Biofuels Year-in-Review 2011

Advanced Biofuels Workshop

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2011 Industry Highlights

- The biodiesel industry rebounded in 2011 from low production levels in 2010.
- Ethanol reached nearly 10 percent of U.S. gasoline consumption by volume.
- Exports of ethanol increased substantially as producers looked abroad for new markets.
- In the 2010/11 agricultural marketing year, 38 percent of the corn crop and 14 percent of soybean oil production was used to produce biofuels.
- The Federal excise tax credits for ethanol and biodiesel and the ethanol import tariff expired at the end of 2011.
- Plans for a pipeline to deliver ethanol from the Midwest to the Northeast were put on hold.
- Four cellulosic biofuels producers began to build commercial production facilities

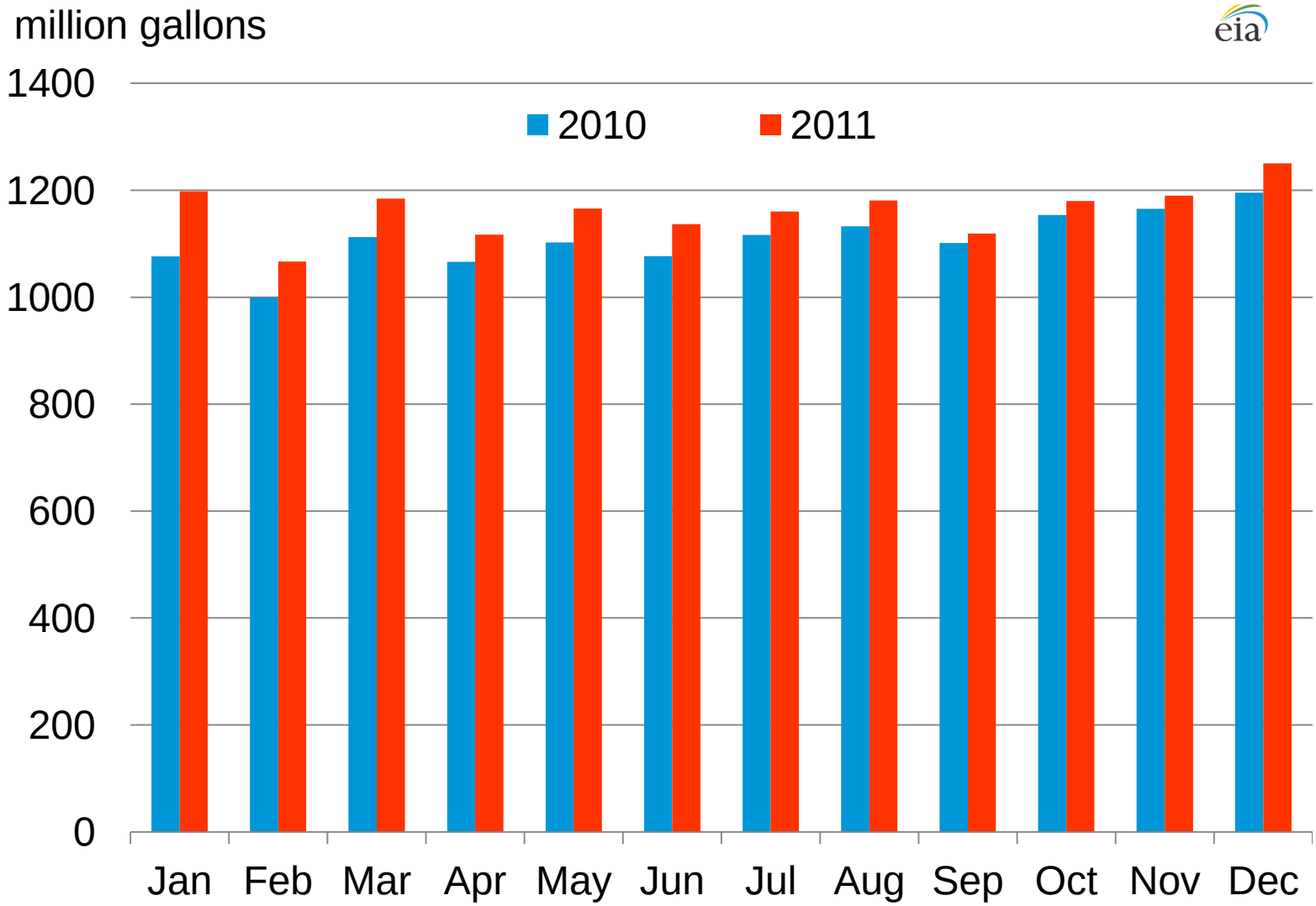
Ethanol and Biodiesel Summary

million gallons, unless otherwise noted	2009	2010	2011
Ethanol			
Net Exports	-198	383	1,064
Production	10,938	13,298	13,949
Consumption	11,037	12,858	12,871
Consumption, Percentage of Gasoline by Volume	8.0	9.3	9.6
Biodiesel			
Net Exports	189	82	37
Production	516	343	967
Consumption	326	263	878
Consumption, Percentage of Distillate Fuel by Volume	0.6	0.5	1.5

