Annual Energy Outlook 2014
Preliminary Reference Case Results for Oil and Natural Gas

AEO2014 Oil and Gas Supply Working Group Meeting

Office of Petroleum, Gas, and Biofuels Analysis

September 26, 2013 | Washington, DC

WORKING GROUP PRESENTATION FOR DISCUSSION PURPOSES

DO NOT QUOTE OR CITE AS RESULTS ARE SUBJECT TO CHANGE
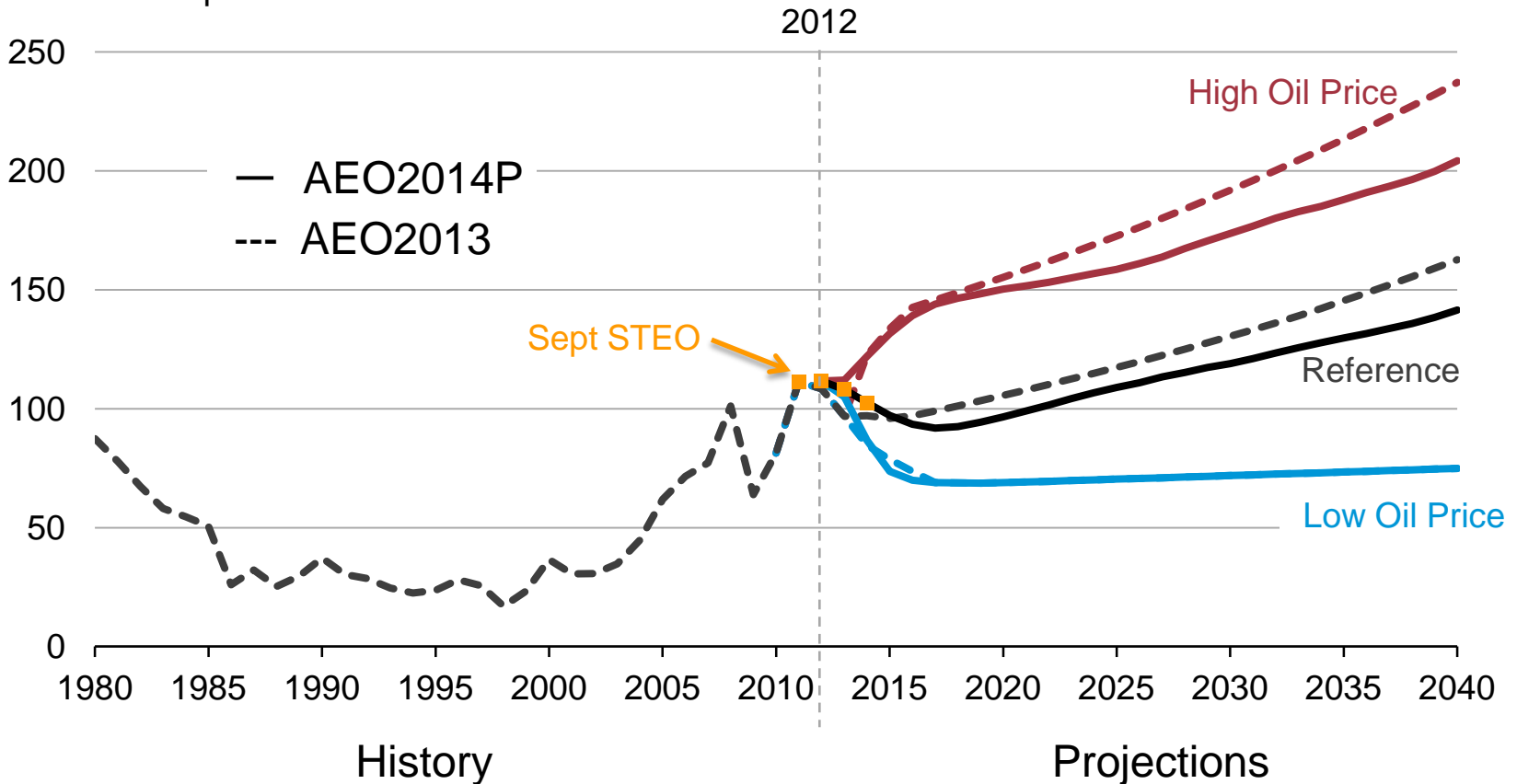
AEO2014P uses ref2014.d092413a
AEO2013 uses ref2013.d102312a

Changes for AEO2014

- Revised shale & tight play resources (EURs, type curves)

- Updated classification of shale gas, tight gas, & tight oil reservoirs

- Updated offshore announced discoveries

- Updated assumptions for Canada

- Estimated world natural gas prices in order to endogenously model LNG exports

- Updated methodology for calculating the Henry Hub price

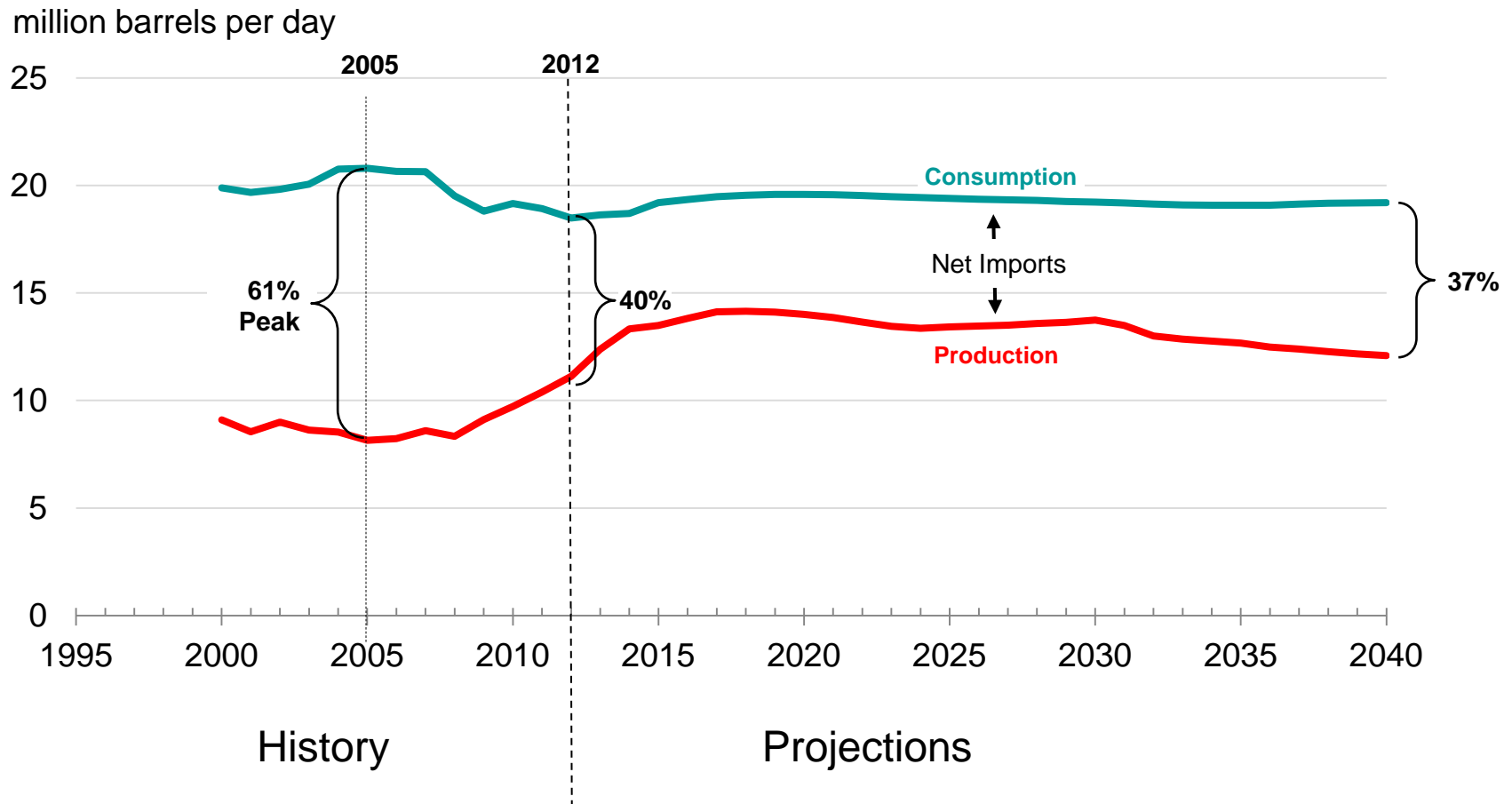- Updated historical data and related parameters

