

Preliminary Results for *Annual Energy Outlook* 2014: Liquid Fuels Markets Working Group



AEO2014 Liquid Fuels Markets Working Group Meeting
Office of Petroleum, Natural Gas & Biofuels Analysis
September 19, 2013 | Washington, DC

**WORKING GROUP PRESENTATION FOR DISCUSSION PURPOSES
DO NOT QUOTE OR CITE AS RESULTS ARE SUBJECT TO CHANGE**

Overview

- Major model changes
- Assumptions
- Results based on AEO2013 price path.

Major Model Changes

- Crude and product distribution system
- Endogenous product exports
- Crude export capability
- Biofuels/xTL
 - Improved CTL, GTL, Pyrolysis representations
 - Biobutanol
 - Revised E15, E85, RFS volume requirements

Crude and product distribution system

- Crude distribution system upgraded to import crude to a logical import region
- Pipeline, rail and marine logistics added to transport to refining area
- Potentially, this will limit crude flows and change imported crude versus prior AEOs

Endogenous refined product exports

- In AEO 2013, product exports were exogenously determined
- Currently, refiners are increasingly relying on product exports to keep refinery utilizations up in the face of dropping refined product demands
- LFMM was modified to permit endogenous refined product exports to one foreign location

U.S. Refined Product exports and imports

- U.S. is expected to remain a net exporter of product liquid fuels for the entire projection period
- Low domestic natural gas prices and low crude prices versus foreign competition should provide economic incentive to US refiners to export product into the world markets
- Due to delays in completing new refining capacity in Latin America, U.S. product exports are expected to grow in the near future
- Domestic motor gasoline demand will reflect a gradual decline, as higher efficiency vehicles begin to lead to lower gasoline consumption

Crude export capability

- AEO 2014 has the added capability to endogenously permit crude exports; this capability is turned off in the Reference Case
- Reference case exports are exogenously limited to historical destinations
 - Eagle Ford to the Canadian East coast
 - Michigan crude to Sarnia
 - California crude exports, currently zero
 - Alaskan crude exports, currently zero
- Capability provides the ability to perform a crude export side case

Biofuels and xTL

- CTL, GTL, and Pyrolysis volumes not evident in latest Reference Case runs
 - Due to technology parameter changes
- Biobutanol volumes evident in Reference Case after 2035
 - New technology added to our model with limited industry data
 - Key assumption: corn ethanol plants can be retrofitted to produce biobutanol

Biofuel Assumptions for AEO2014

- RFS volume requirements
 - All 2013 and 2014 levels as defined by EPA in RFS 2013 Final Rule (net of banked RINs)
 - 2015 – 2022: Renewable fuel total equal to 2014 mandate (net of banked RINs)
 - 2023 – 2040: All levels are held constant at 2022 levels
- E15 allowed to grow to a maximum of 25% of the gasoline pool by 2040 if desired
- E85: minimal penetration to meet RFS mandates
- Sugarcane imports from Brazil are available as needed and as economic

AEO2014 Emerging Technology Parameters

Parameter	Name-plate Capacity	Base Overnight Capital	Contingency Factors		Total Overnight Capital	Thermal Efficiency	Capacity Factor	Construction Lead Time
			Project	Optimism				
Units of Measure	bb/d	\$/daily bbl	%	%	\$/daily bbl	%	%	years
Biochemical								
Corn Ethanol	6,800	18,180	3	0	18,726	82	100	2
Advanced Grain Ethanol	3,400	43,350	3	0	44,651	83	100	2
Cellulosic Ethanol	3,700	114,000	10	20	156,750	28	85	3
Thermochemical Catalytic								
Methyl Ester Biodiesel	1,200	19,730	3	0	20,322	21	95	2
Non Ester Renewable Biodiesel	2,000	28,000	10	20	38,500	21	95	2
Pyrolysis	5,200	201,000	10	20	276,375	55	90	3
Thermochemical Fischer-Tropsch								
Gas to liquids	48,000	126,000	10	10	152,460	54	85	4
Coal to liquids	48,000	150,000	10	15	189,750	49	85	5
Coal+biomass to liq.	48,000	140,000	10	20	184,800	45	85	5
Biomass to liquids	6,000	262,000	10	20	345,840	38	85	5