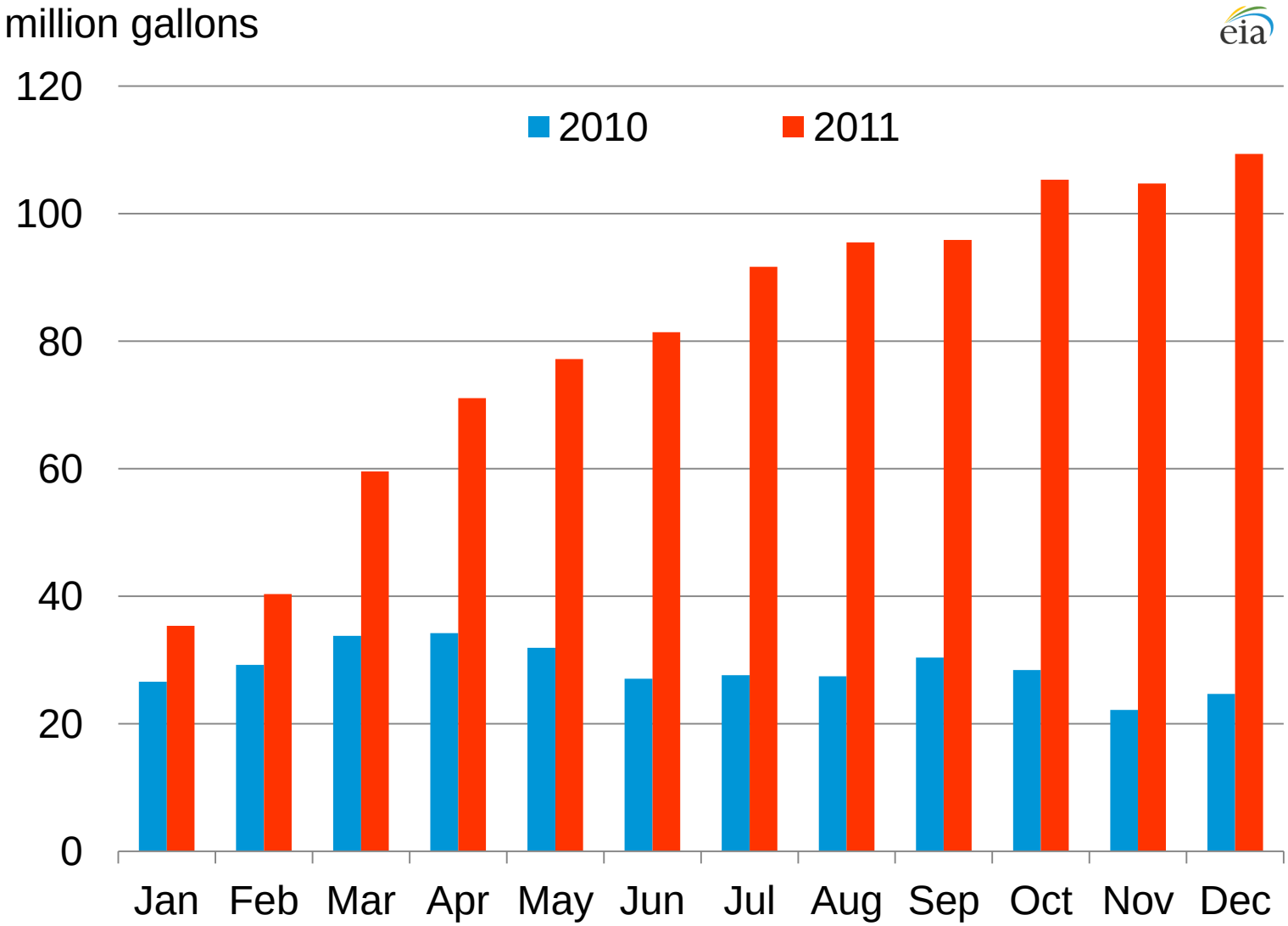
Biofuels Production

- Ethanol production reached historically high levels in 2011 but could not match growth rates achieved in prior years.
  - Uncertain market for higher production levels
  - Higher corn prices acted as a brake on growth
- Ethanol production in 2011 was 13.9 billion gallons, compared to 13.3 billion gallons in 2010.
- Biodiesel recovered strongly in 2011 with a temporary extension of the Federal excise tax credit and an increase in the Biomass-Based Diesel portion of the Renewable Fuels Standard.
- EIA estimates biodiesel production of 967 million gallons for 2011. Production for all of 2010 was 343 million gallons.