Range of oil price paths is slightly more narrow than in *AEO2014*

Annual average spot price of Brent crude oil
2012 dollars per barrel

U.S. reliance on imported liquid fuels is reduced by increased domestic production and greater fuel efficiency

million barrels per day

2005   2012

Consumption

Net Imports

Production

61% Peak

40%

37%

History   Projections

Source: Preliminary AEO2014 runs, dated as of 09/24/2013

Liquid fuels consumption by sector, 1990-2040

million barrels per day
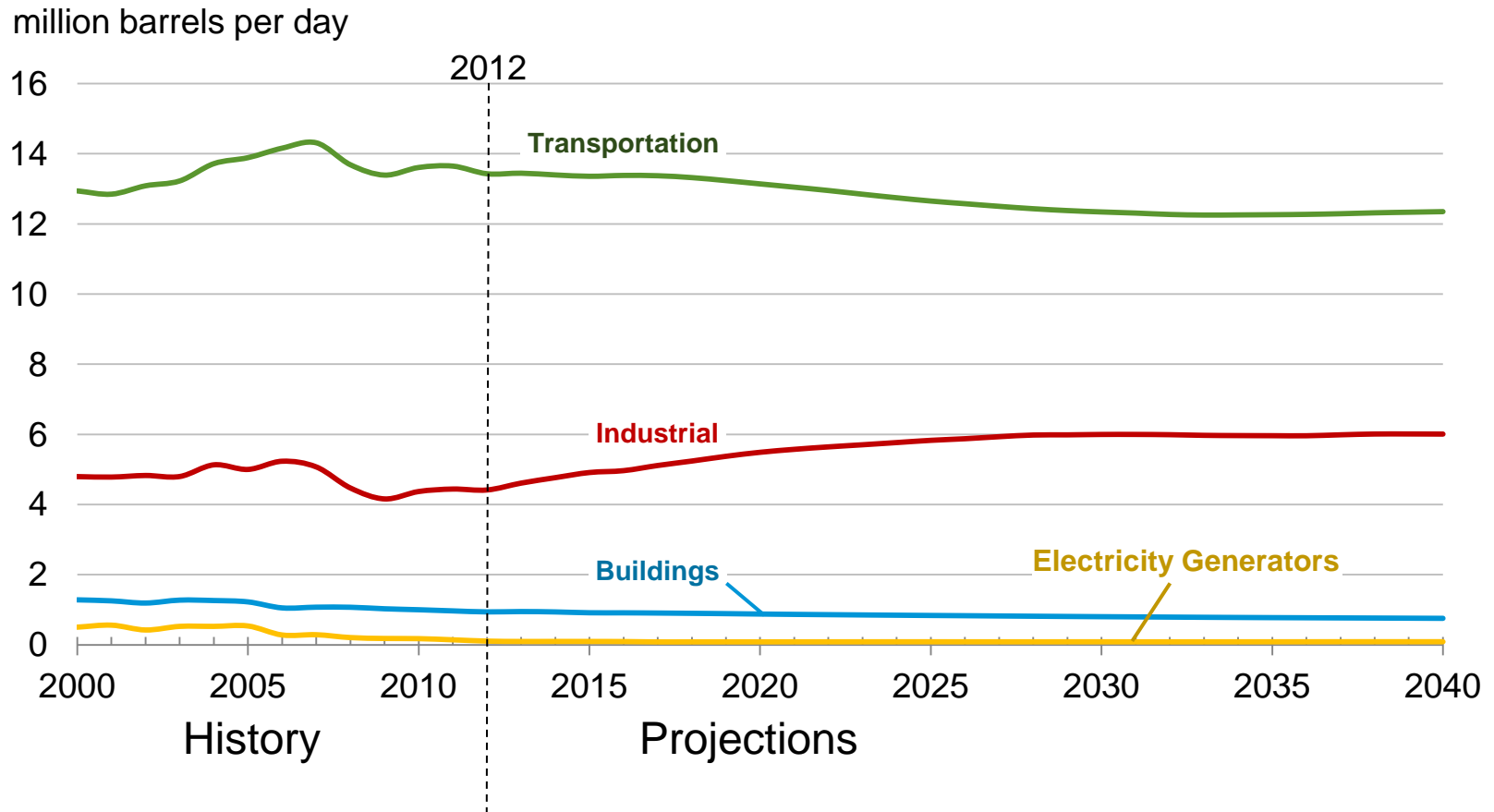
Source: Preliminary AEO2014 runs, dated as of 09/24/2013

Lower 48 unproved tight oil resources (million bbls)

Region	Basin	Play	TRR (mmb)			Wells Needed to Develop TRR		
			Oil	Condensates	Total	Oil	Condensates	Total
1	Appalachian	Marcellus		43	43		69,431	69,431
		Utica	965	-	965		48,668	48,668
2	West Gulf	Austin Chalk	7,313		7,313	87,173		87,173
		Cotton Valley/Bossier		795	795		87,593	87,593
		Eagle Ford	3,274	6,039	9,313	32,509	34,449	66,958
		Vicksburg		43	43		2,634	2,634
		Wilcox/Lobo		-	-		7,178	7,178
3	Anadarko	Woodford	90	97	187	2,751	11,974	14,725
		Granite Wash/Atoka		564	564		14,663	14,663
4	Permian	Abo/Canyon		1,088	1,088		49,440	49,440
		Avalon/Bonespring	3,322		3,322	49,031		49,031
		Barnett		22	22		12,828	12,828
		Spraberry	8,083		8,083	75,177		75,177
		Wolfcamp	1,983		1,983	24,882		24,882
5	Bakken	Denver	1,441		1,441	39,179		39,179
		Greater Green River		-	-		31,141	31,141
		Montana Thrust Belt	602		602	5,433		5,433
		Powder River	2,417		2,417	63,488		63,488
		San Juan		19	19		27,076	27,076
		Southwestern Wyoming	1,972		1,972	17,691		17,691
		Uinta/Piceance	68	-	68	1,367	12,344	13,711
		Williston	8,449		8,449	70,709		70,709
6	San Joaquin/Los Angeles	Monterey/Santos	555		555	1,229		1,229
			40,532	8,710	49,242	470,619	409,419	880,038

