Biofuels in the United States: Context and Outlook

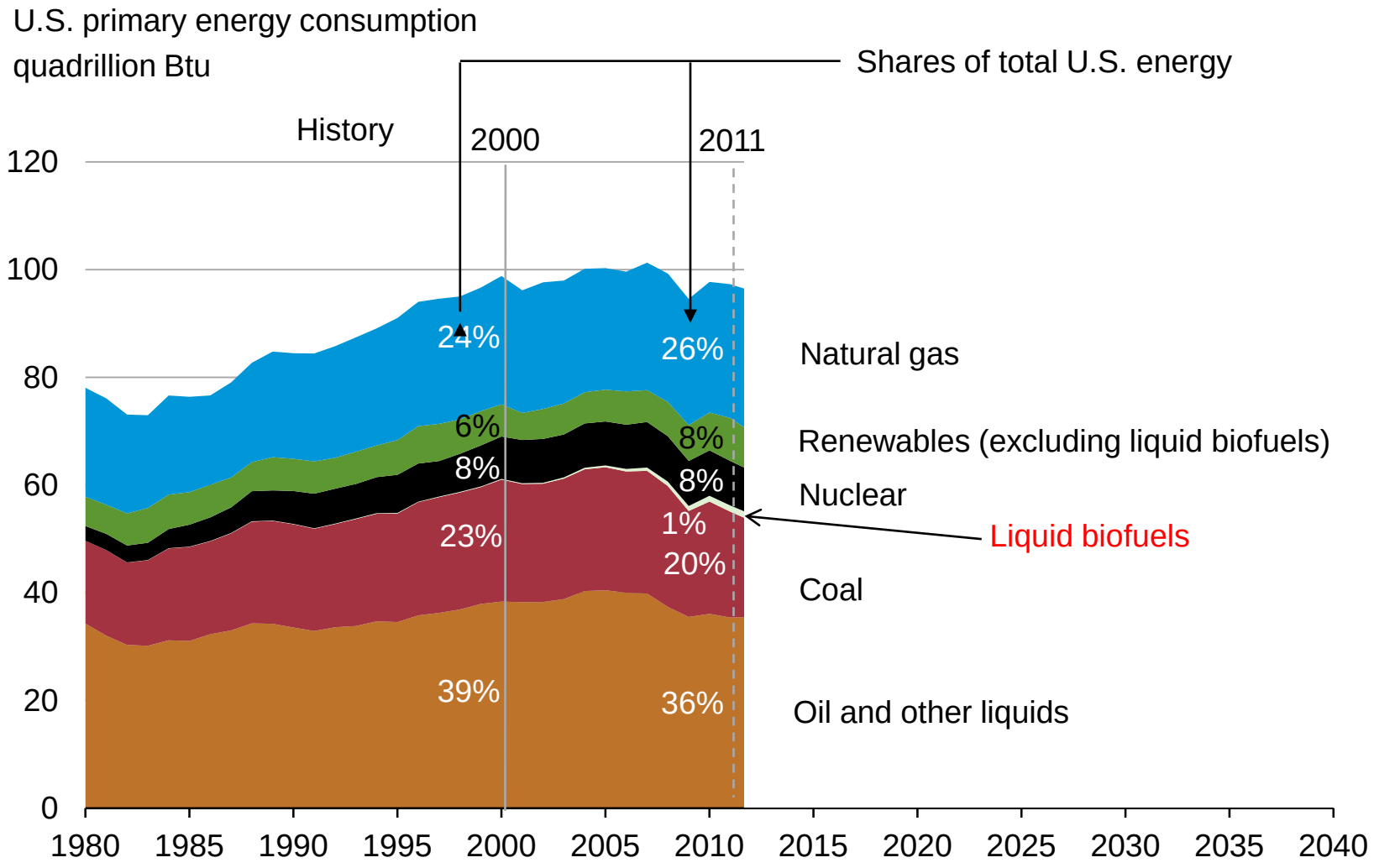
Biofuels Workshop
Institute of Medicine, National Academy of Sciences
January 24, 2013 | Washington, DC

By
Howard Gruenspecht, Deputy Administrator

Topics addressed

- Current role of biofuels
- Biofuels outlook – EIA's Annual Energy Outlook 2013 Reference case
- Biofuels and fuel market segmentation
- Biofuels in the context of multiple policy issues

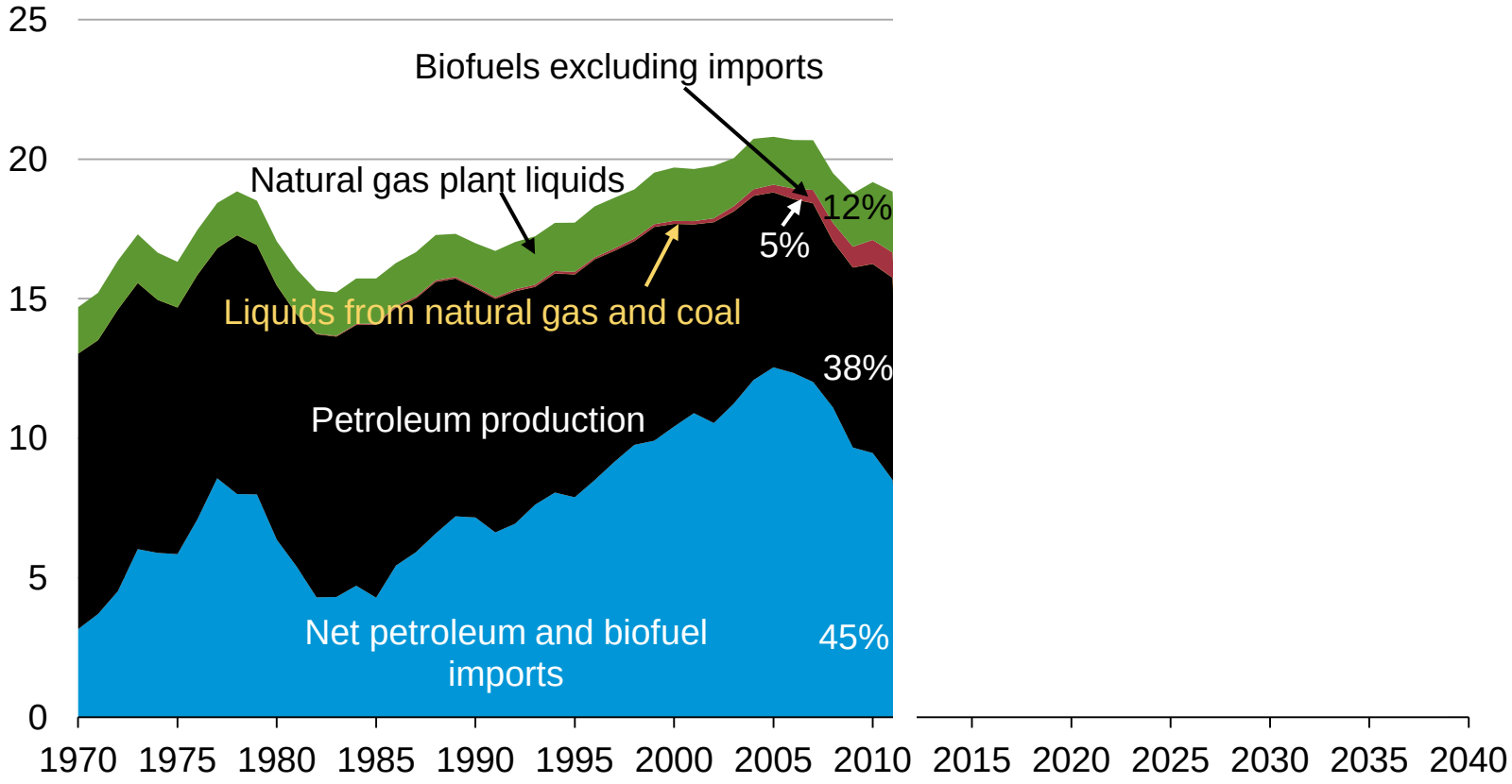
Liquid biofuels currently provide about 1 percent of total U.S. energy