Ethanol Production



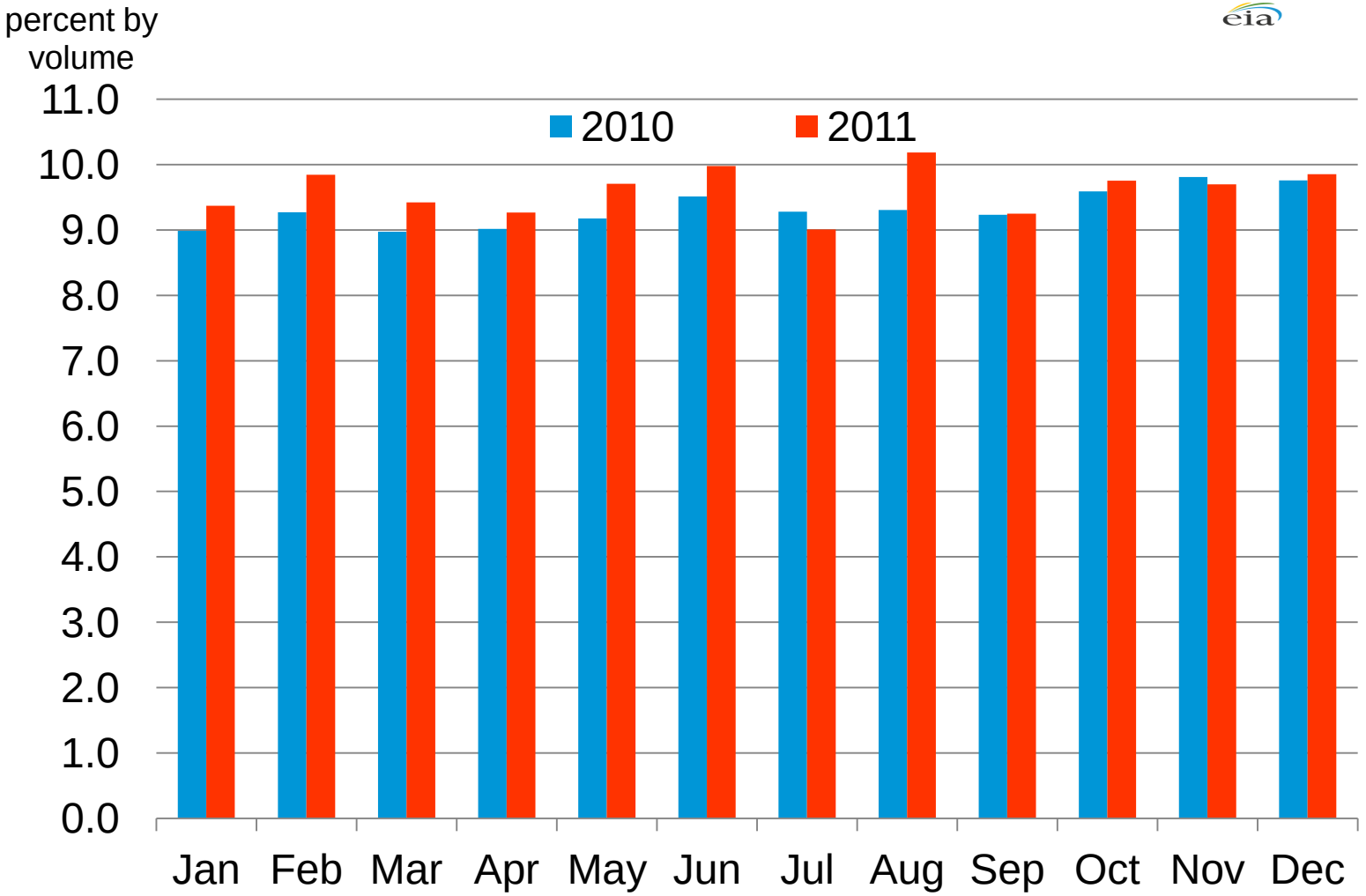
Biodiesel Production



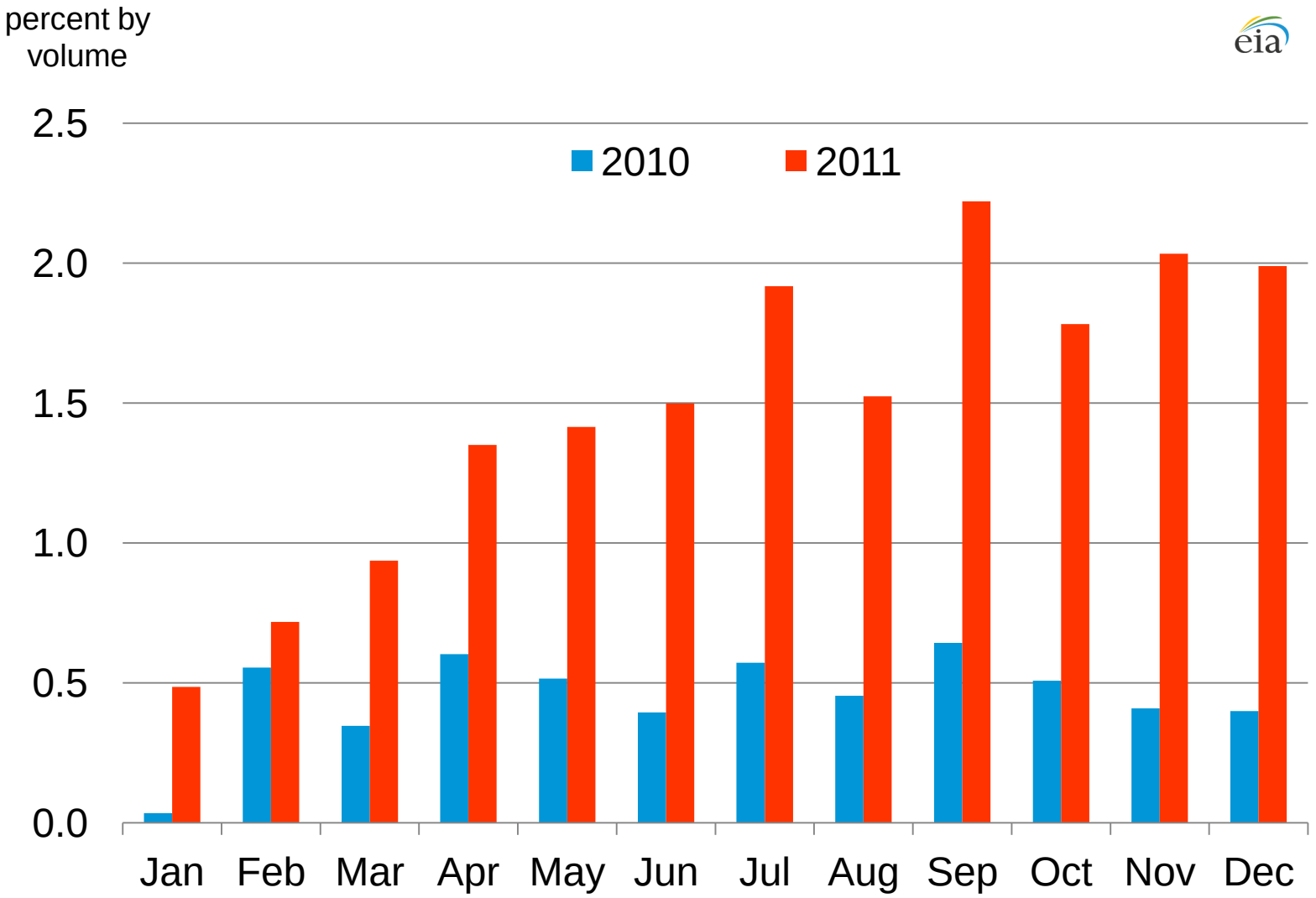
Biofuels Consumption

- Consumption of ethanol in gasoline blends with more than 10 percent ethanol by volume grew in 2011.
  - In 2011, U.S. refiners and blenders produced 38.2 million gallons of gasoline with ethanol content above 55 percent by volume
- The average concentration of ethanol in gasoline for all of 2011 was 9.6 percent.
- Biodiesel consumption in distillate grew strongly but remained well below the 5-percent volume limit that is currently recommended for all diesel engines.
- Biodiesel's share of all distillate peaked just above 2 percent in September 2011.