Source: Preliminary AEO2014 runs, dated as of 09/24/2013

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Domestic crude oil production by source, 1990-2040
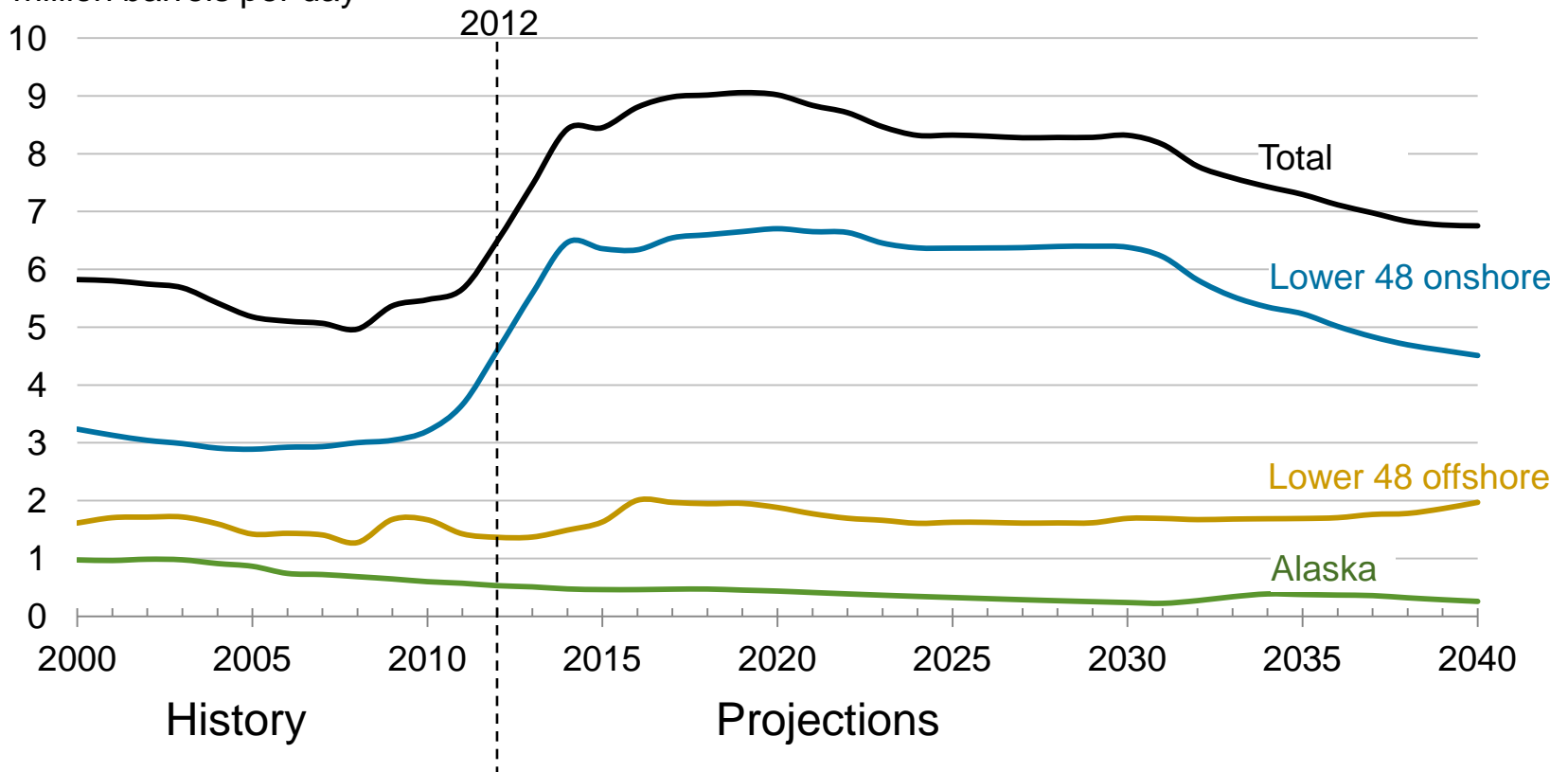
Source: EIA, Annual Energy Outlook 2013, and AEO2014 Preliminary run 09/24/2013