Source: EIA, Annual Energy Outlook 2013 Early Release

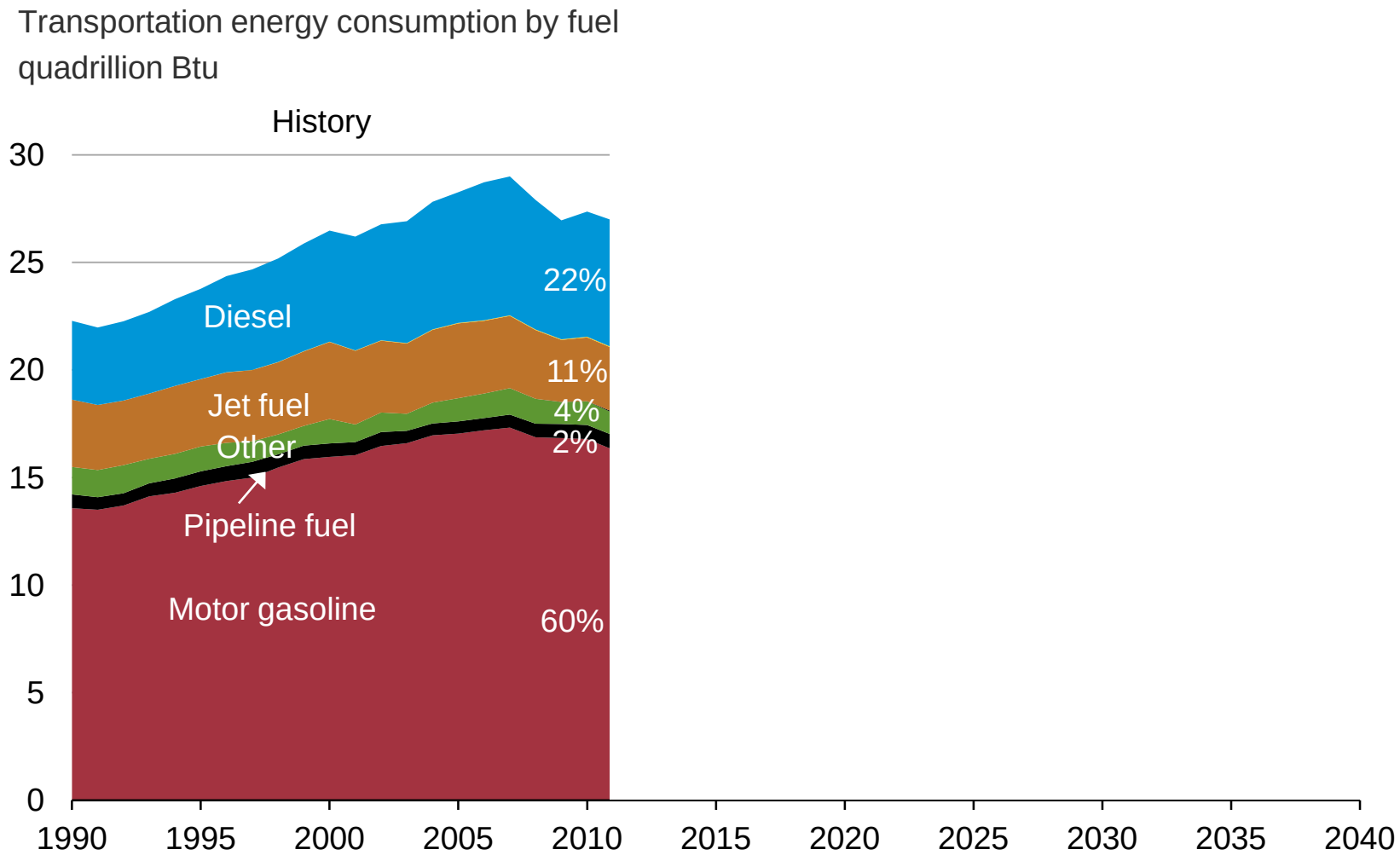
The import share of U.S. liquid fuels use has been declining since 2005

U.S. liquid fuels supply
million barrels per day



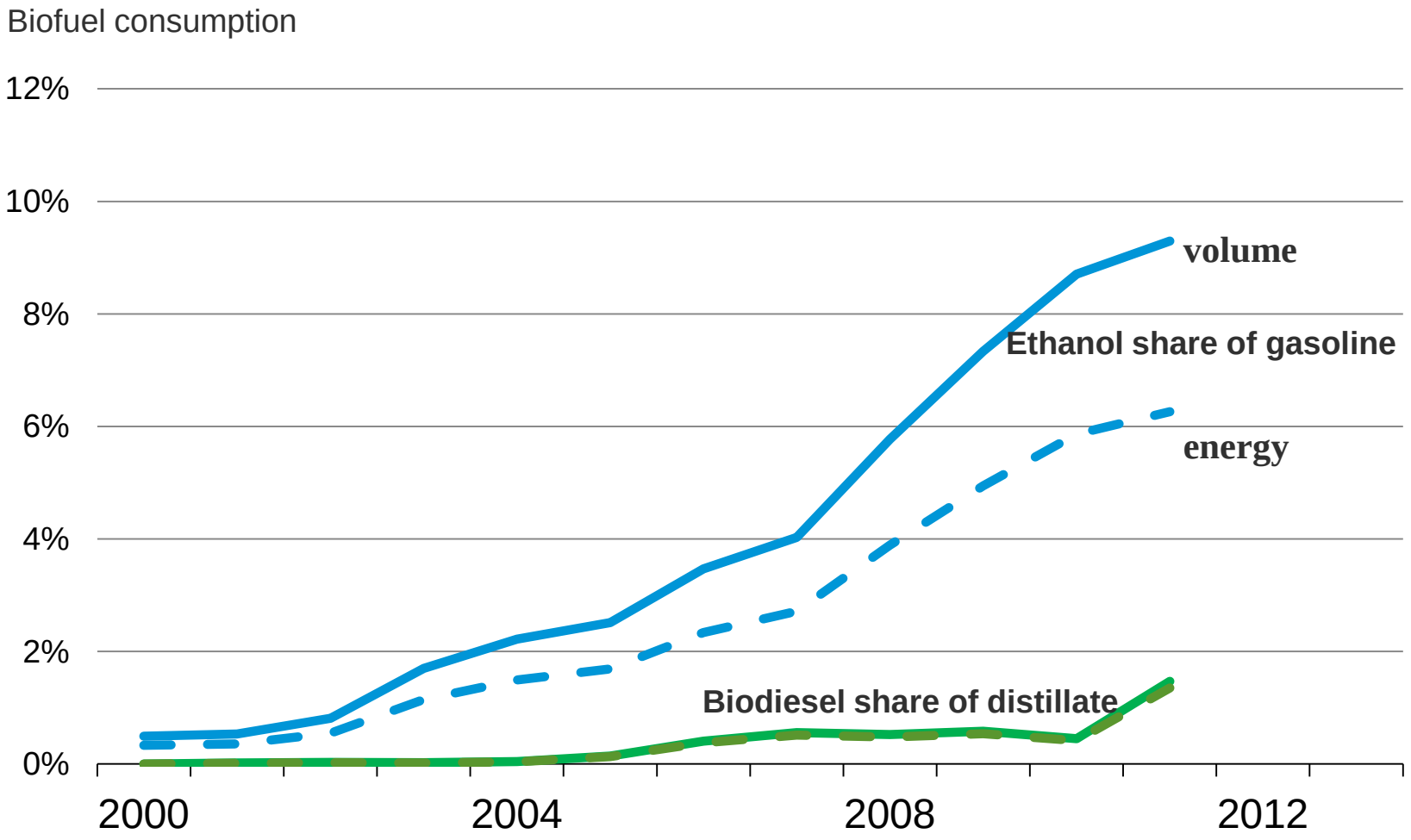
Source: EIA, Annual Energy Outlook 2013 Early Release