Ethanol Share of U.S. Gasoline Supply



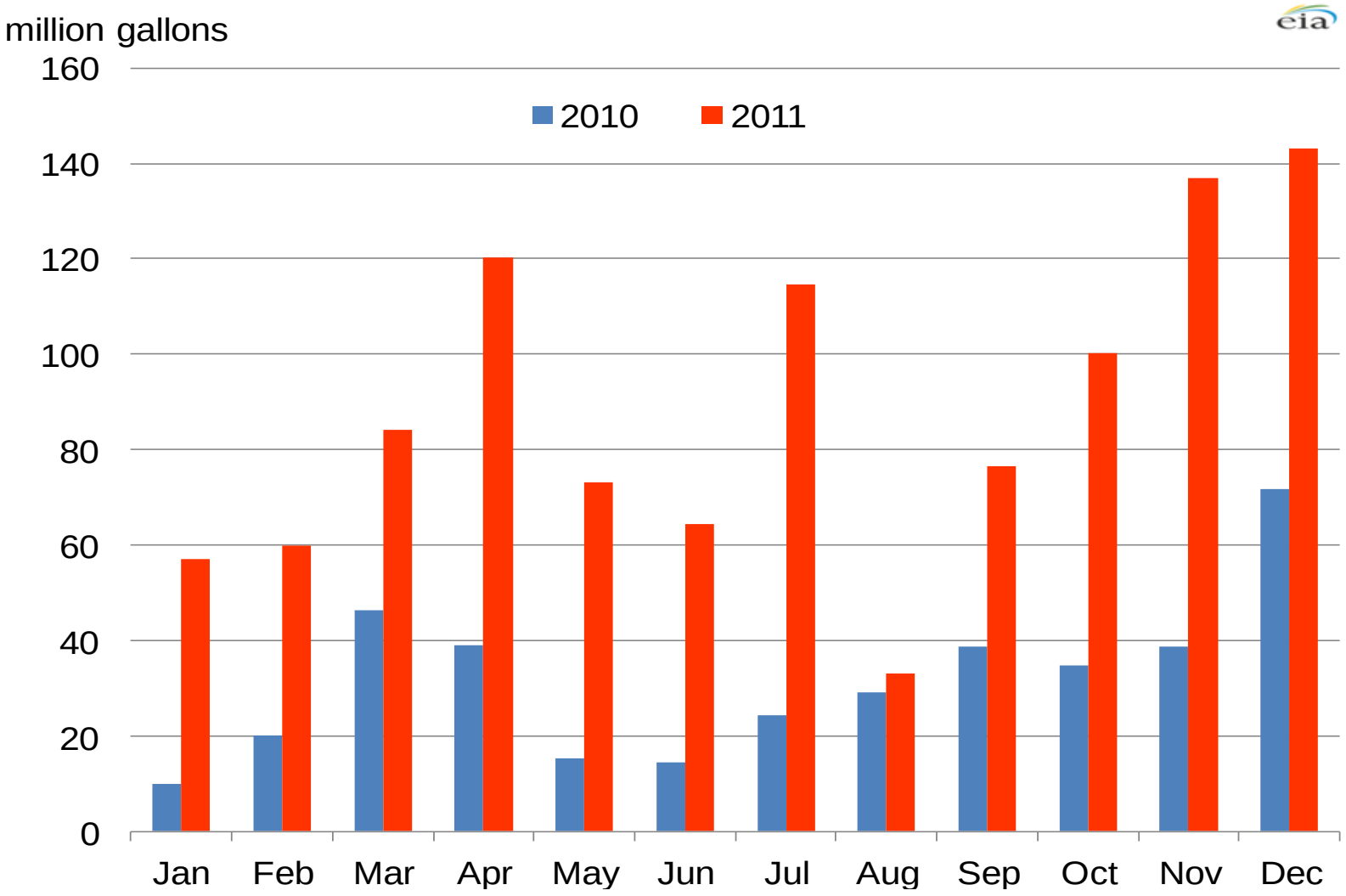
Biodiesel Share of U.S. Distillate Supply