Lower 48 onshore oil production, 2005-2040

million barrels per day

Onshore Other + Tight Oil + Other EOR

— AEO2014P
--- AEO2013

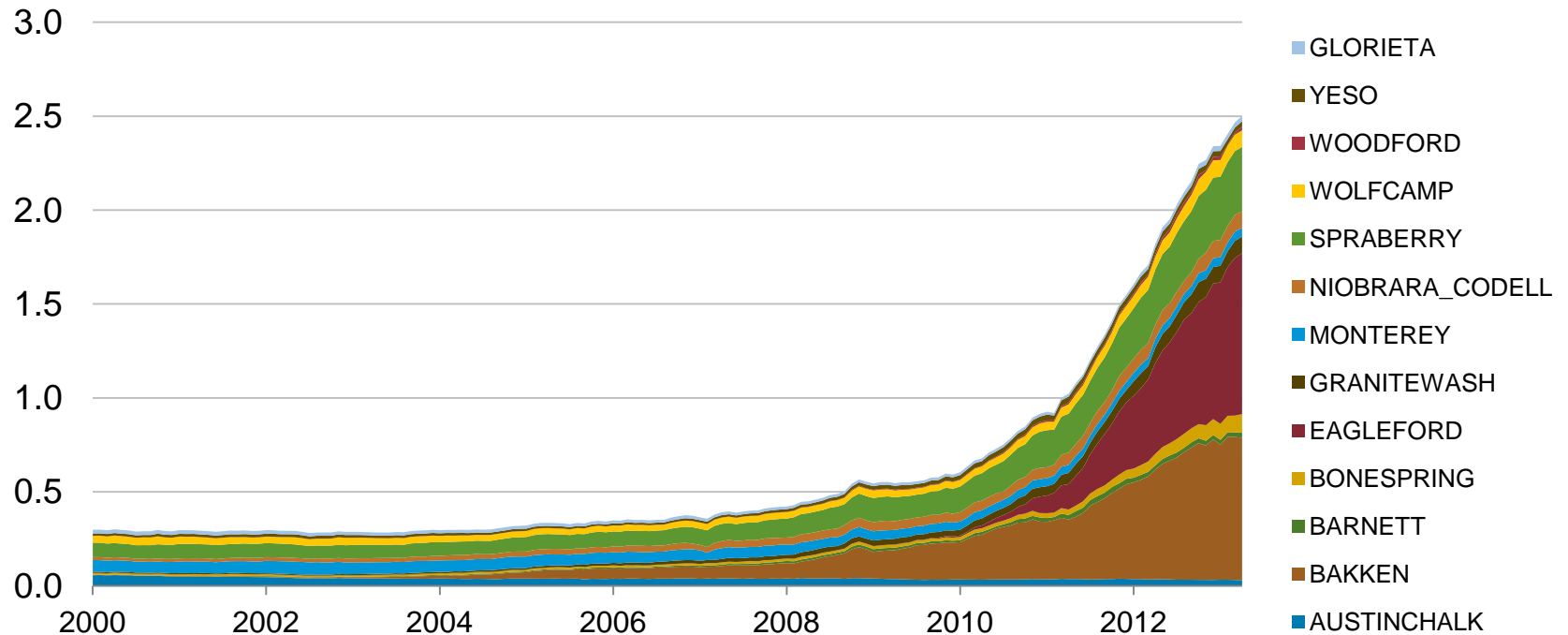CO_2 EOR

History   Projections
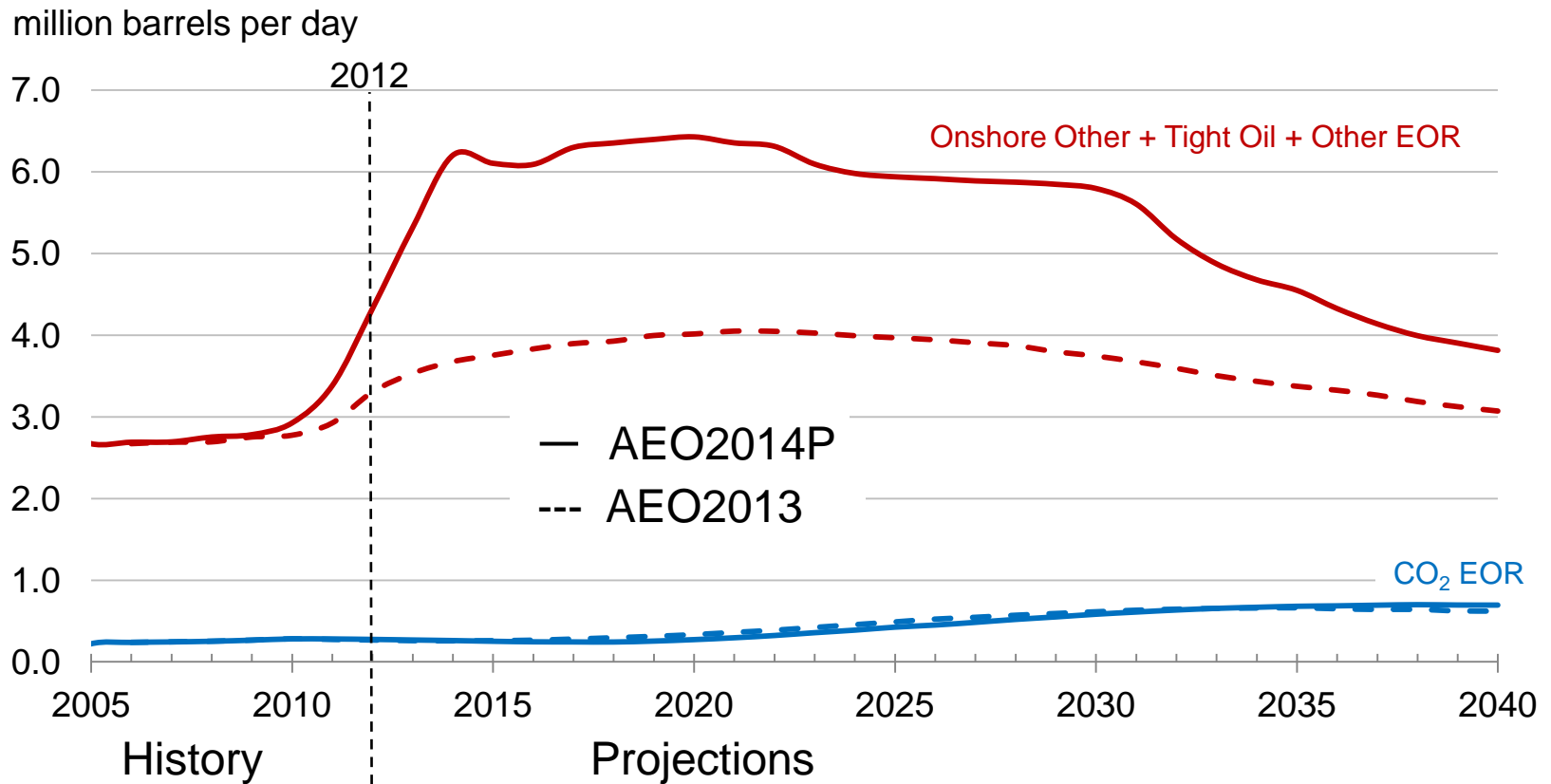
Source: Preliminary AEO2014 runs, dated as of 09/24/2013
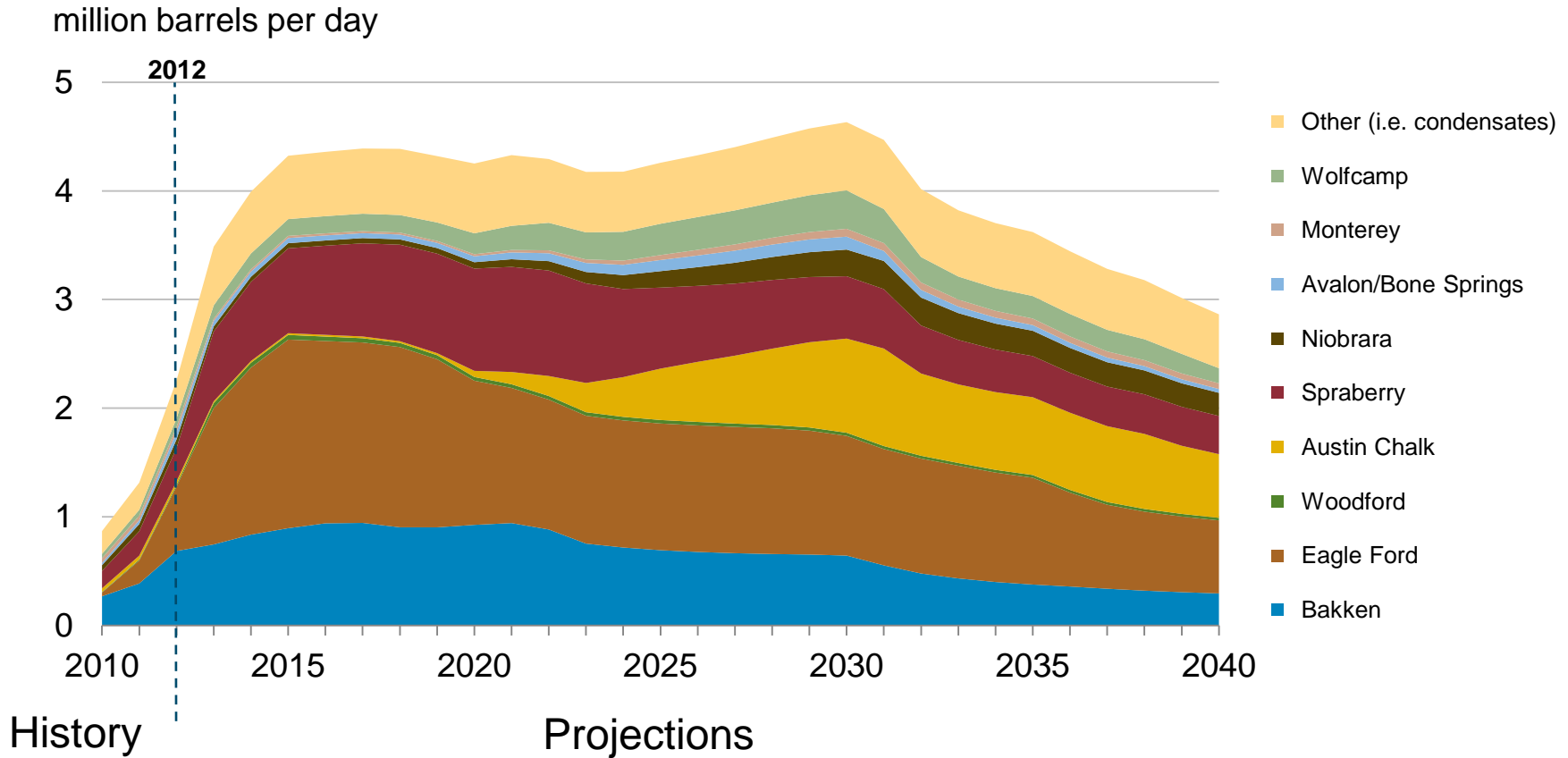*Note: Sum of two sets of lines equals L48 onshore total*

Tight oil production estimates

million barrels per day

Source tight oil: HPDI, Texas RRC, North Dakota department of mineral resources, and EIA, through April 2013.

# Projected crude oil production from tight oil plays in AEO 2014

million barrels per day

Legend:
- Other (i.e. condensates)
- Wolfcamp
- Monterey
- Avalon/Bone Springs
- Niobrara
- Spraberry
- Austin Chalk
- Woodford
- Eagle Ford
- Bakken

History | Projections

Source: Preliminary AEO2014 runs, dated as of 09/24/2013

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Lower 48 unproved shale gas resources

Region	Basin	Play	AEO2014P (billion cubic feet)	AEO2013 (billion cubic feet)
Northeast	Appalachian	Marcellus	132,739	148,409
		Devonian	8,283	27,395
		Utica	37,355	37,257
	Illinois	Northwestern Ohio	2,620	2,641
		New Albany	11,680	10,909
	Michigan	Antrim	15,316	12,586
Gulf Coast	TX-LA-MS Salt	Haynesville	70,850	74,661
	Western Gulf Coast	Eagle Ford	53,377	55,040
		Pearsall	7,821	8,652
	Black Warrior	Floyd-Neal/Conasauga	4,263	4,922
Midcontinent	Arkoma	Fayetteville – Central	14,619	11,075
		Fayetteville – West	5,207	4,517
		Woodford – Western Arkoma	6,732	15,043
		Caney	1,053	1,132
		Chattanooga	1,585	1,620
	Anadarko	Woodford - Central	8,921	19,168
Southwest	Ft. Worth	Barnett	20,274	29,454
	Permian	Barnett-Woodford	15,834	28,259
Rocky Mountain	Greater Green River	Hilliard-Baxter-Mancos	10,491	13,302
	San Juan	Lewis	9,772	9,778
	Uinta	Mancos	10,865	11,288
	Williston	Gammon	3,376	3,491