Transportation sector motor gasoline has been declining since 2007



Source: EIA, Annual Energy Outlook 2013 Early Release

Despite recent growth, ethanol and biodiesel provide a modest share of U.S. motor fuels

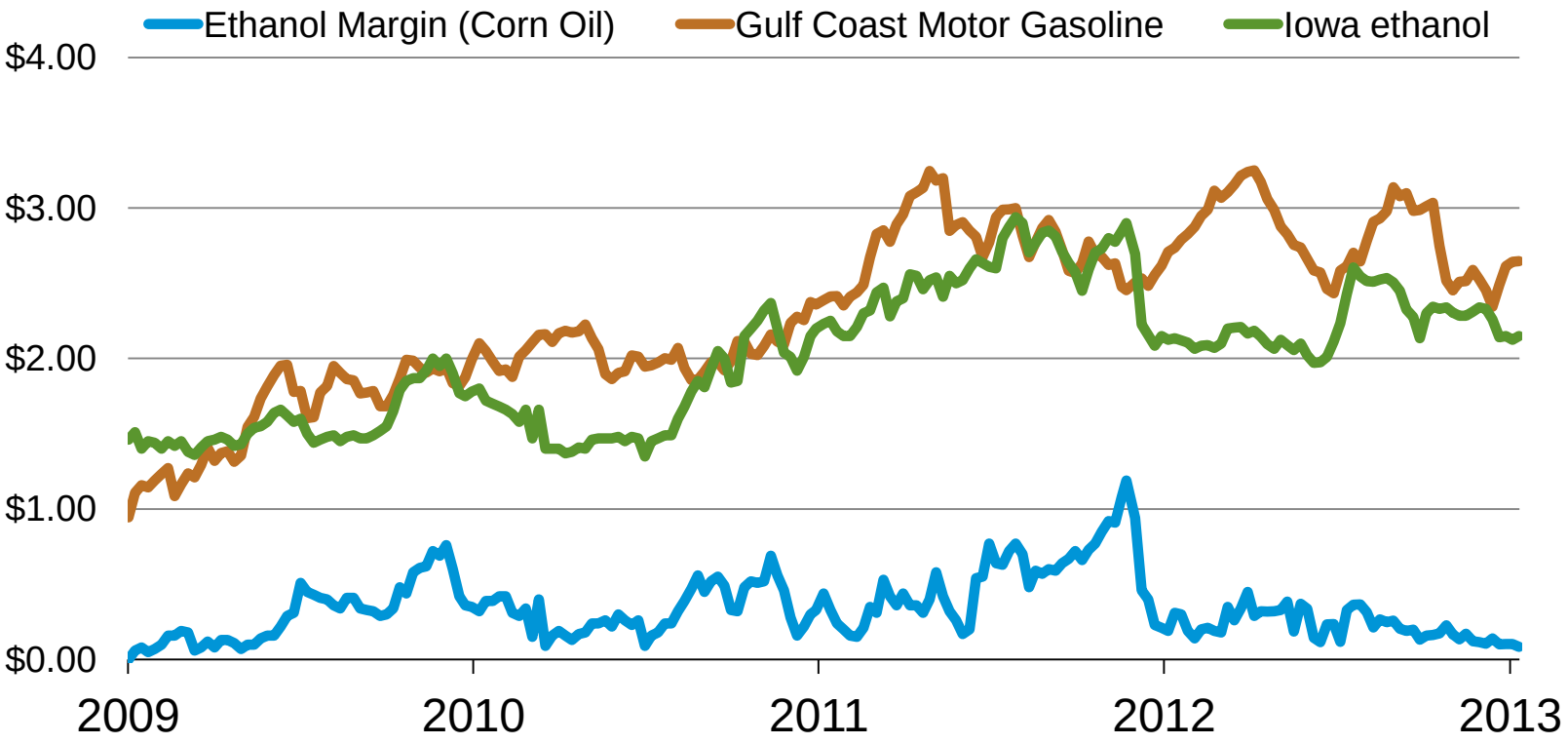


Source: EIA, Short-Term Energy Outlook, November 2012.