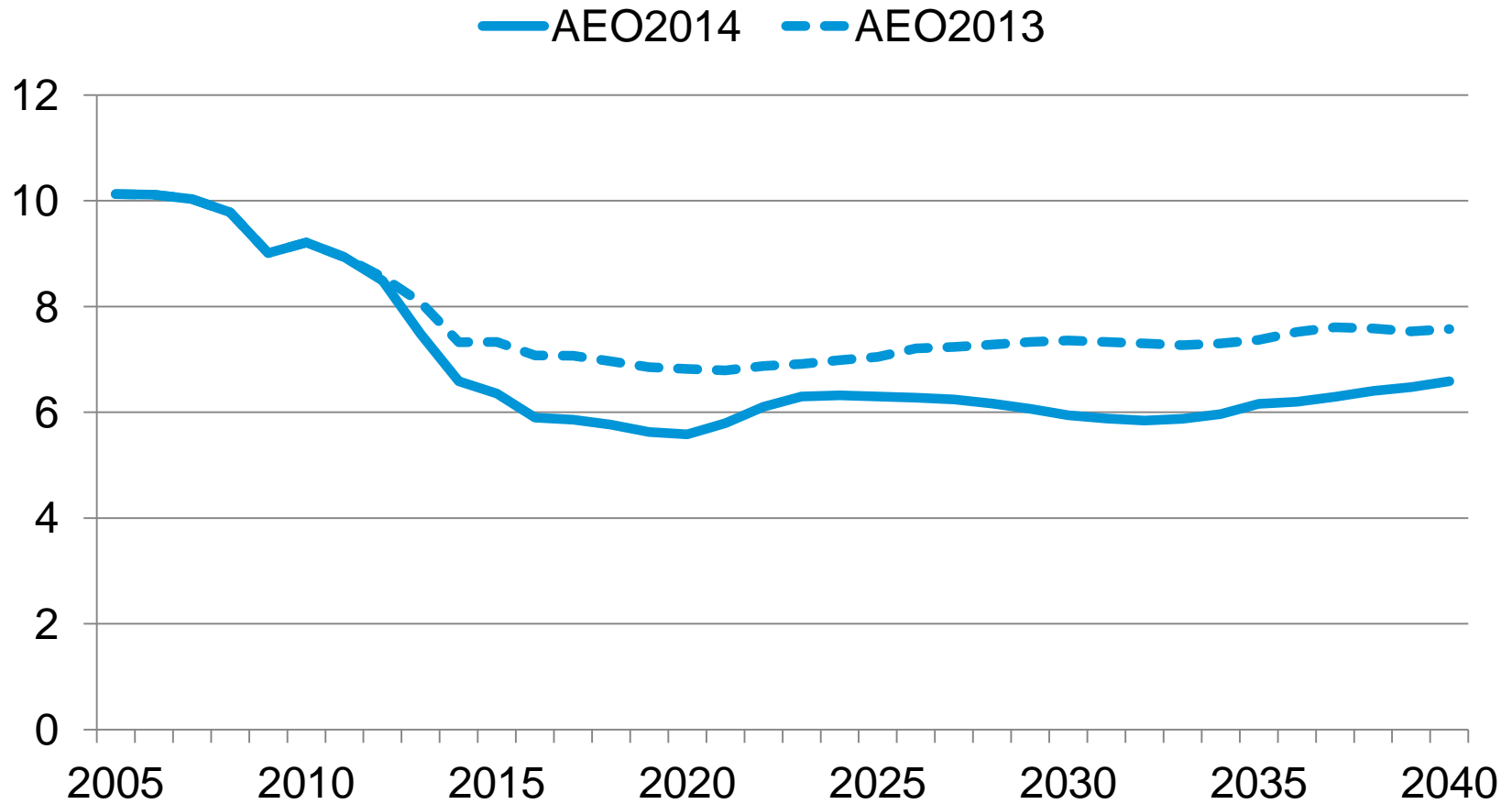
All costs expressed in 2012\$

AEO2014 Results compared to AEO2013

- Crude Imports are lower
- Transportation Liquid Fuel Demand
 - Gasoline lower
 - Diesel similar
- Gasoline and diesel prices
 - Gasoline similar
 - Diesel higher
- Net Import Share lower in early years
- Ethanol use in gasoline lower
- CTL, GTL, Pyrolysis production zero in AEO 2014

