

Assumptions for *Annual Energy Outlook 2017*: Oil and Gas Working Group



AEO2017 Oil and Gas Supply Working Group Meeting

Office of Petroleum, Gas, and Biofuels Analysis

August 25, 2016/ Washington, DC

<http://www.eia.gov/forecasts/aeo/workinggroup/>

WORKING GROUP PRESENTATION FOR DISCUSSION PURPOSES

DO NOT QUOTE OR CITE AS RESULTS ARE SUBJECT TO CHANGE

Overview

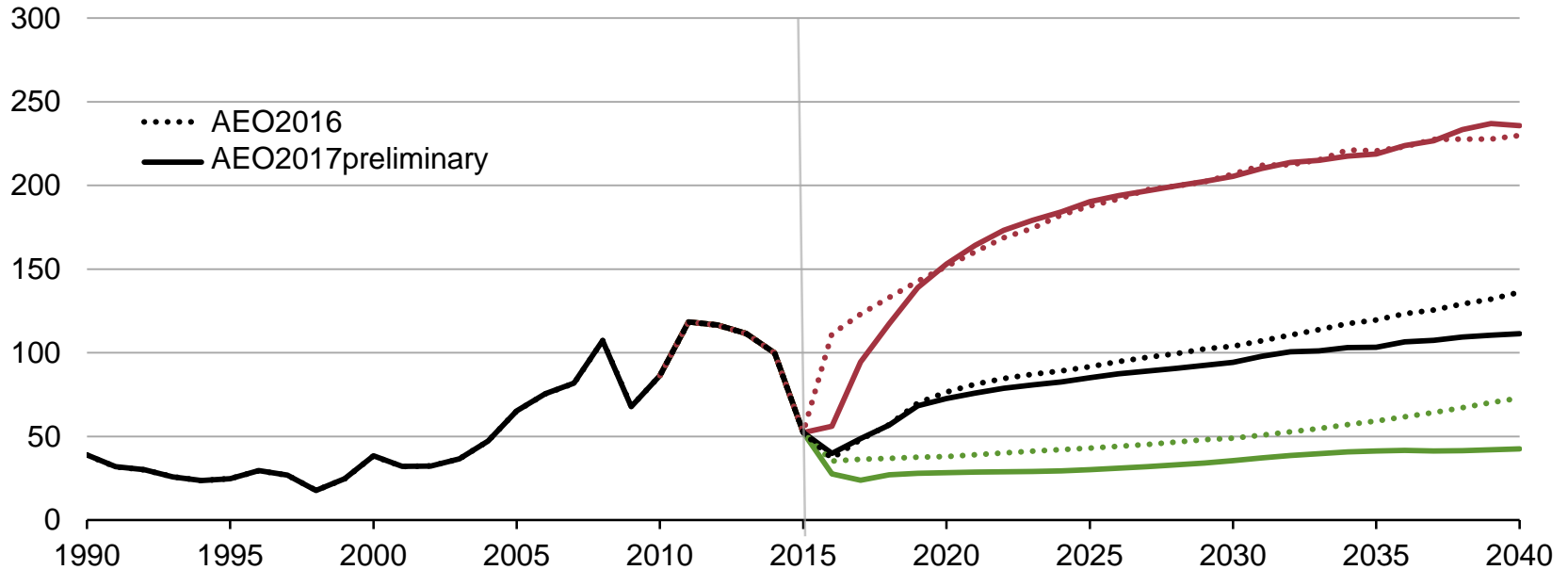
- “Short” AEO2017 with extension of model projection period to 2050
- World oil prices
- Upstream
 - Offshore Gulf of Mexico and Alaska
 - Feedback on AEO2016 results
- Natural gas markets
 - Feedback on AEO2016 results
 - LNG exports
 - Pipeline imports/exports

“Short” AEO2017

- In general, restricted to historical data updates and major policy changes
- Can include design updates that help to better represent current events – none are planned for OGSM and NGTDM
- AEO cases are limited
 - Reference price case
 - High and low price cases
 - High and low economic cases
 - High and low resource and technology cases
- Extending projection period to 2050