Ethanol is cheaper than gasoline on a volume basis

Gasoline and ethanol prices and ethanol margins

Dollars per gallon

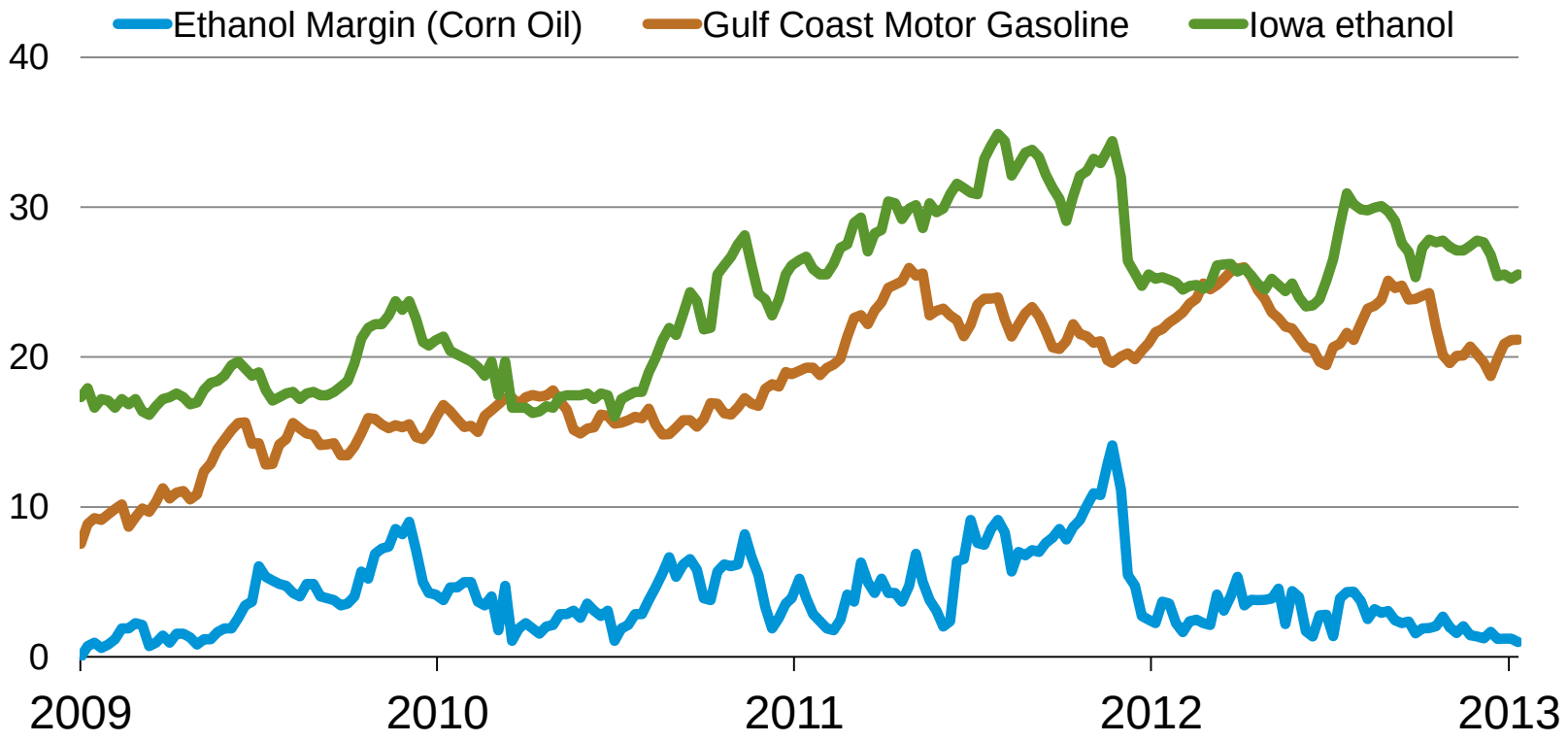


Source: Calculated from USDA Agricultural Marketing Service, National Weekly Ethanol Summary http://www.ams.usda.gov/mnreports/LSWEthanol.pdf; Thomson-Reuters Henry Hub natural gas prices, http://www.eia.gov/dnav/ng/hist/rngwhhdd.htm; Weekly U.S. Gulf Coast Conventional Gasoline Regular Spot Price FOB, http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=EER_EPMRU_PF4_RGC_DPG&f=W. .

…..but more expensive than gasoline on an energy content basis

Gasoline and ethanol prices and ethanol margins

Dollars per million Btu

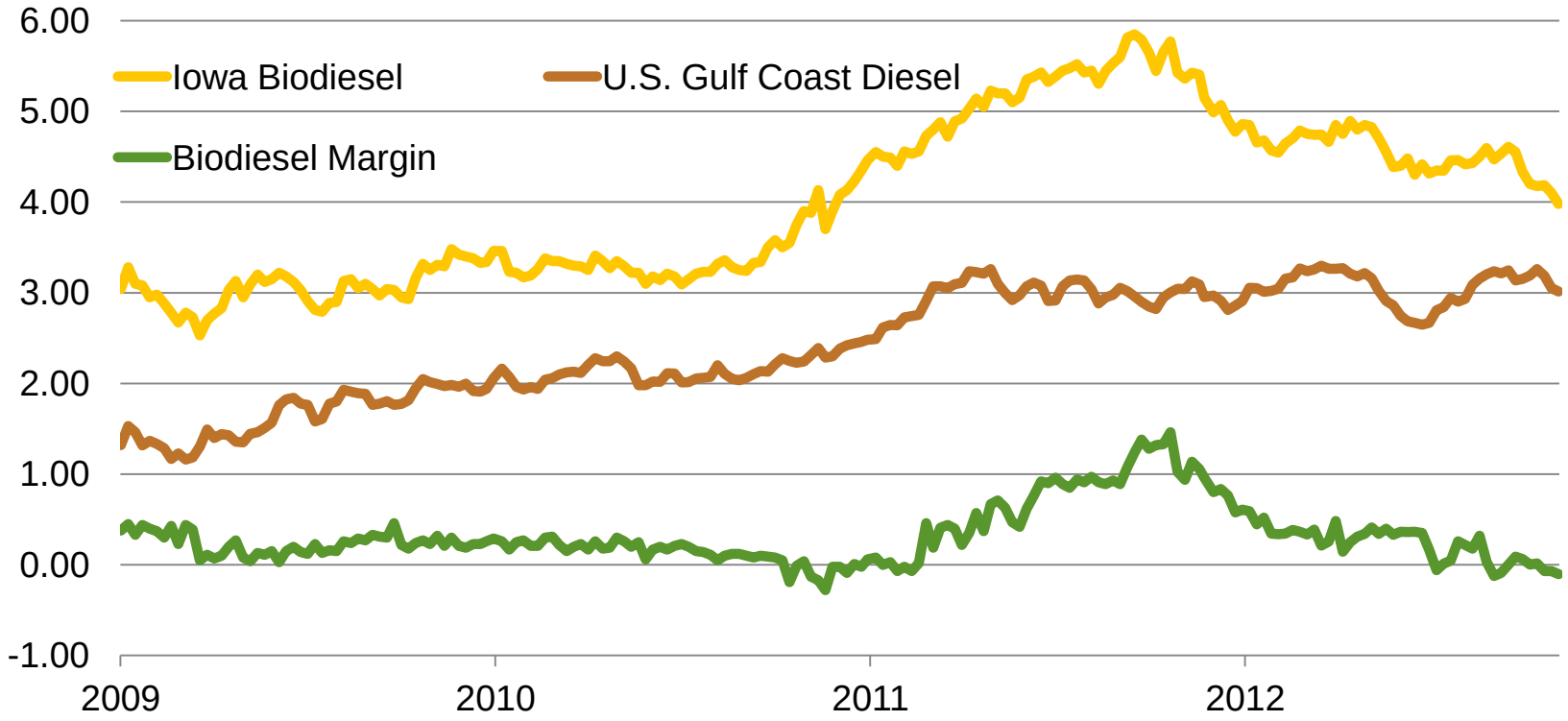


Source: Calculated from USDA Agricultural Marketing Service, National Weekly Ethanol Summary http://www.ams.usda.gov/mnreports/LSWEthanol.pdf; Thomson-Reuters Henry Hub natural gas prices, http://www.eia.gov/dnav/ng/hist/rngwhhdd.htm; Weekly U.S. Gulf Coast Conventional Gasoline Regular Spot Price FOB, http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=EER_EPMRU_PF4_RGC_DPG&f=W. .