Source: Preliminary AEO2014 runs, dated as of 09/24/2013
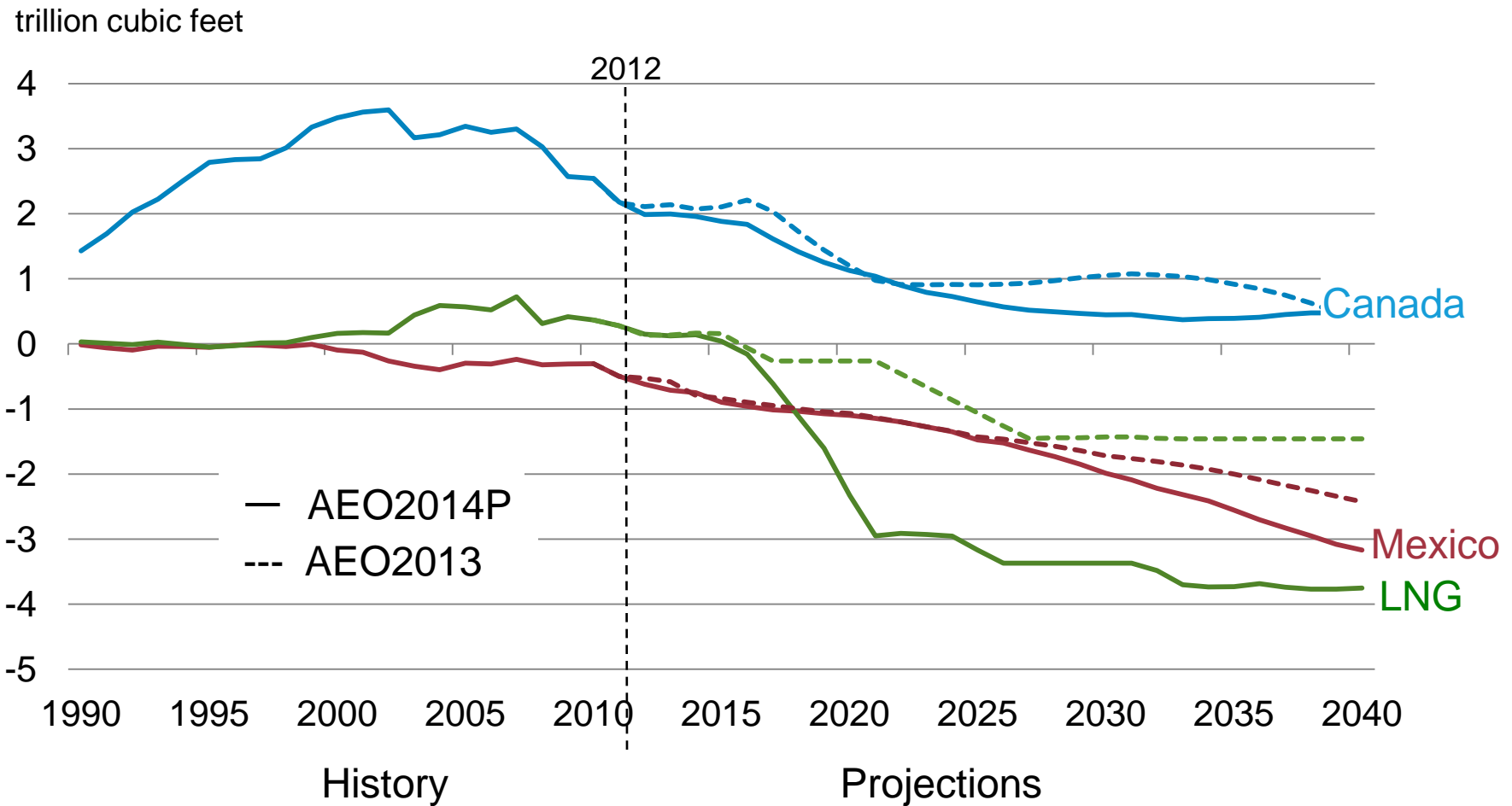
Shale gas production by play
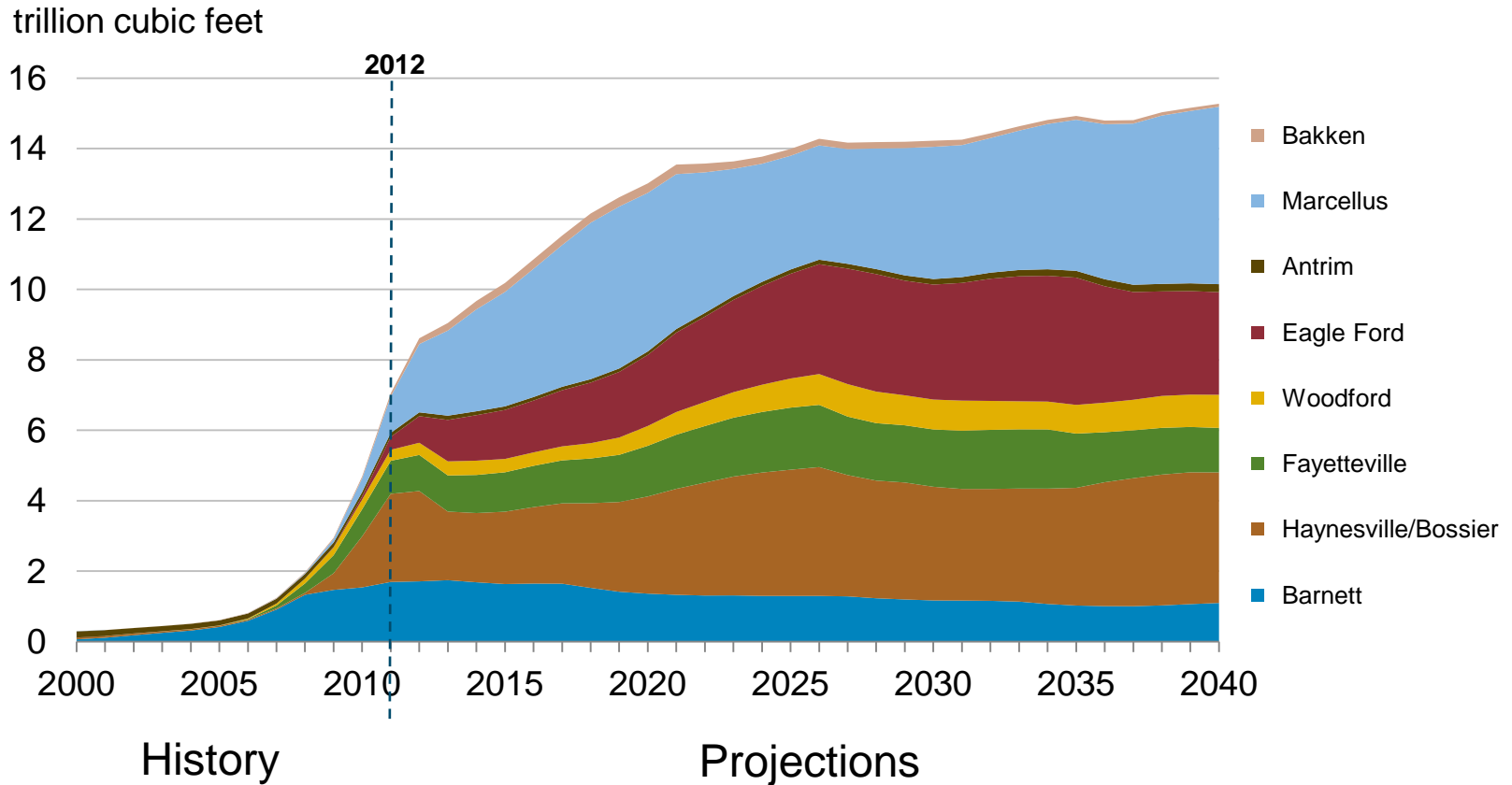
Natural Gas Markets