Crude oil price lower for AEO2017

Brent crude oil spot price
2015 dollars per barrel



Source: EIA, Annual Energy Outlook 2017 and Annual Energy Outlook 2016

OGSM / Upstream

Oil and Gas Supply – Offshore GOM and Alaska

- Update assumptions for announced discoveries in the GOM
- Preliminary Reference case results for Alaska crude oil production show minimum throughput volume of TAPS and minimum oil production revenue level reached, causing Alaska crude oil production to shut down in 2037
 - Solicit feedback on reasonableness

Lower 48 offshore announced discoveries

Field name	Field nickname	Water Depth (Feet)	Year of Discovery	Start Year of Production	Resource size (MMBoe)	Field name	Field nickname	Water Depth (Feet)	Year of Discovery	Start Year of Production	Resource size (MMBoe)
AC865	GOTCHA	7844	2006	2019	80	LL370	DIAMOND	9975	2008	2018	75
DC353	VICKSBURG	7457	2009	2019	325	LL400	CHEYENNE EAST	9187	2011	2020	12
GB506	BUSHWOOD	2700	2009	2019	65	MC199	MANDY	2478	2010	2020	20
GC432	SAMURAI	3400	2009	2017	60	MC392	APPOMATTOX	7290	2009	2017	325
GC468	STAMPEDE-PONY	3497	2006	2018	372	MC762	DEIMOS SOUTH	3122	2010	2016	75
GC512	STAMPEDE-KNOTTY HEAD	3557	2005	2018	372	MC771	KODIAK	5006	2008	2018	182
GC903	HEIDELBERG	5271	2009	2016	400	MC792	WEST BOREAS	3094	2009	2015	182
KC102	TIBER	4132	2009	2017	692	MC984	VITO	4038	2009	2020	365
KC292	KASKIDA	5894	2006	2020	691	SM217	FLATROCK	10	2007	2017	200
KC736	MOCCASIN	6759	2011	2021	350	MC768	KAIKIAS	4575	2014	2024	100
KC872	BUCKSKIN	6978	2009	2018	200	WR029	BIG FOOT	5235	2006	2018	200
KC919	HADRIAN NORTH	7000	2010	2020	372	WR052	SHENANDOAH	5750	2009	2017	182
						WR508	STONES	9556	2005	2018	250

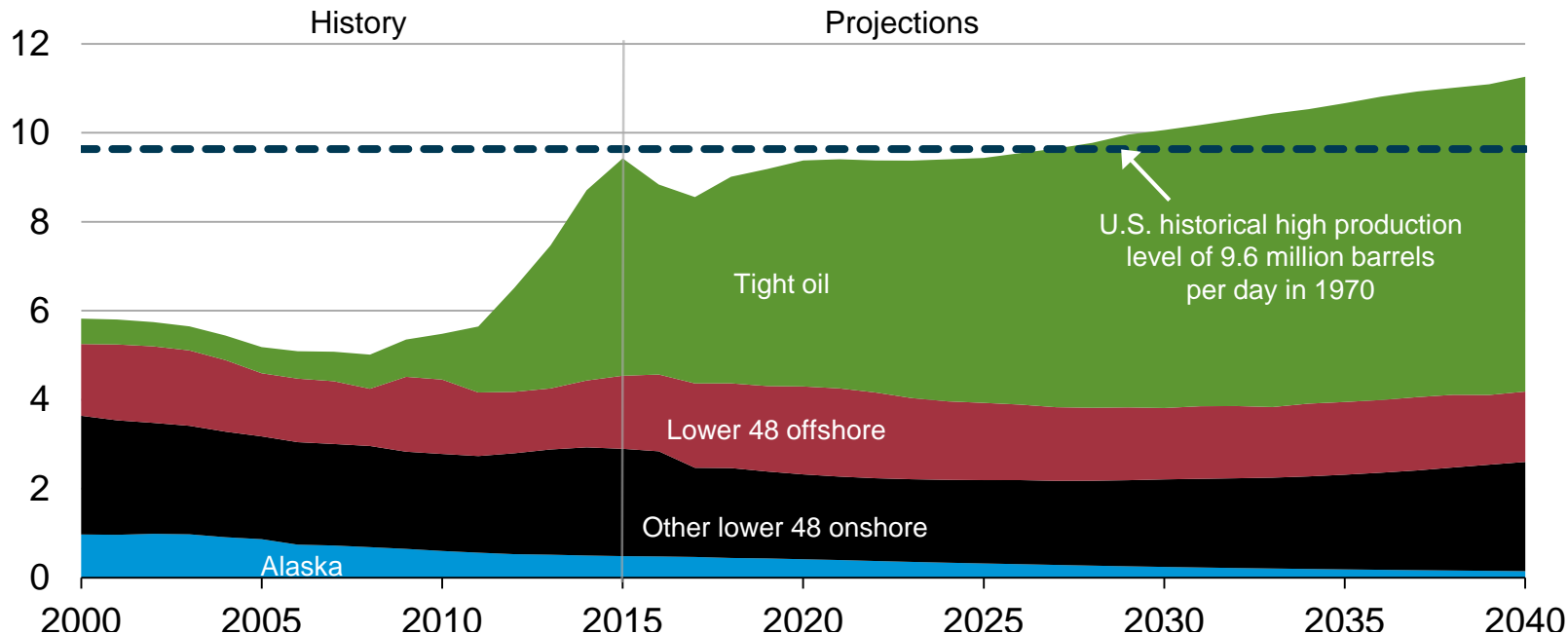
Lower 48 offshore announced discoveries (cont.)