Biodiesel costs more than than diesel fuel

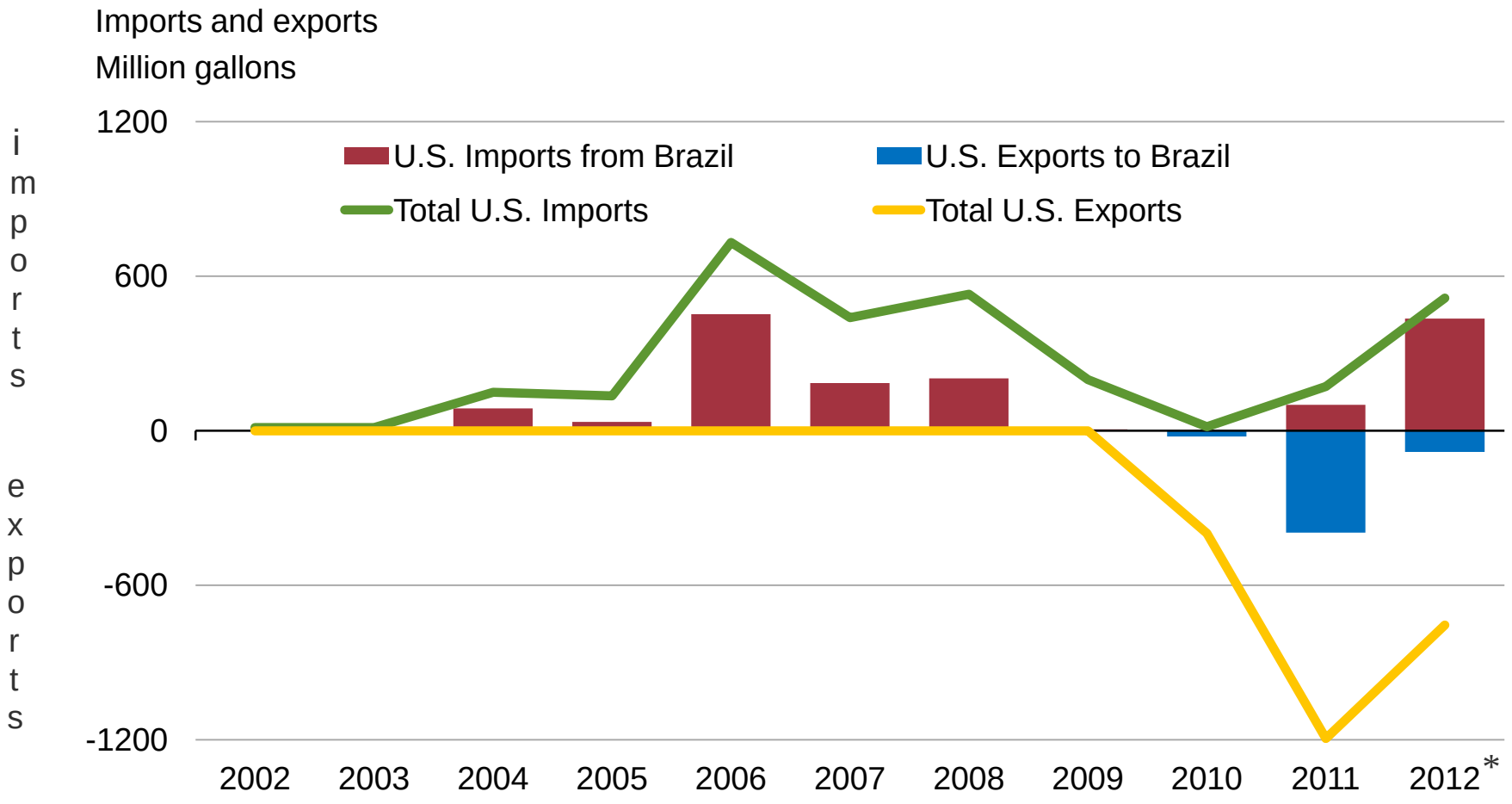
Diesel prices, biodiesel prices, and biodiesel margins

Dollars per gallon



Source: Calculated from USDA Agricultural Marketing Service, National Weekly Ag Energy Roundup, http://www.ams.usda.gov/mnreports/LSWAgEnergy.pdf; National Weekly Ag Energy Roundup and Methanex historical methanol prices, http://www.methanex.com/products/documents/MxAvgPrice_Feb282012.pdf. EIA, Weekly U.S. Gulf Coast Ultra-Low-Sulfur No. 2 Diesel Spot Price, http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=EER_EPD2DXL0_PF4_RGC_DPG&f=W.

Since 2010, the United States has been a net ethanol exporter; we have two-way ethanol trade with Brazil



** 2012 data includes actual data through October plus estimated data for November and December.*

Source: EIA, U.S. Imports of Fuel Ethanol by Destination,
http://www.eia.gov/dnav/pet/PET_MOVE_IMPCUS_A2_NUS_EPOOXE_IM0_MBBL_M.htm.

As tax incentives are phased out, biofuels policy is increasingly focused on mandates

- Three Federal tax incentives expired at the end of 2011 – one remains
  - Ethanol blending tax credit (45 cents per gallon)
  - Biodiesel blending tax credit ($1 per gallon)
  - Ethanol import tariff (54 cents per gallon)
  - The tax credit for cellulosic ethanol ($1.01 per gallon) was scheduled to expire at the end of 2012, but was extended in the “fiscal cliff” legislation
- Renewable Fuels Standard
  - Enacted with Energy Policy Act of 2005 (RFS) and expanded by the Energy Independence and Security Act of 2007 (RFS2)
- California continues to pursue its Low Carbon Fuel Standard
  - State policy to reduce greenhouse gas emissions from motor vehicles.