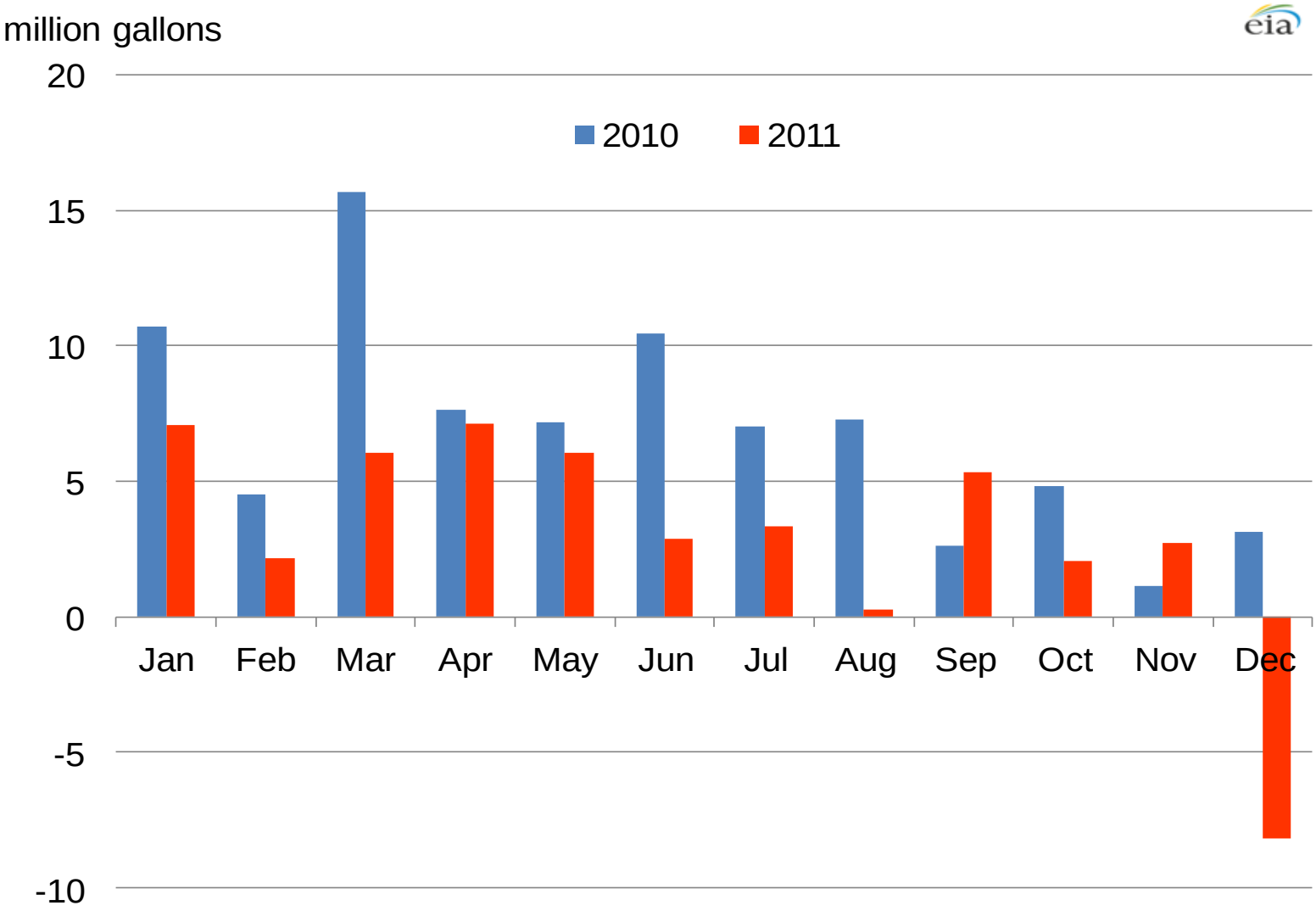
Biofuels Imports and Exports

- The United States became a net exporter of fuel ethanol for the first time in 2010
  - U.S. gasoline pool nearly saturated with ethanol
- The United States was the source of more than 90 percent of Brazil's ethanol imports in 2010 and the first half of 2011.
  - Poor sugar cane harvest in Brazil
  - Cane ethanol needed to meet the Renewable Fuels Standard and the California Low Carbon Fuels Standard
- Net exports of ethanol in 2011 were 1.06 billion gallons.
- The United States was also the largest source of Brazil's biodiesel imports in 2010 and in the first half of 2011.
- Net exports of biodiesel in 2011 were 37 million gallons
  - Trend away from exports and toward domestic consumption