Field name	Field nickname	Water Depth (Feet)	Year of Discovery	Start Year of Production	Resource size (MMBoe)	Field name	Field nickname	Water Depth (Feet)	Year of Discovery	Start Year of Production	Resource size (MMBoe)
WR627	JULIA	7087	2007	2018	600	GC807	ANCHOR	5183	2015	2025	1392
MC948	GUNFLINT	6138	2008	2016	90	KC010	GUADALUPE	4000	2014	2024	450
KC093	GILA	4900	2013	2017	692	GC040	KATMAI	2100	2014	2024	100
MC026	AMETHYST	1200	2014	2017	60	WR160	YETI	5895	2015	2025	175
MC525	RYDBERG	7500	2014	2019	100	DC398	GETTYSBURG	5000	2014	2024	100
MC431	SON OF BLUTO 2	6461	2012	2017	100	MC079	OTIS	3800	2014	2018	44
GB959	NORTH PLATTE	4400	2012	2022	693	KC642	LEON	1865	2014	2024	357
GC823	PARMER	3821	2012	2022	44	GC643	HOLSTEIN DEEP	4326	2014	2016	250
SE039	PHOBOS	8500	2013	2018	100	MC566	FORT SUMTER	7062	2016	2020	125
WR095	YUCATAN NORTH	5860	2013	2020	90	KC814	SICILY	6716	2015	2020	400
MC126	HORN MOUNTAIN DEEP	5400	2015	2017	90	EB954	EW954	560	2015	2016	90
						GC726	CAESAR TONGA 2	5000	-	2016	90