Crude oil imports

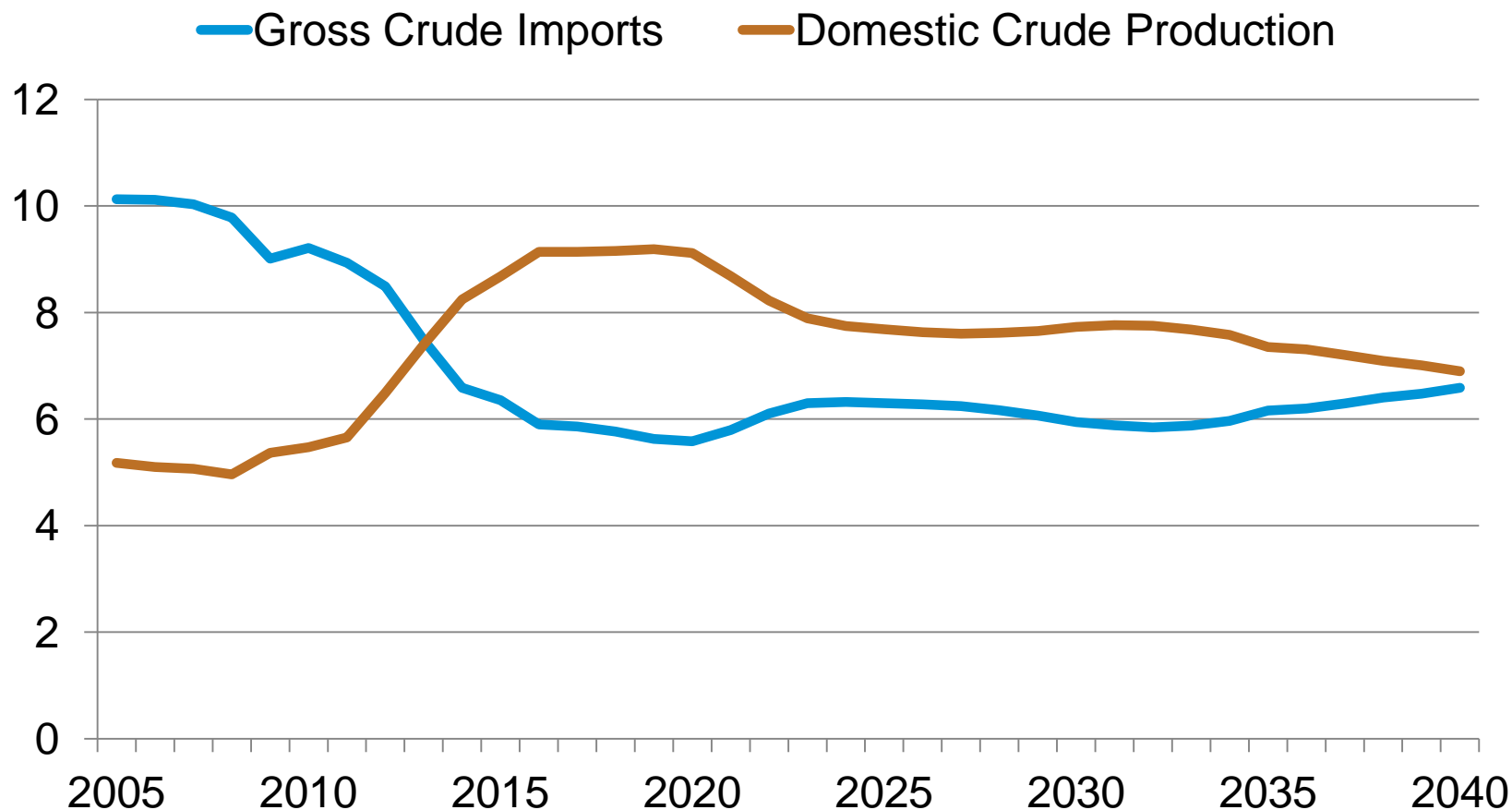
Gross crude imports
(million bbl/day)