U.S. Net Exports of Ethanol



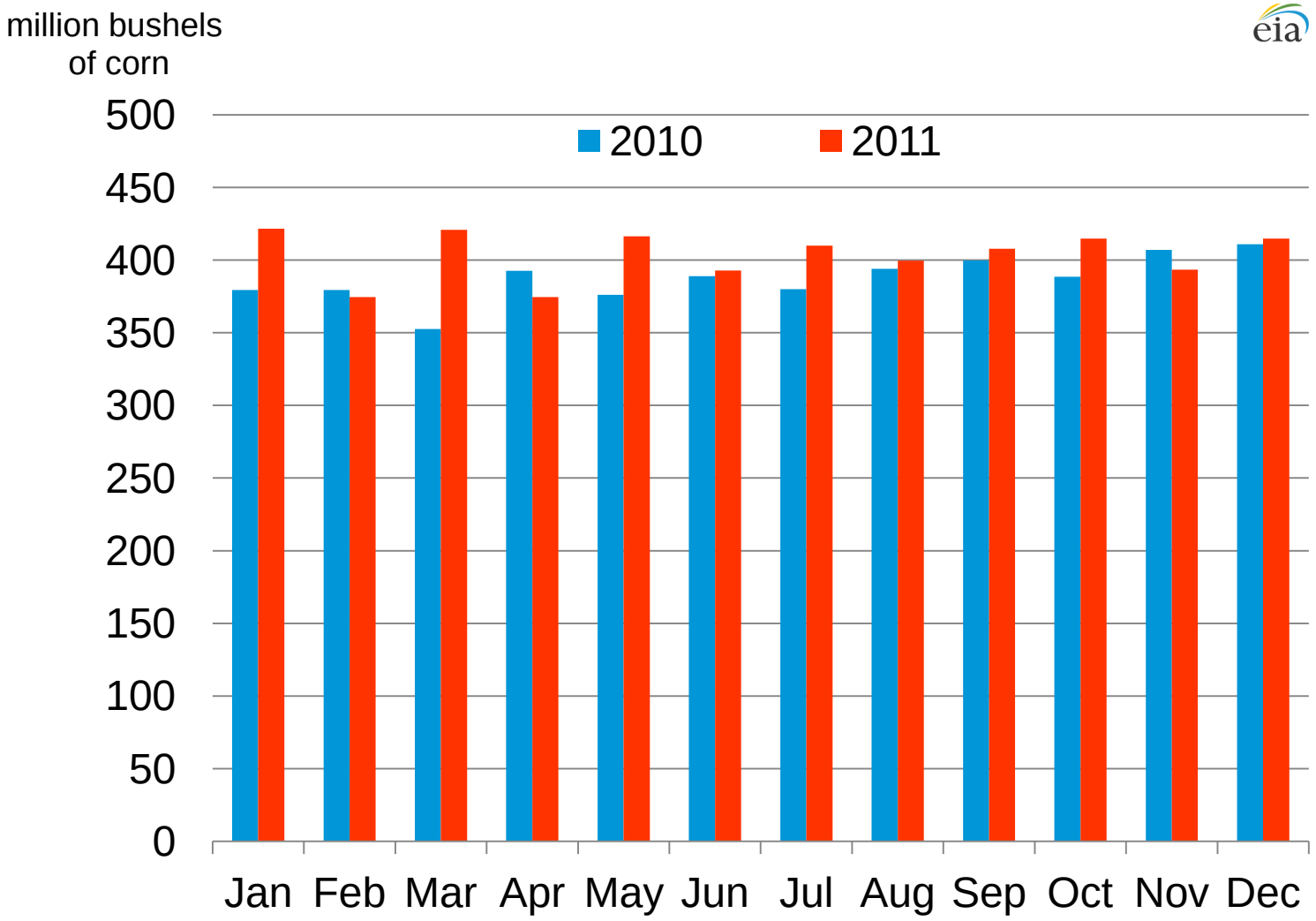
Net Exports of Biodiesel



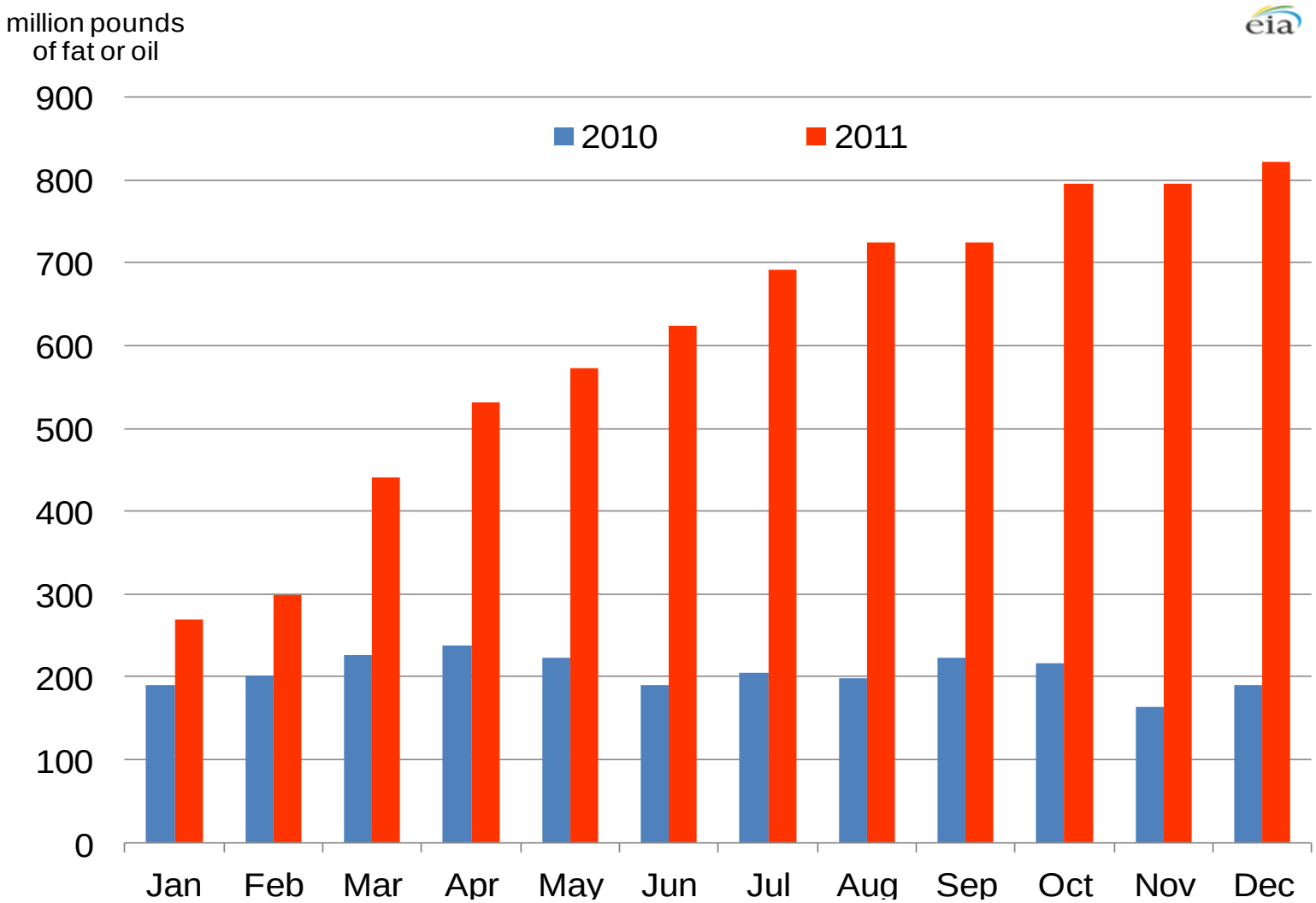
Biofuels Raw Material Input

- 38 % of United States corn production was used for biofuels production during the 2010/11 marketing year.
  - Corn marketing year begins September 1.
- 14 % of United States soybean oil production was used for biofuels production during the 2010/11 marketing year.
  - Soybean oil marketing year begins October 1.
- Corn use for ethanol production was estimated at 4.6 billion bushels (260 billion pounds) in 2010 and 4.8 billion bushels (271 billion pounds) in 2011.
- The use of vegetable oil and animal fat for biodiesel production was 2.5 billion pounds in 2010, and 7.3 billion pounds in 2011.