AEO2016 Reference case

U.S. crude oil production rises above previous historical high before 2030

U.S. crude oil production
million barrels per day

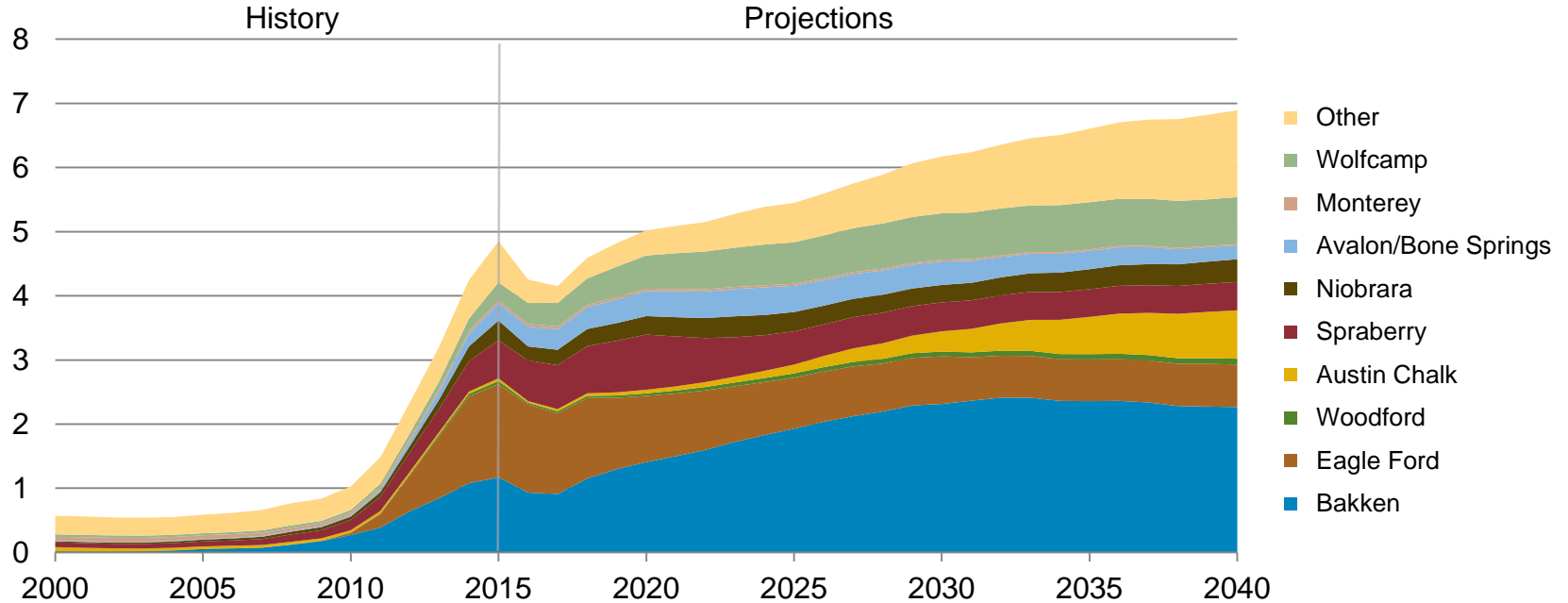


Source: EIA, Annual Energy Outlook 2016