Source: ref2014.091713a, ref2013.102312a

Crude imports and domestic crude production in *AEO2014*

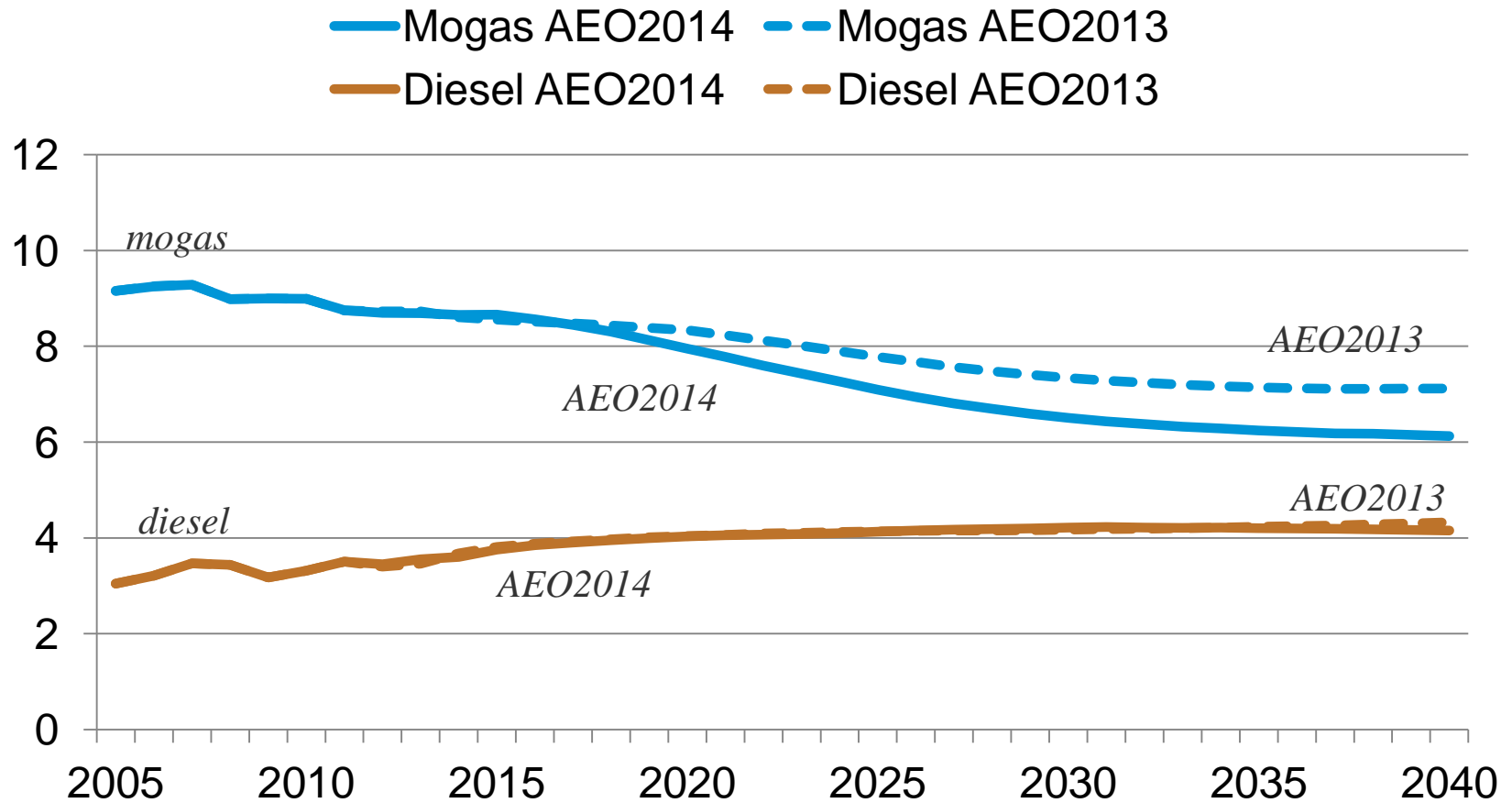
Crude
(million bbl/day)