Feedstock Input to Ethanol Production



Feedstock Input to Biodiesel Production



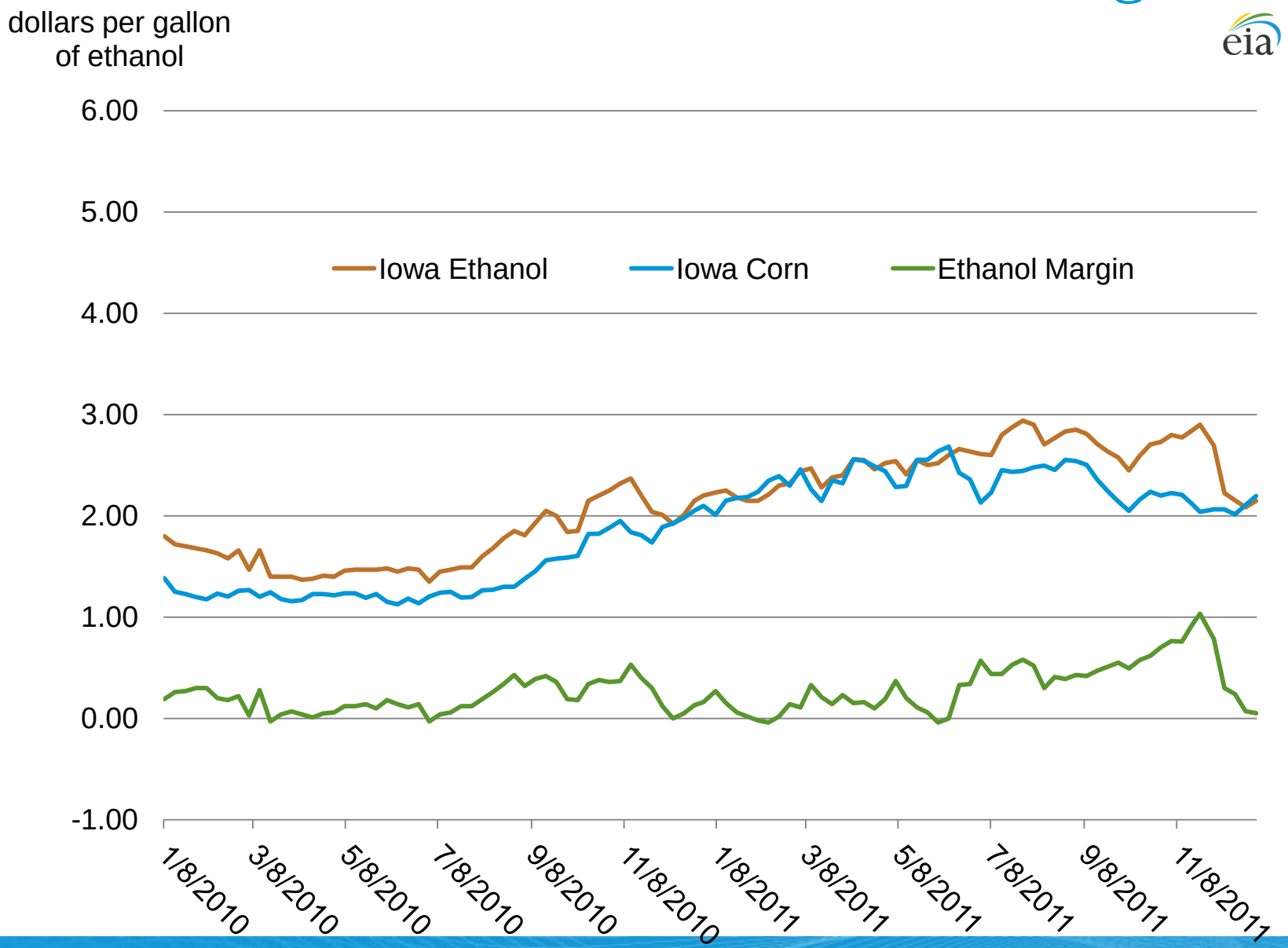
Biofuels Prices and Producer Margins

•The profitability of individual ethanol and biodiesel producers may depend on unobserved firm-specific factors.