Projected crude oil production from tight oil plays in Reference case

Crude oil production

million barrels per day

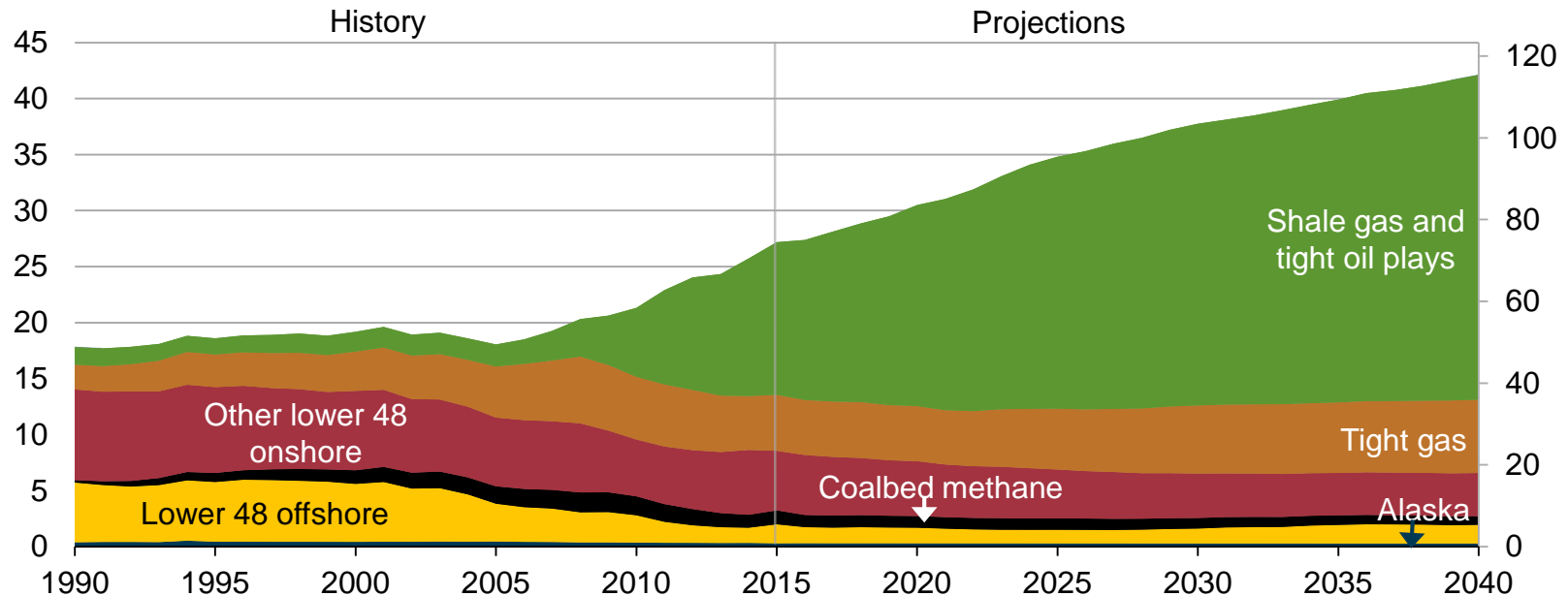


Source: EIA, Annual Energy Outlook 2016

Shale resources remain the dominant source of U.S. natural gas production growth