Source: *ref2014.091713a, ref2013.102312a*

Motor gasoline and diesel demand in the transportation sector

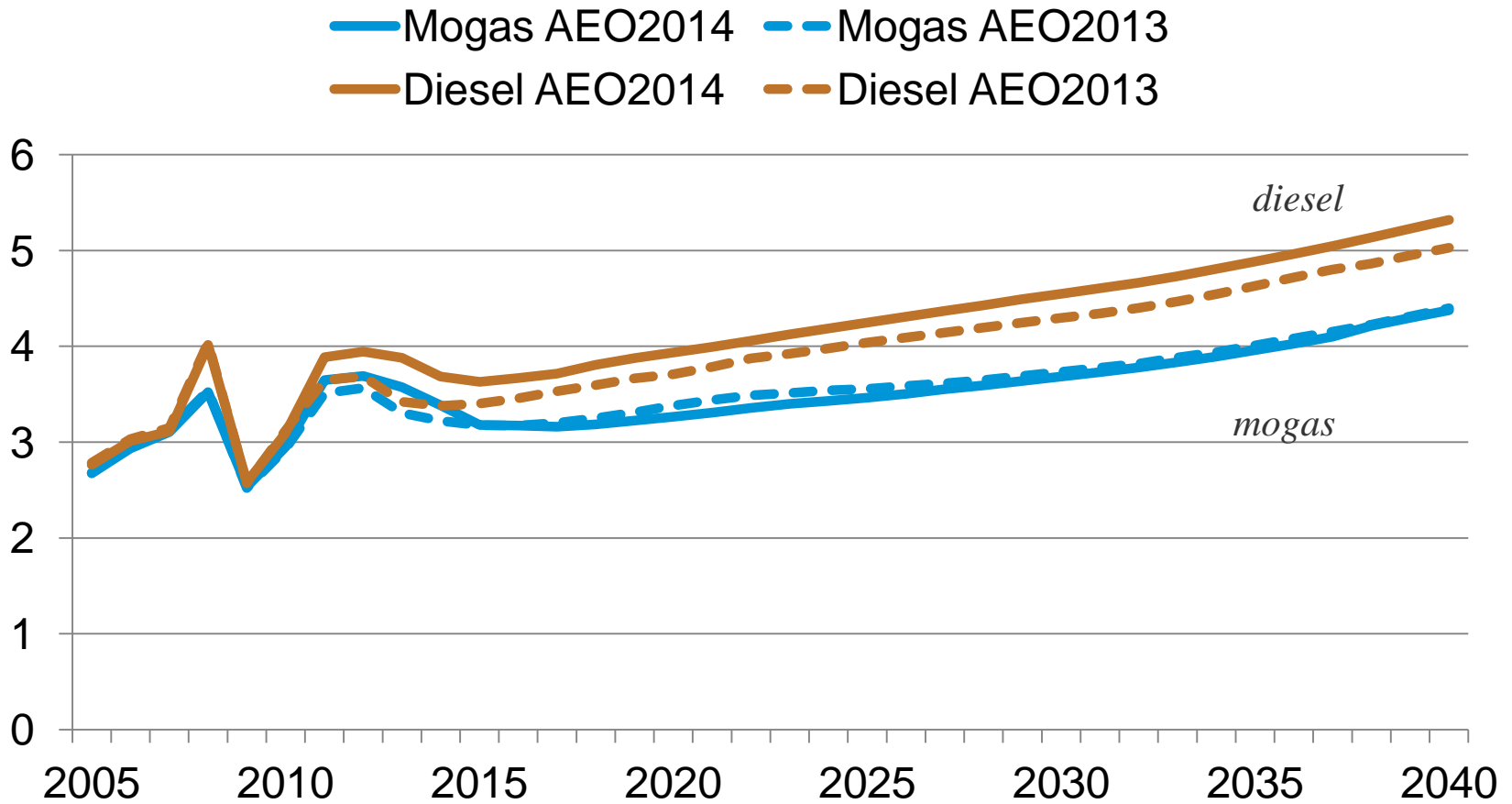
Motor gasoline and diesel demand
(million bbl/day)