Natural gas consumption, production, and trade, 1990-2040
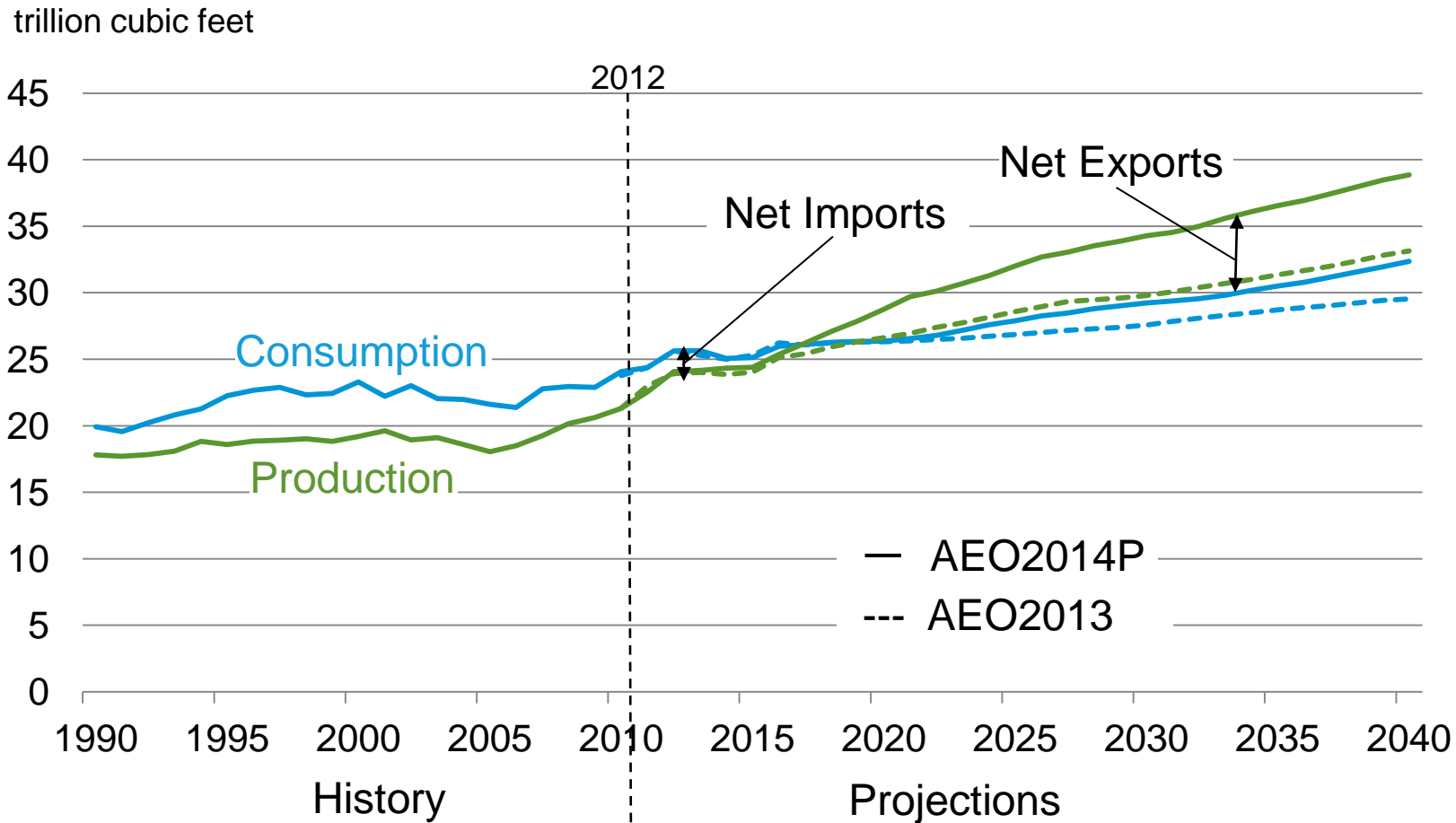
Source: Preliminary AEO2014 runs, dated as of 09/24/2013

Net U.S. imports by source, 1990-2040

trillion cubic feet

Legend: AEO2014P (solid line), AEO2013 (dashed line)

Lines labeled: Canada, Mexico, LNG

History | Projections

Source: Preliminary AEO2014 runs, dated as of 09/24/2013

LNG Exports, 2015-2040: All LNG Exports from North America are destined for the Asian market

AEO2013

billion cubic feet per day

AEO2014P

billion cubic feet per day

Atlantic

Western Canada

Alaska

Gulf
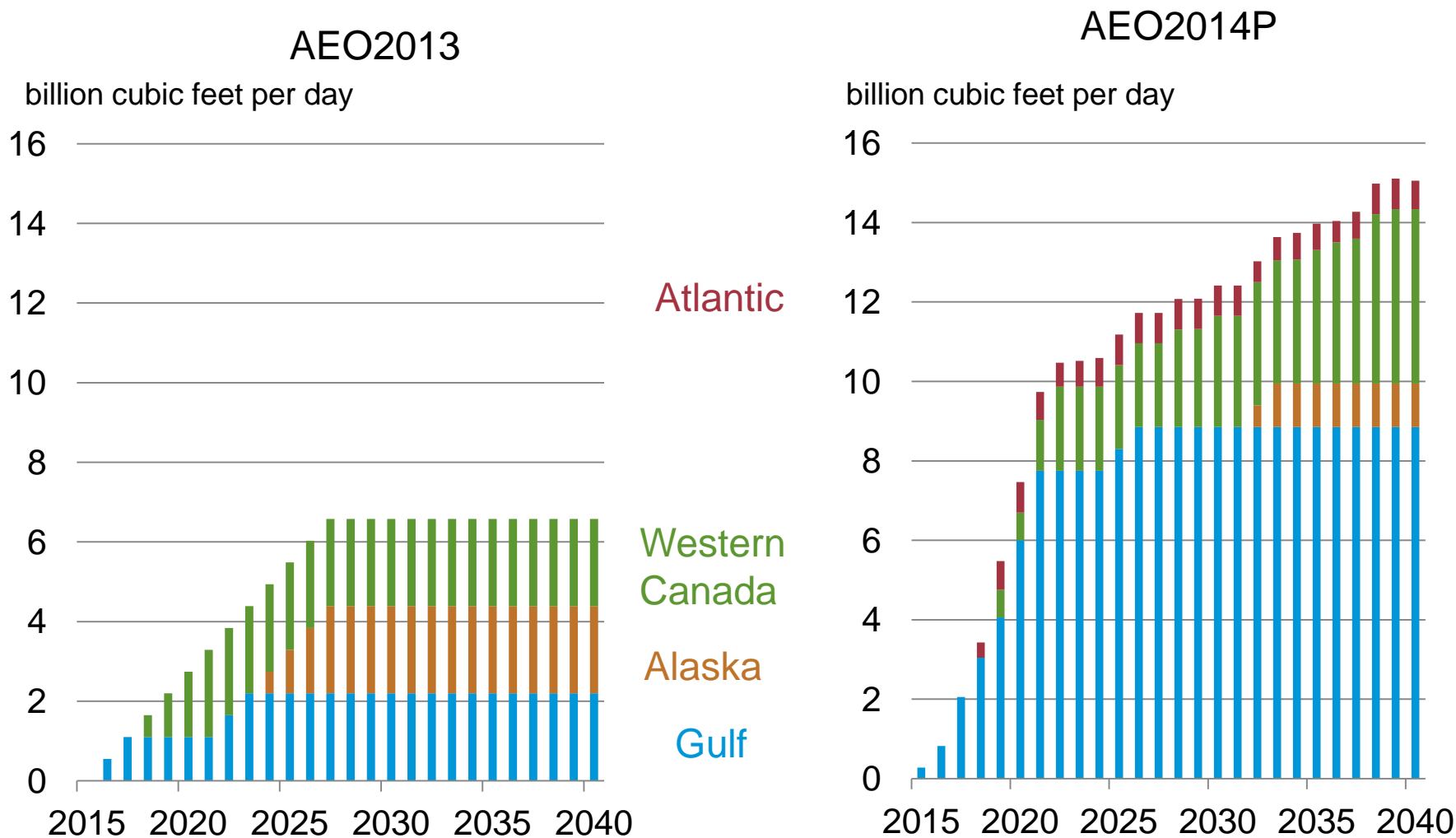
Source: AEO2013 compared with the preliminary AEO2014 runs, dated as of 9/24/2013

