanol Facilities ²		0	5	--
Corn Ethanol Production ³	<i>Billion Gallons</i>	6.52	14.30	119%
Animal Feed Co-product Output ⁴	<i>Million Metric Tons</i>	18.5	39.0	111%
Value of Ethanol Industry Output ⁵	<i>Billion \$</i>	\$17.8	\$39.8	124%
Ethanol Industry Jobs ⁶		238,541	383,260	61%
U.S. Advanced & Cellulosic Biofuel Production ⁷	<i>Million Gallons</i>	450	1,513	236%

AGRICULTURAL IMPACTS

		2007	2014	% Change
Corn Production ⁸	<i>Billion Bushels</i>	13.04	14.41	10.5%
Corn Acres Planted ⁹	<i>Million Acres</i>	93.6	90.9	-2.9%
Average Corn Yield ¹⁰	<i>Bushels/Acre</i>	150.7	173.4	15.1%
Corn Price (Season Avg.) ¹¹	<i>\$/Bushel</i>	\$4.20	\$3.50	-16.7%
U.S. Agricultural Land ¹²	<i>Million Acres</i>	402	384	-4.5%
Gross Value of Crops ¹³	<i>Billion \$</i>	\$150.1	\$193.4	28.8%
Gross Value of Livestock ¹⁴	<i>Billion \$</i>	\$138.5	\$208.7	67.7%
Net Farm Income ¹⁵	<i>Billion \$</i>	\$70	\$97	38.6%

ENVIRONMENTAL ISSUES

		2007	2014	% Change
Size of Gulf Hypoxia Zone ¹⁶	<i>Square Miles</i>	7,903	5,052	-36.1%
Amazon Deforestation ¹⁷	<i>Square Miles</i>	4,498	1,872	-58.4%
Transportation Sector CO2 Emissions ¹⁸	<i>Million Metric Tons</i>	2,040	1,839	-9.9%
CO2e Emissions Avoided from Using Ethanol ¹⁹	<i>Million Metric Tons</i>	12.7	39.6	211.8%
Ethanol CO2e Emissions Reduction vs. Gasoline ²⁰	<i>%</i>	~25%	36%	n/a

FUEL PRICES

		2007	2014	% Change
World Oil Price ²¹	<i>\$/Barrel</i>	\$72.34	\$99.54	37.6%
Retail Diesel Price ²²	<i>\$/Gallon</i>	\$2.89	\$3.82	32.2%
Retail Gasoline Price (Regular) ²³	<i>\$/Gallon</i>	\$2.80	\$3.37	20.4%
Wholesale (Rack) Gasoline Price ²⁴	<i>\$/Gallon</i>	\$2.23	\$2.75	23.3%
Wholesale (Rack) Ethanol Price ²⁵	<i>\$/Gallon</i>	\$2.24	\$2.34	4.5%

PETROLEUM IMPORT DEPENDENCE

		2007	2014	% Change
Crude Oil Imports, as % of U.S. Crude Oil Demand ²⁶	<i>%</i>	66.2%	47.0%	n/a
Total Net Import Dependence: Crude Oil/Petroleum Prods. ²⁷	<i>%</i>	58.2%	28.5%	n/a
Crude Oil Imports from OPEC	<i>Billion Barrels</i>	1.97	1.14	-42%
Gasoline Imports ²⁸	<i>Billion Gals.</i>	6.331	0.817	-87%
Ethanol, % of Gasoline Supply ²⁹	<i>%</i>	4.6%	9.9%	n/a

FOOD PRICES/HOUSEHOLD SPENDING

		2007	2014	% Change
World Food Prices, Fourth Quarter Avg. ³⁰	<i>Index</i>	187.2	192.7	2.9%
Avg. Household Spending on Food ³¹	<i>\$/Household</i>	\$6,133	\$6,602	7.6%
Avg. Household Spending on Gasoline & Motor Oil ³²	<i>\$/Household</i>	\$2,384	\$2,611	9.5%
Change in U.S. Food Prices from Previous Year ³³	<i>%</i>	4.0%	3.0%	n/a

Sources:

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- ¹ RFA Biorefinery Locations. <http://www.ethanolrfa.org/bio-refinery-locations/>
- ² Operational or near-operational. Abengoa (Hugoton, KS); DuPont (Nevada, IA); Ineos BIO (Vero Beach, FL); Poet/DSM (Emmetsburg, IA); Quad County Corn Processors (Galva, IA).
- ³ 2007 from Energy Information Administration (EIA). 2013 projected by RFA based on EIA data.
- ⁴ Estimated by RFA.
- ⁵ Estimated by RFA.
- ⁶ Urbanchuk (2008), Urbanchuk (2013). Includes direct, indirect and induced jobs.
- ⁷ The National Biodiesel Board reports that 450 million gallons of biodiesel, an advanced biofuel under the RFS, were produced in 2007. EPA EMTS data through OCT 2014 show domestic production of cellulosic biofuel, biodiesel and other advanced biofuels is on pace for 1,513 million gallons in 2014.
- ⁸ USDA.
- ⁹ USDA
- ¹⁰ USDA.
- ¹¹ USDA. 2007/08 season average compared to projected 2014/15 season average.
- ¹² EPA analysis determined 402 m. acres were engaged in agricultural production in 2007. EPA's analysis for 2012 (latest available) determined agricultural land use was 384 m. acres. USDA data show that major crop acres were lower in 2014 than in 2012; thus EPA's determination of agricultural land for 2014 is likely to be lower than 384 m. acres.
- ¹³ USDA.
- ¹⁴ USDA.
- ¹⁵ USDA
- ¹⁶ Louisiana State University and NOAA.
- ¹⁷ National Institute of Space Research, Brazil.
- ¹⁸ EIA. Comparison is 2007 to 2013 (latest available)
- ¹⁹ RFA calculations based on GREET and EIA data.
- ²⁰ Department of Energy GREET model.
- ²¹ EIA (Brent crude). 2014 price from December 2014 STEO.
- ²² EIA. 2014 price from December 2013 STEO.
- ²³ EIA. 2014 price from December 2013 STEO.
- ²⁴ Omaha rack price. Nebraska Energy Office.
- ²⁵ Omaha rack price. Nebraska Energy Office.
- ²⁶ EIA. 2014 is projected based on monthly data for Jan-Sep.
- ²⁷ EIA. 2014 is projected based on monthly data for Jan-Sep.
- ²⁸ EIA. 2014 is projected based on monthly data for Jan-Sep.
- ²⁹ RFA calculation based on EIA data. 2014 is projected based on monthly data for Jan-Sep.
- ³⁰ U.N. Food and Agriculture Organization. Oct.-Dec. 2007 compared to Sep.-Nov. 2014. (latest available)
- ³¹ BLS Consumer Expenditure Survey. Compares 2007 to 2013 (latest available).
- ³² BLS Consumer Expenditure Survey. Compares 2007 to 2013 (latest available).
- ³³ USDA.