Source: ref2014.091713a, ref2013.102312a

Motor gasoline and diesel prices in the transportation sector

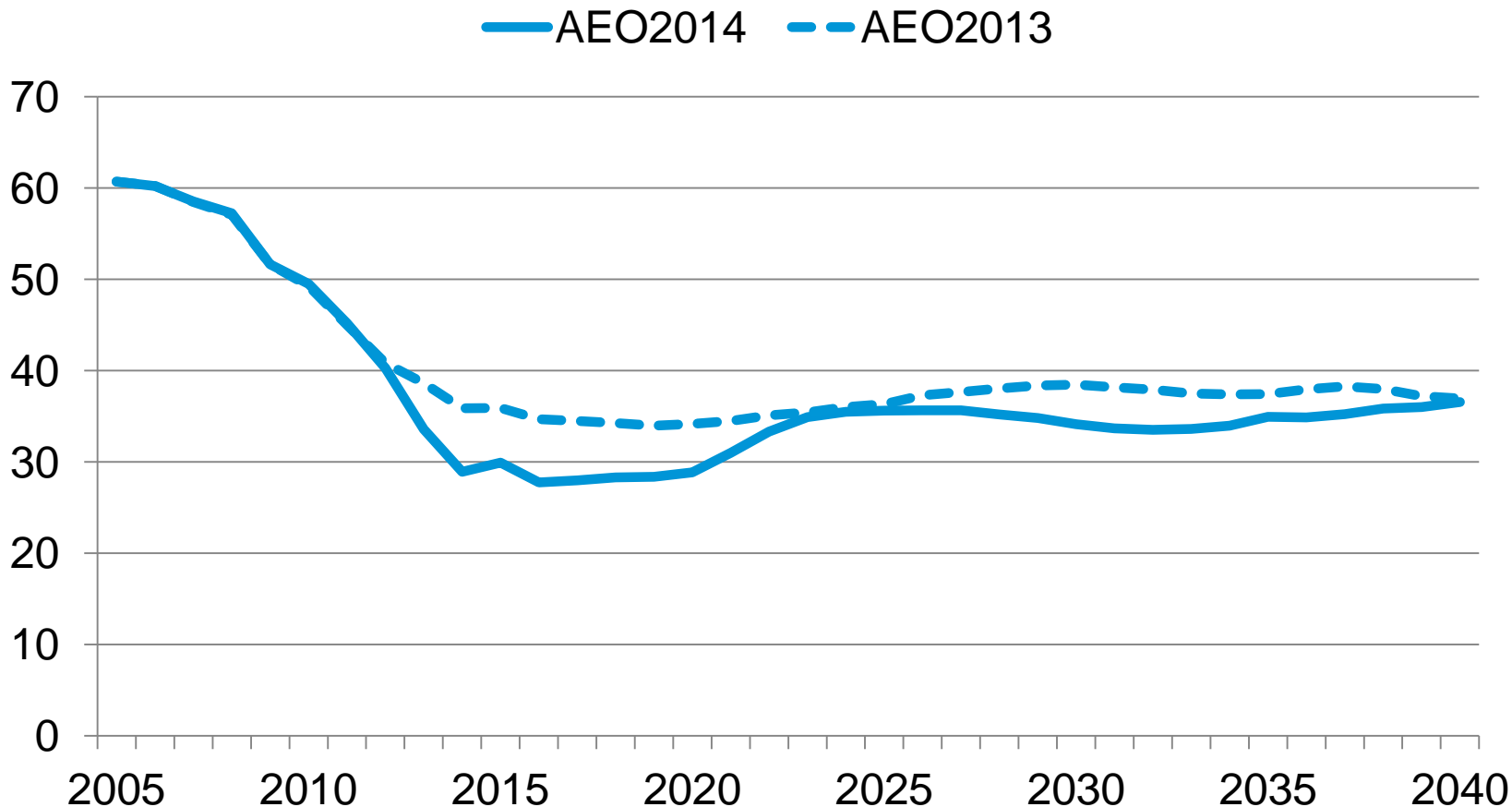
Motor gasoline and diesel prices
(real 2012 dollars per gallon)