The targets for cellulosic biofuels are very ambitious

Renewable Fuels Standard requirements
Billion ethanol-gallon equivalents

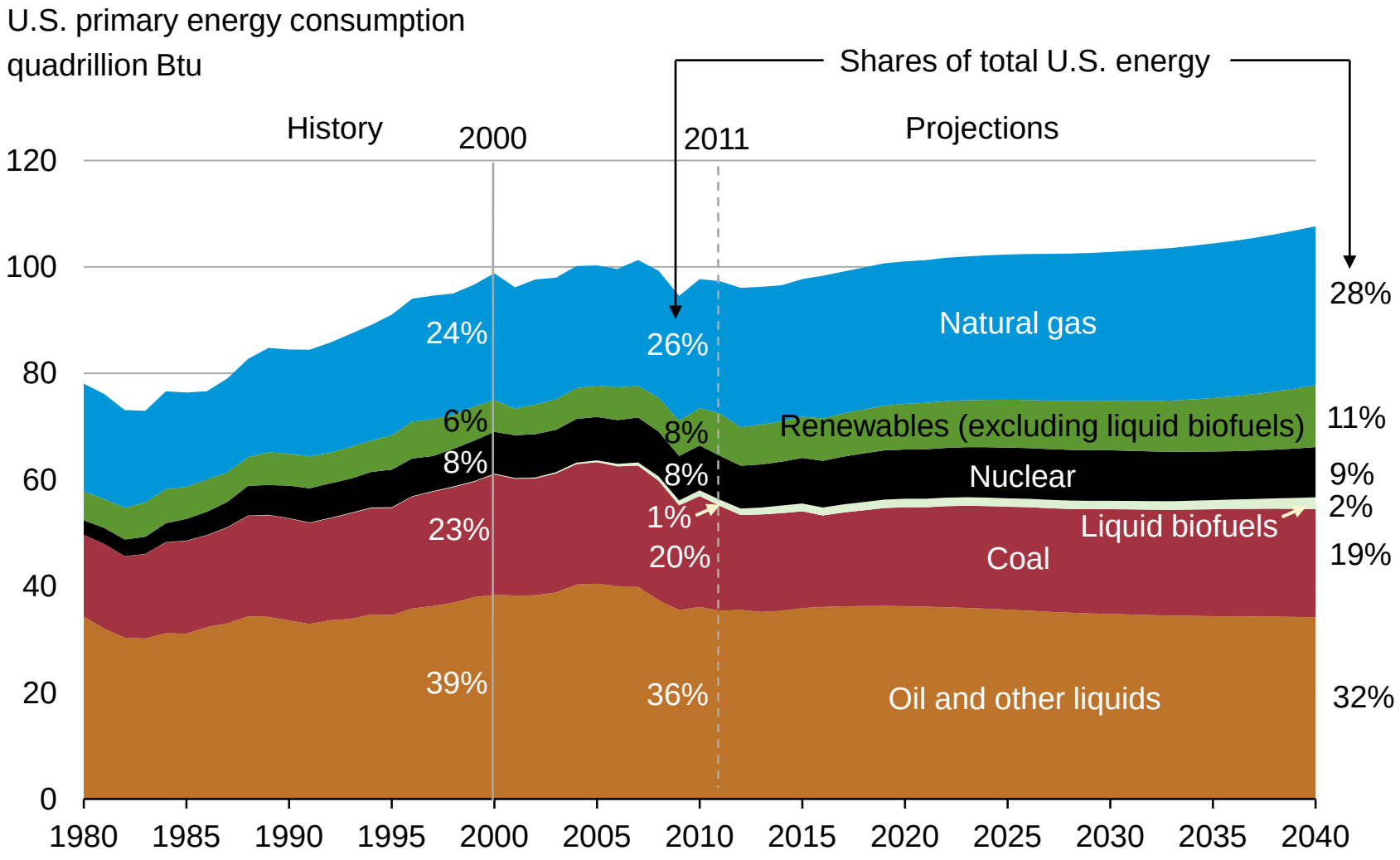
Year	Total Biofuel (including Advanced)	Advanced Biofuel (including Cellulosic and Biodiesel)	Cellulosic		Biodiesel (physical gallons)
			Statutory Goal	EPA Final Rule	
2009	11.1	0.6	0	0.00650	
2010	12.95	0.95	0.1		1.15
2011	13.95	1.35	0.25	0.00600	0.8
2012	15.2	2	0.5	0.01045	1
2013	16.55	2.75	1	?	1.28
2014	18.15	3.75	1.75	?	?
2015	20.5	5.5	3	?	?
2016	22.25	7.25	4.25	?	?
2017	24	9	5.5	?	?
2018	26	11	7	?	?
2019	28	13	8.5	?	?
2020	30	15	10.5	?	?
2021	33	18	13.5	?	?
2022	36	21	16	?	?

The Outlook for Biofuels: AEO2013 Reference case projections

Key results from the *AEO2013* Reference case:

- Growth in energy production outstrips consumption growth
- Crude oil production, particularly from tight oil plays, rises sharply over the next decade
- Natural gas production grows faster than in previous projections, serving the industrial and power sectors and an expanding export market
- Motor gasoline consumption reflects the introduction of more stringent fuel economy standards, while diesel fuel consumption is moderated by increased natural gas use in heavy-duty vehicles
- The U.S. becomes a larger exporter of natural gas and coal than was projected in earlier projections
- All renewable fuels grow, but biomass and biofuels growth is slower than in previous projections
- U.S. energy-related carbon dioxide emissions remain more than five percent below their 2005 level through 2040, reflecting increased efficiency and the shift to a less carbon-intensive fuel mix

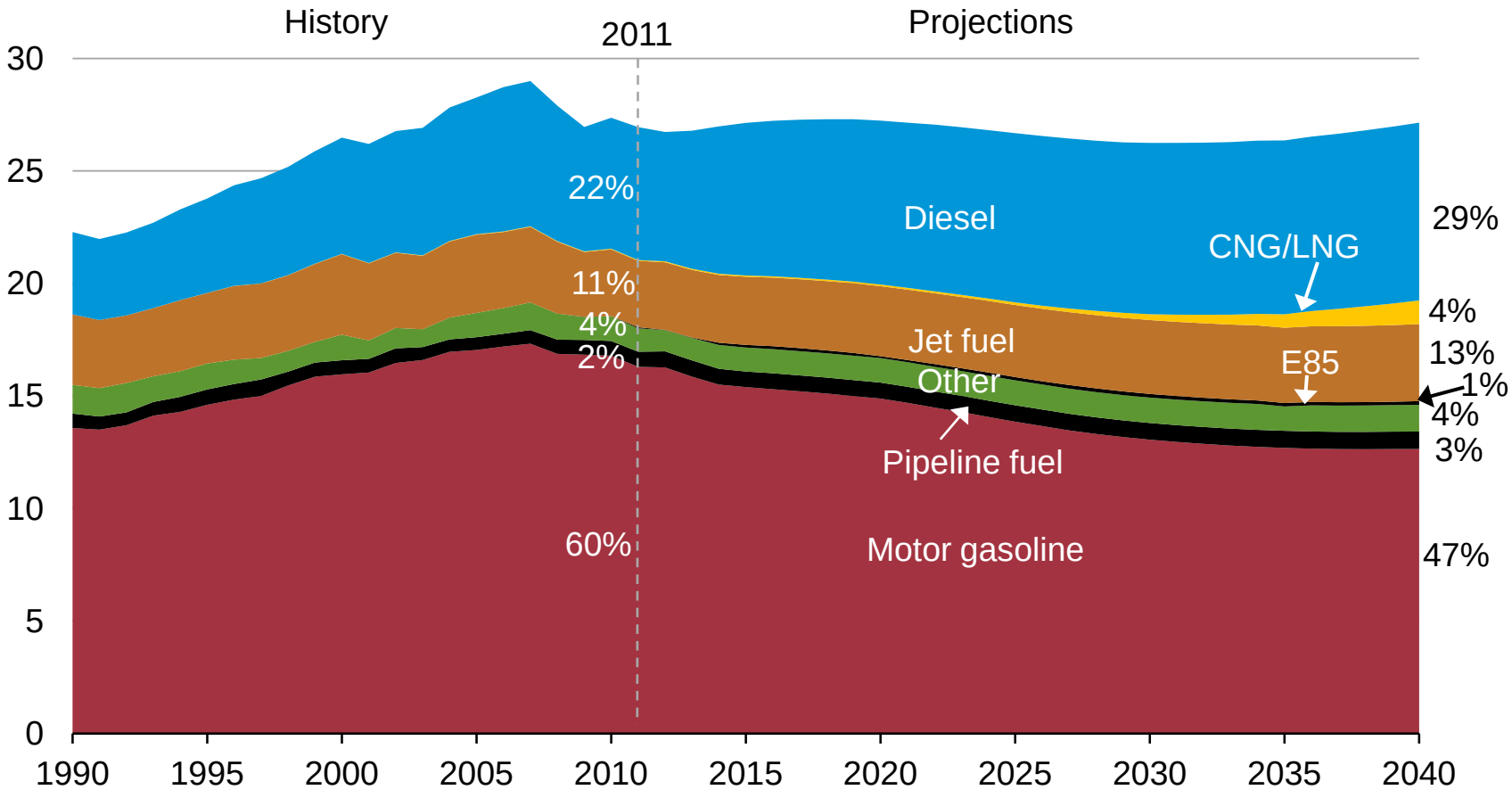
U.S. energy use grows slowly over the projection reflecting improving energy efficiency. Liquid biofuels gain share but remain a small source.