Henry Hub Natural Gas Spot Prices, 1995-2040
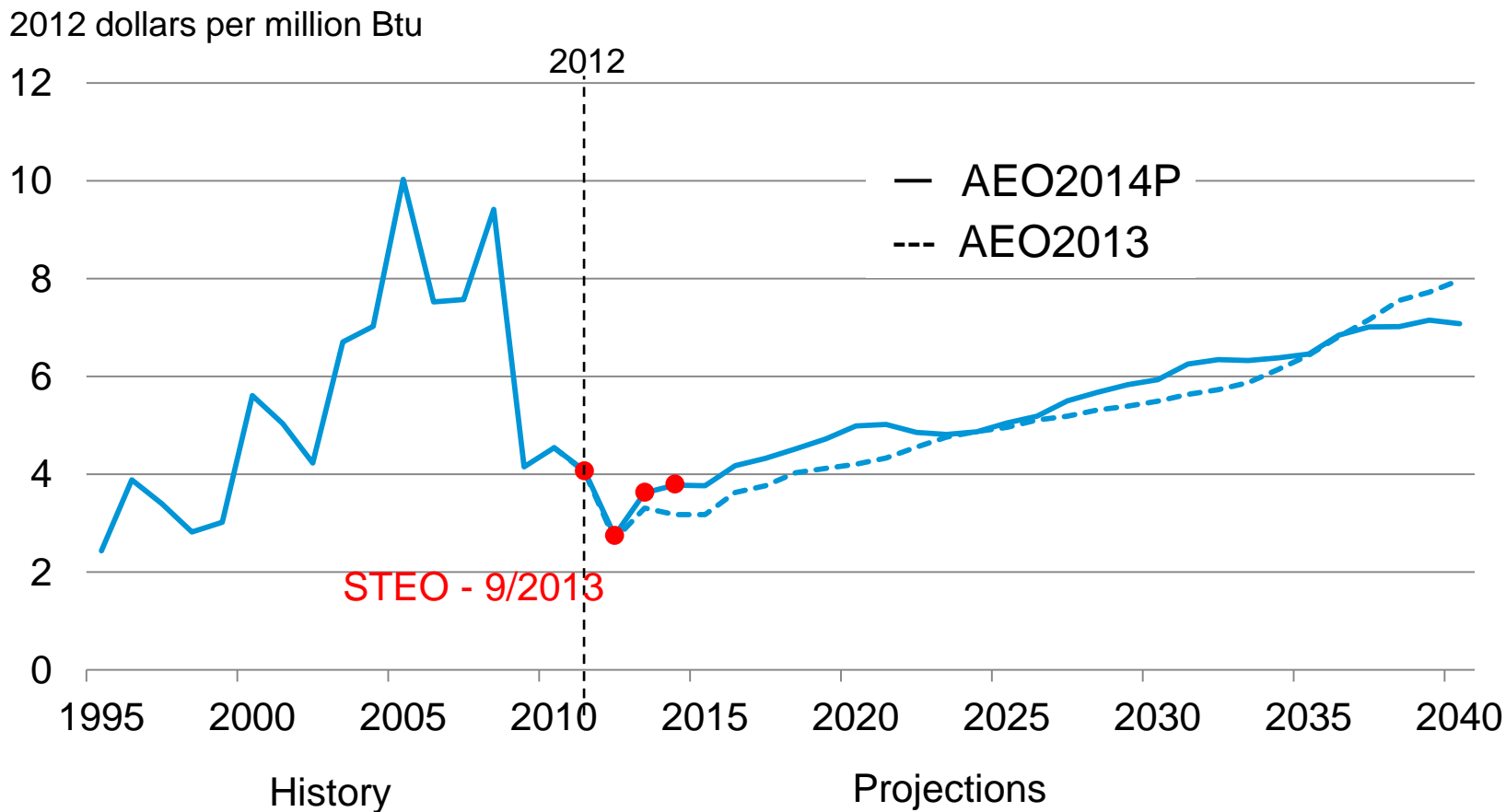
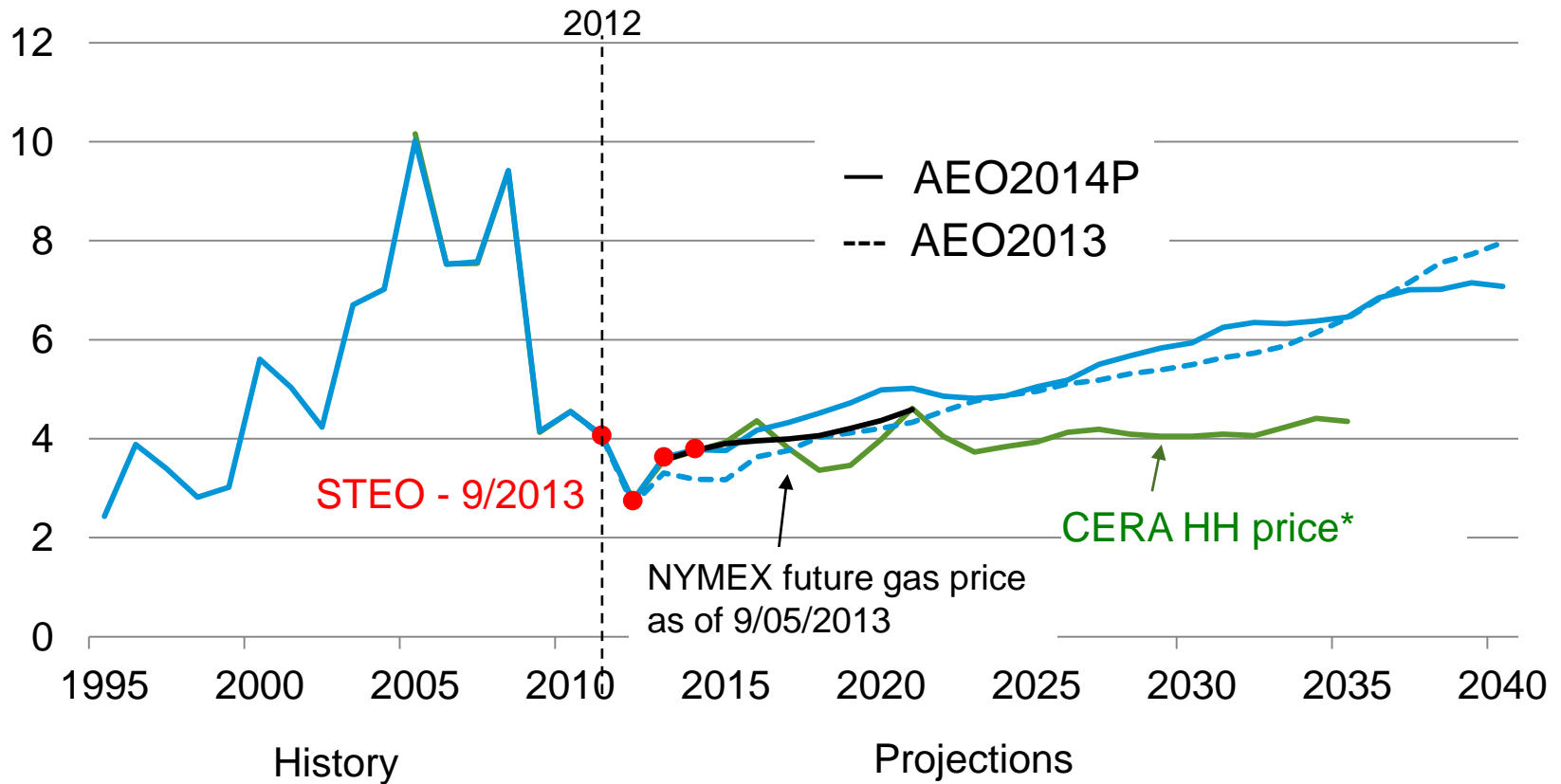2012 dollars per million Btu

History

Projections

* CERA: August 2012, IHS CERA North American Natural Gas Outlook Data Tables*
Source: Preliminary AEO2014 runs, dated as of 09/24/2013