Source: ref2014.091713a, ref2013.102312a

Net import share of product supplied

Share of product supplied
(percent)

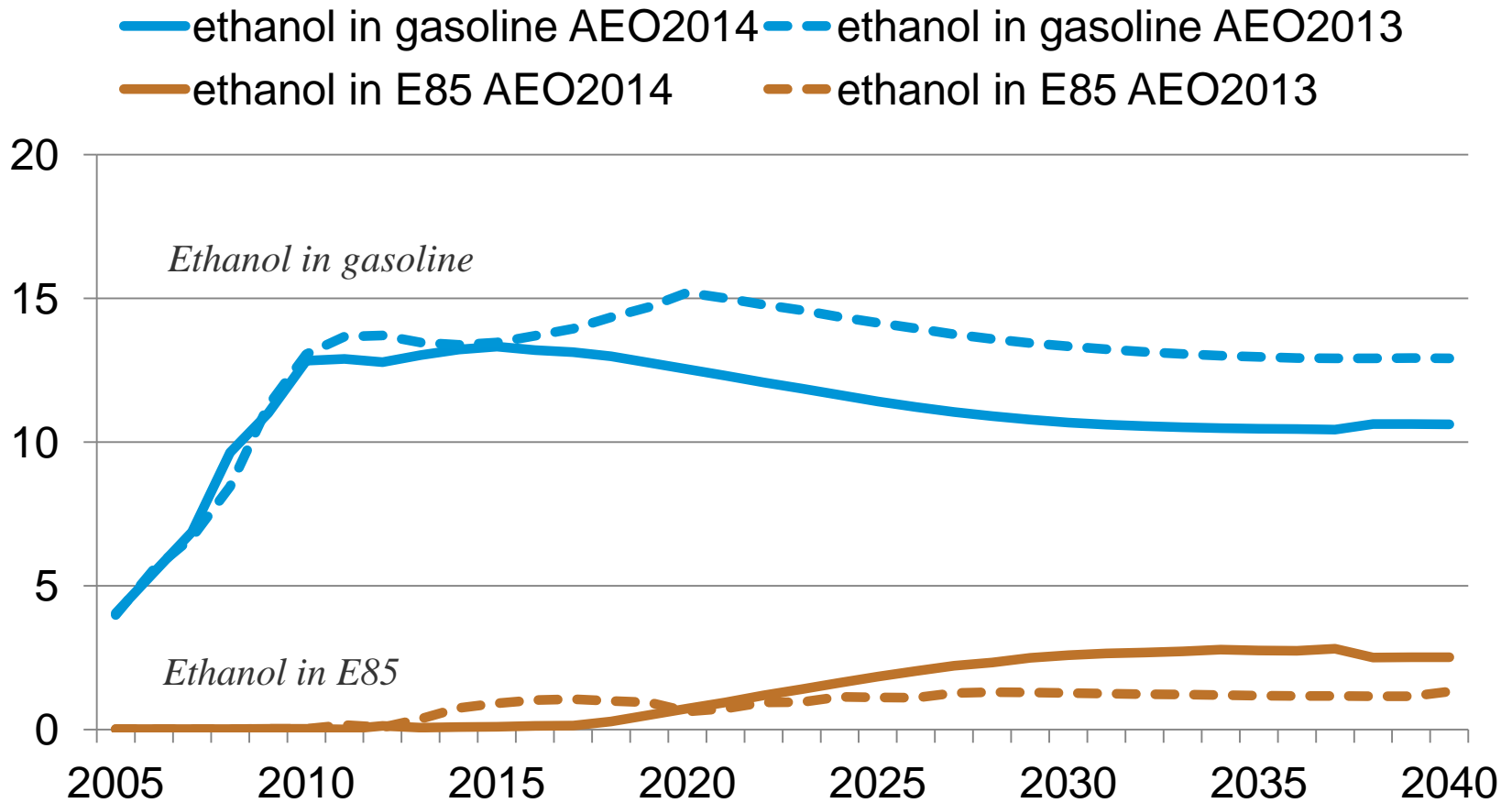


Source: ref2014.091713a, ref2013.102312a

Ethanol in motor gasoline and E85

Ethanol

(billion gallons per year)