Source: EIA, Annual Energy Outlook 2013 Early Release

Transportation sector motor gasoline demand is projected to fall further

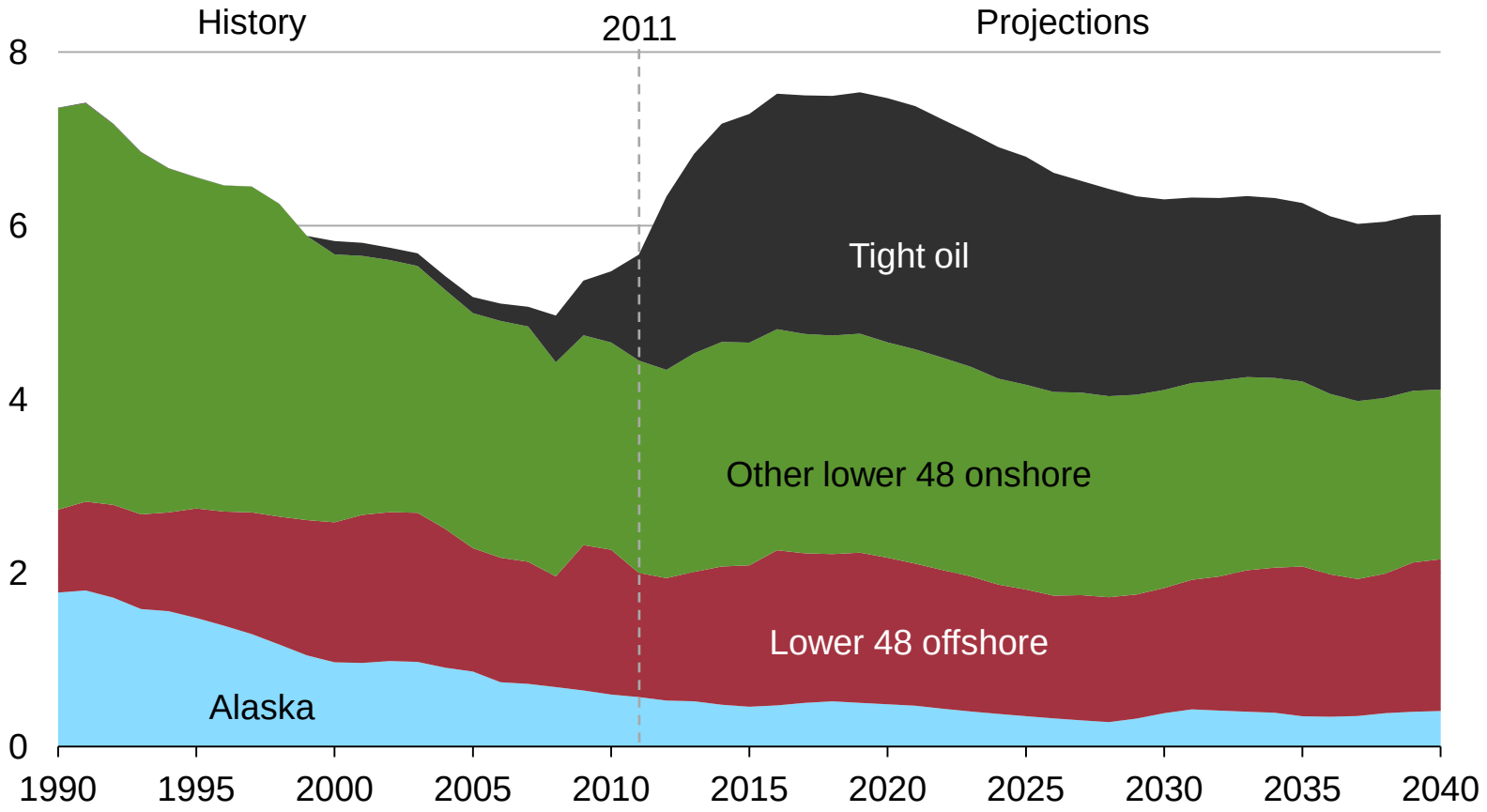
Transportation energy consumption by fuel
quadrillion Btu



Source: EIA, Annual Energy Outlook 2013 Early Release

U.S. tight oil production leads a growth in domestic crude oil production of 2.6 million barrels per day between 2008 and 2019

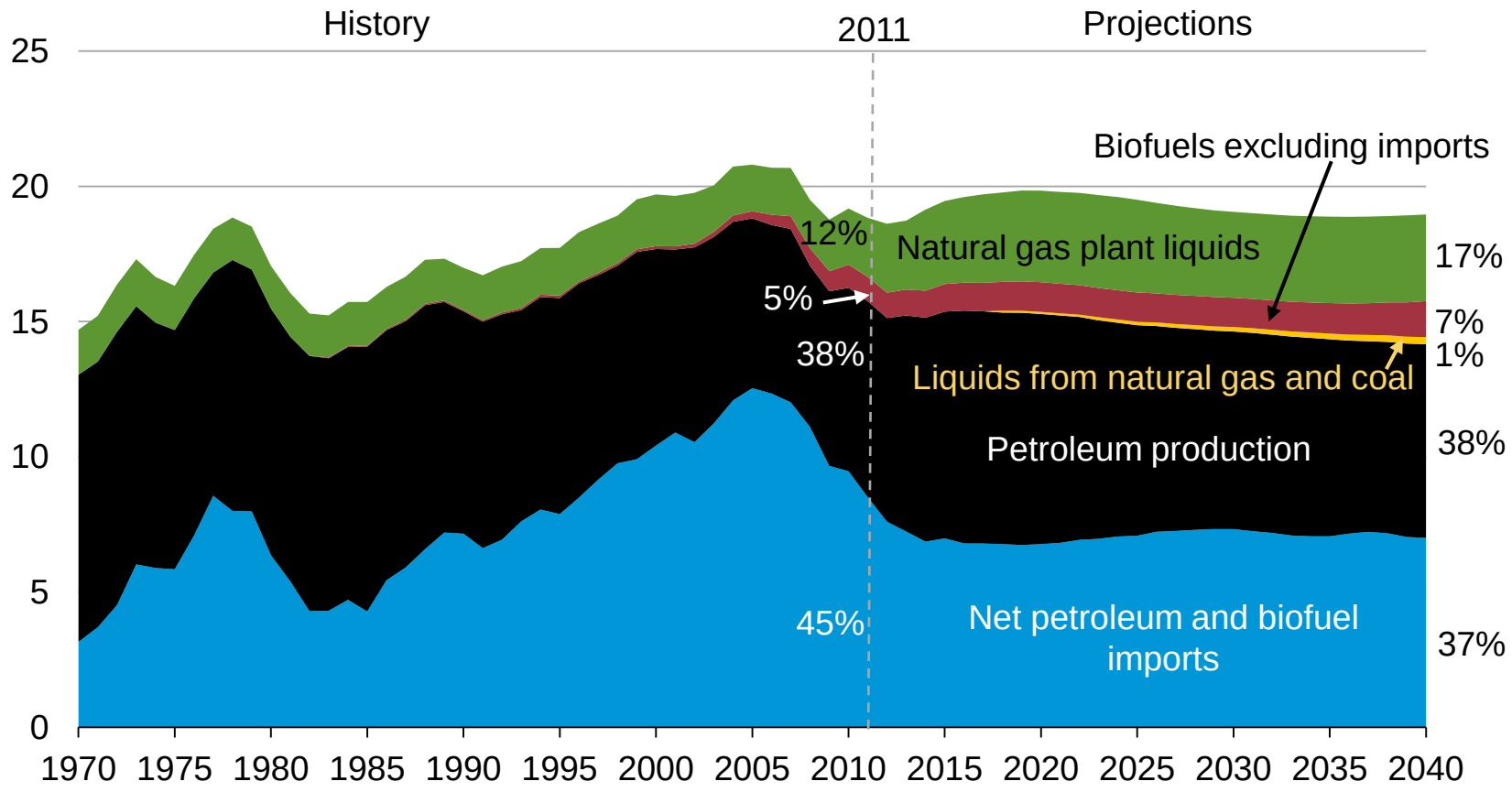
U.S. crude oil production
million barrels per day