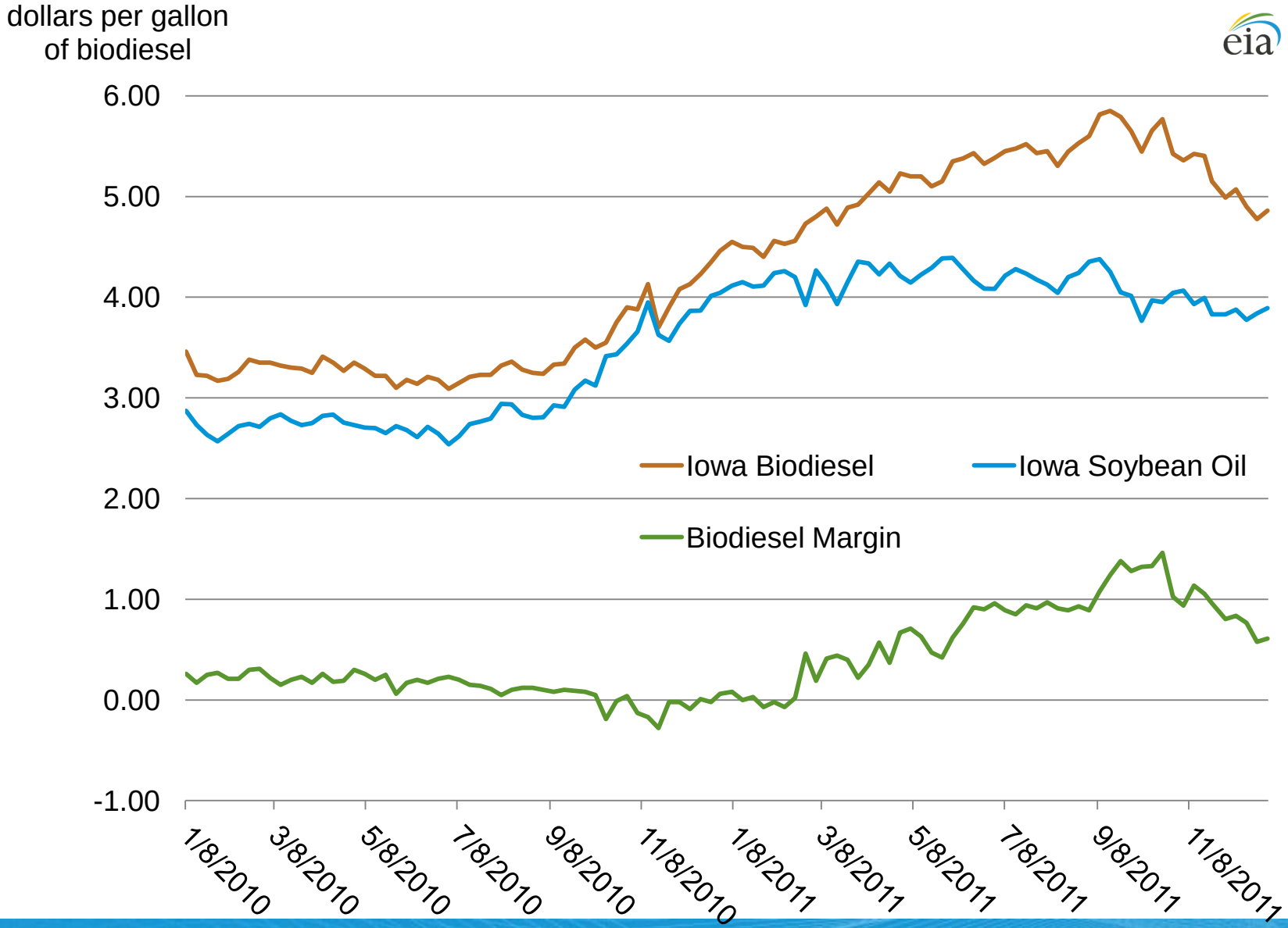
•Trends in variable cost common to all producers can be evaluated using producer margins calculated from spot prices of inputs and outputs

- Biodiesel margin calculation includes:
  - Prices of biodiesel, soybean oil, and methanol
  - Estimated credit of 3 cents per gallon for glycerine (produced as a byproduct)
  - Estimated operating cost of 25 cents per gallon
- Ethanol margin calculation includes
  - Prices of corn, ethanol, and distiller grains (the byproduct of most ethanol producers)
  - Cost of natural gas
  - Estimated operating cost of 35 cents per gallon

Iowa Wholesale Prices and Ethanol Margins



Iowa Wholesale Prices and Biodiesel Margins



Biofuels Legislation and Regulation

- The Federal tax credit for ethanol blending into gasoline expired.
- The reinstatement of the Federal tax credit for biodiesel and the Biomass-Based Diesel standard helped the biodiesel industry recover in 2011.
- The tariff on imported fuel ethanol also expired at the end of 2011.
- EPA granted a key regulatory approval to increase the allowable ethanol content in gasoline from 10 percent to 15 percent
- California continued work on its Low Carbon Fuels Standard
  - Implementation began but was subsequently halted for the remainder of 2011 as two separate lawsuits worked their way through the State and Federal courts.
  - The injunction was lifted in April 2012, pending further litigation.

Biofuels Infrastructure

- Recent investments in ethanol distribution have been geared toward efficiency improvement.
  - Wholesale distribution infrastructure for ethanol allows the blending of nearly every gallon of gasoline with ethanol.
- Plans to upgrade three rail terminals were announced in 2011.
  - One of which will feed ethanol into a pipeline
- A multi-company plan to build a dedicated ethanol pipeline from the Midwest to the Northeast was placed on hold in 2011.
- There is interest in shipping biodiesel blends on pipelines
  - Allowance for minimal amounts of biodiesel in jet fuel is needed
- Some upgrades to service station pumps may be needed to dispense ethanol blends above E10.
- Existing wholesale and retail infrastructure appears to be able to accommodate considerably more biodiesel without modification.

Biofuels Technology Progress

- Biodiesel producers increased the range of vegetable oils and animal fats that they consume as raw materials
  - Movement to a more diverse mix including soybean oil, non-food grade corn oil, as well as various types of waste greases.
  - There were also several experiments with oils from algae or cyanobacteria.
- Vegetable oil or animal fat can be reacted with hydrogen to produce hydrocarbons, instead of being reacted with alcohol to produce biodiesel.
  - Hydrotreatment produces renewable jet fuel or renewable diesel fuel that does not adversely affect jet fuel when the two products are shipped on the same petroleum product pipeline.
- There are many ethanol plant upgrades completed or under development to extract corn oil from distiller's grains.
  - The corn oil can be used to produce biodiesel or renewable diesel

Cellulosic Biofuels Projects in Procurement, Capacity and Startup Dates

million gallons	
2012	19
KiOR	11
INP Bioenergy	8
2013	48
Abengoa Bioenergy	23
POET	25
Grand Total	67

For more information

U.S. Energy Information Administration home page | www.eia.gov

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