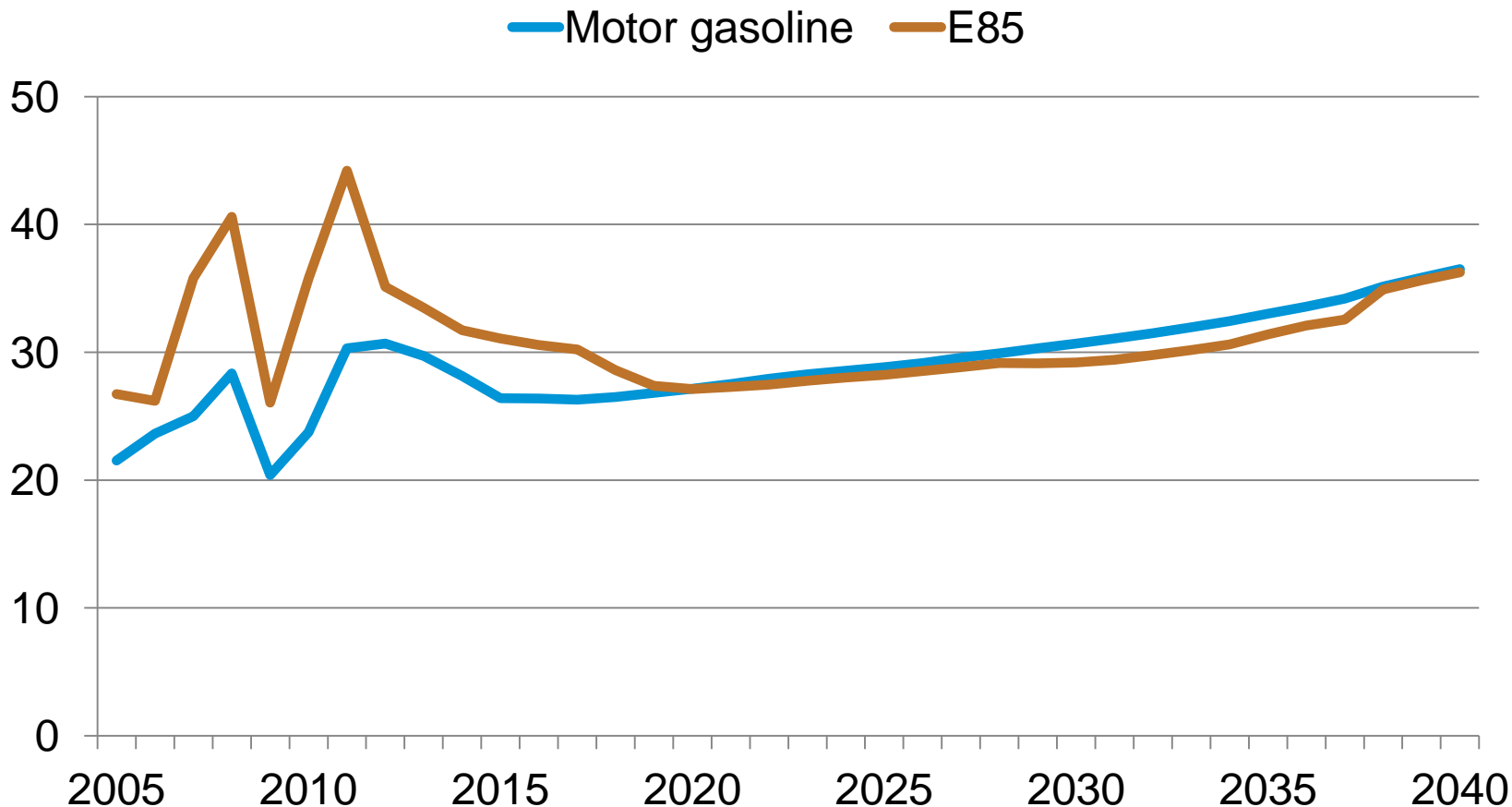


Source: ref2014.091713a, ref2013.102312a

Projected E85 and motor gasoline prices for AEO2014

Product prices

Real 2012 dollars per million Btu



Source: ref2014.091713a, ref2013.102312a

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