Source: EIA, Annual Energy Outlook 2013 Early Release

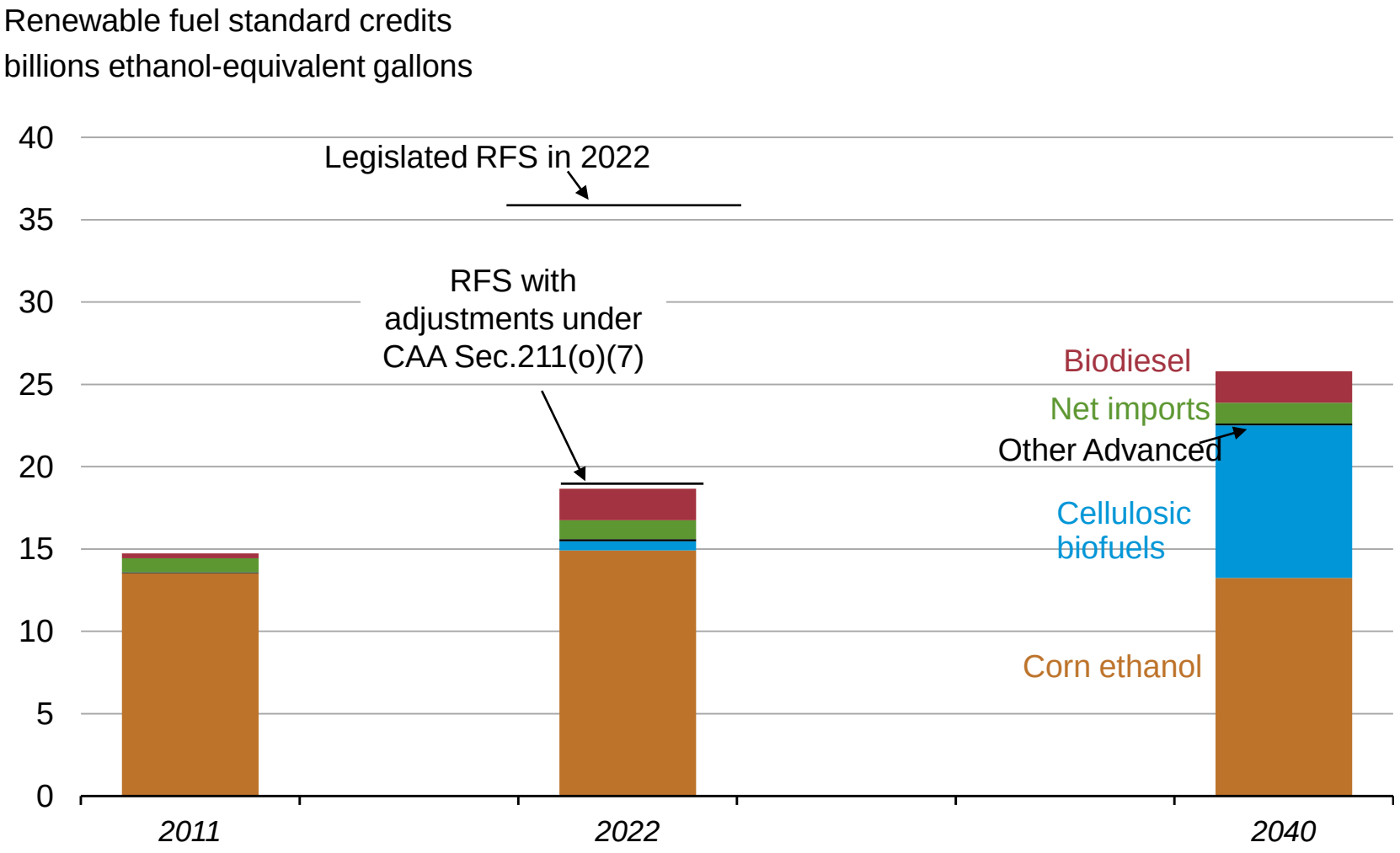
U.S. import share of liquid fuels falls due to increased production of tight oil and gas liquids, and greater fuel efficiency

U.S. liquid fuels supply
million barrels per day



Source: EIA, Annual Energy Outlook 2013 Early Release

Biofuels grow at a slow rate due to lower near-term crude oil prices and slow growth in sales of high-percentage ethanol blends such as E85



Sources: EIA, Annual Energy Outlook 2013 Early Release and EIA, Annual Energy Outlook 2012

Two closing scene setters

Biofuels can play several different roles in the very complex market for motor fuels

- Ethanol competes, or could compete, in three distinct market segments, with very different economic characteristics:
  - Octane source
  - Volume extender
  - Energy content provider
- Ethanol is facing significant challenges in moving beyond its current roles as a source of both octane and volume
  - Blend wall
  - Availability of E85 and other high percentage blends
  - Challenging economics of pricing of E85 and other high percentage blends to be competitive on an energy content basis

Biofuels intersect with multiple policy issues

Petroleum import dependence

How do biofuels fit in relative to other potential import reducers, including additional vehicle efficiency improvements, increased reliance on natural gas as a transportation fuel (LNG, CNG, or GTL), increased domestic petroleum liquids production, electric vehicles, etc.?

Scale issues limiting the potential contribution of biofuels to the energy system

Greenhouse gas mitigation

How do biofuels fit in with other possible uses of biomass for energy or other purposes related to GHG mitigation?

Rural economic development, food, water, environmental and health policy

There are likely to be important interconnections here, but others are better equipped to identify the key questions.

For more information

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

Short-Term Energy Outlook | www.eia.gov/steo

Annual Energy Outlook | www.eia.gov/aeo

International Energy Outlook | www.eia.gov/ieo

Monthly Energy Review | www.eia.gov/mer

EIA Information Center

(202) 586-8800 | email: InfoCtr@eia.gov