Henry Hub Natural Gas Spot Prices, 1995-2040

2012 dollars per million Btu

— AEO2014P

--- AEO2013

STEO - 9/2013

NYMEX future gas price
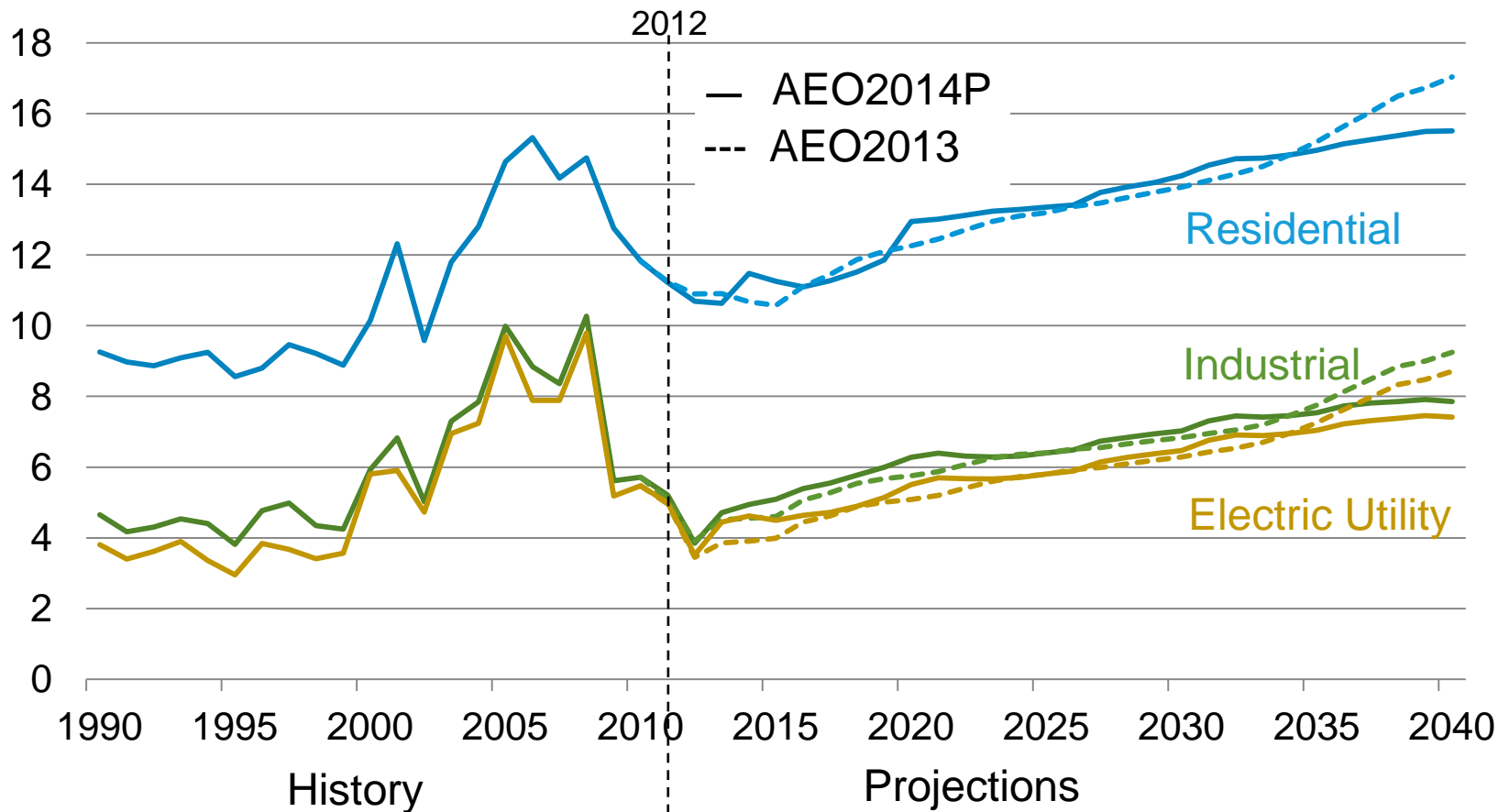as of 9/05/2013

CERA HH price*

History

Projections

* CERA: August 2012, IHS CERA North American Natural Gas Outlook Data Tables

Source: Preliminary AEO2014 runs, dated as of 09/24/2013
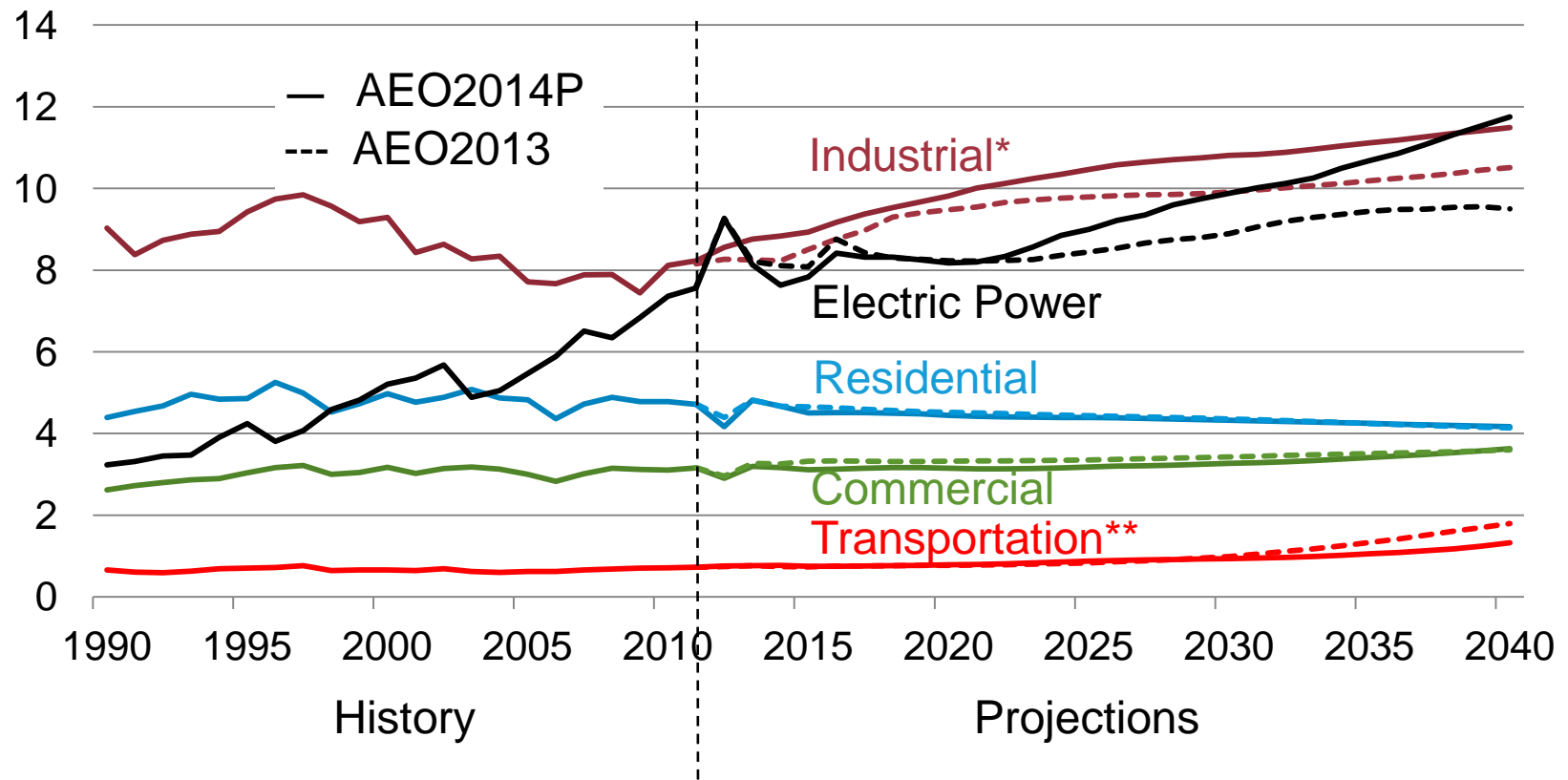
Natural Gas End-User Prices, 1970-2040

2012 dollars per thousand cubic feet

Source: Preliminary AEO2014 runs, dated as of 09/24/2013

Natural gas consumption by sector, 1990-2040

trillion cubic feet

— AEO2014P
--- AEO2013

Industrial*
Electric Power
Residential
Commercial
Transportation**

History
Projections

* Includes lease and plant fuel, and natural gas-to-liquids heat, power, and production
** Includes pipeline fuel

Source: Preliminary AEO2014 runs, dated as of 09/24/2013

NGTDM AEO2014 model enhancements (network flows and pricing)

- Allow reverse direction flows out of Middle Atlantic

- Move gas based on variable pipeline rates, not fixed plus variable rates

- Set variable pipeline rates based on historical basis differentials, not regulated rates

- Benchmark regional hub prices to historical spot prices

- Set electric prices based on markup off of regional spot price, not citygate

- Update residential/commercial distributor tariffs

NGTDM AEO2014 model enhancements (imports and exports)

- Update equations/parameters for Canada and Mexico supply/demand

- Set majority of exports to Canada endogenously

- Set LNG exports out of Canada exogenously

- Allow three LNG export trains to be built in North America each year

- Allow less than 100% utilization of liquefaction capacity based on economics

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

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24-hour automated information line about EIA and frequently asked questions.

Changes in release cycles for EIA's AEO and IEO

- To focus more resources on rapidly changing energy markets and how they might evolve over the next few years, the U.S. Energy Information Administration is revising the schedule and approach for production of the *International Energy Outlook* (*IEO*) and the *Annual Energy Outlook* (*AEO*).

- Starting with *IEO2013*, which was released in July, 2013, EIA adopted a two-year production cycle for both the *IEO* and *AEO*.

- Under this approach, a full edition of the *IEO* and *AEO* will be produced in alternating years and an interim, shorter edition of each will be completed in the "off" years.

	2014	**2015**
International Energy Outlook	**Interim Edition will be released in mid 2014**, focusing on the liquids projection, which is used as part of the *AEO2014*. Summary tables and a short analysis will be included.	**Full Edition will be released in the spring 2015**
Annual Energy Outlook	**Full Edition will be released in spring 2014**, including analysis of energy issues and many alternative scenarios.	**Interim Edition will be released in late 2014 or early 2015** and will only include the Reference, Low and High Economic Growth, and Low and High Oil Price cases. The shorter version will include tables for these cases and short discussions.