U.S. dry natural gas production
trillion cubic feet

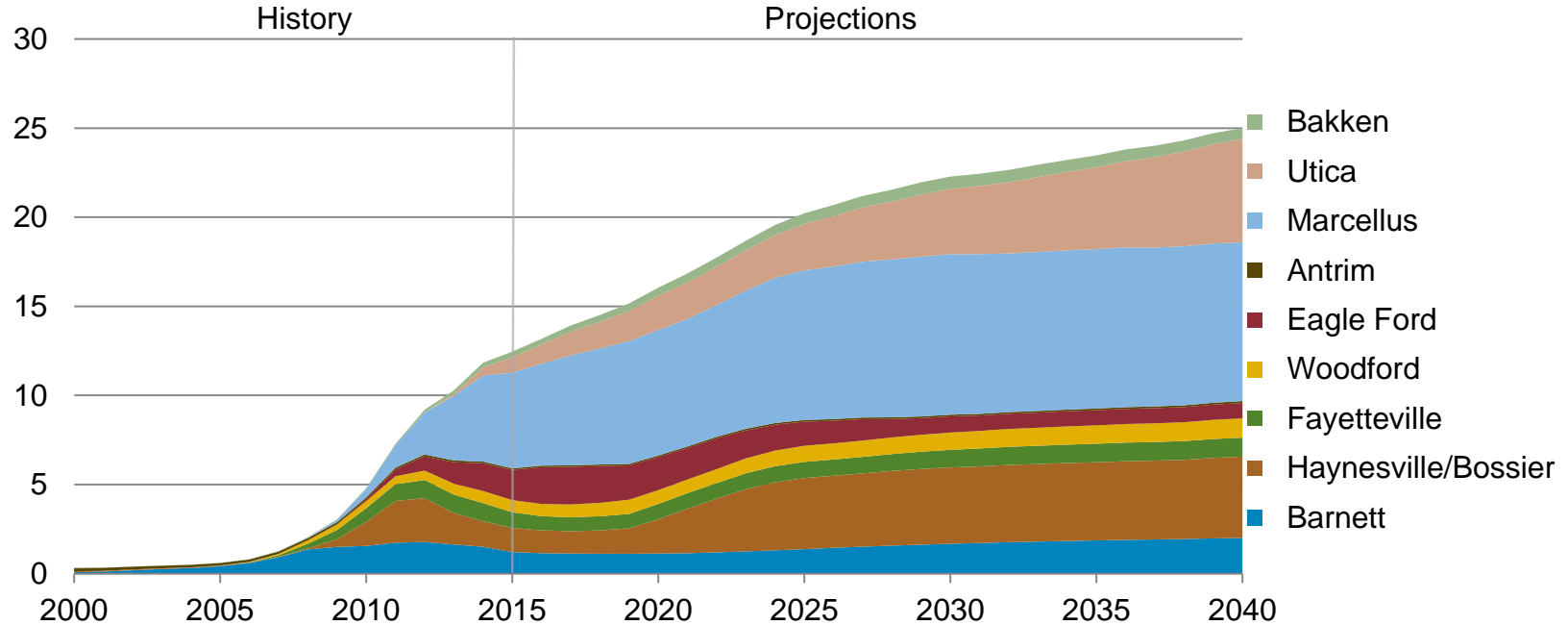
billion cubic feet per day



Source: EIA, Annual Energy Outlook 2016

Shale gas production by play

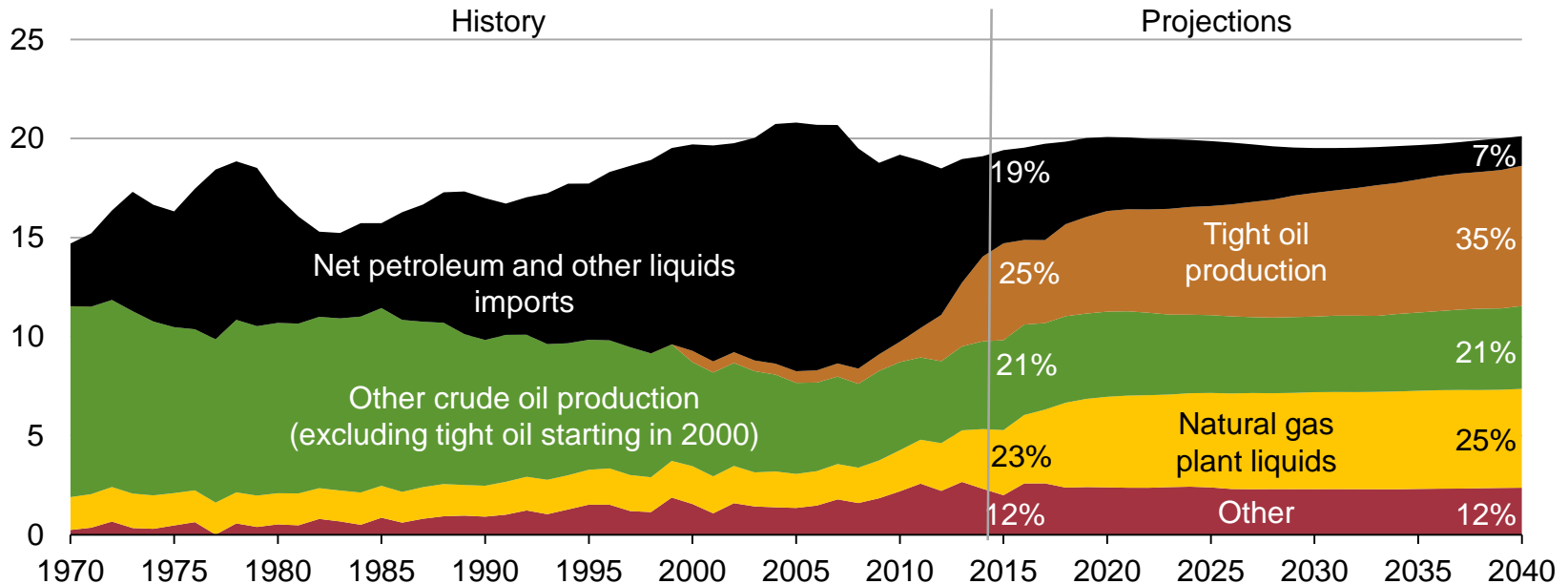
Natural gas production
trillion cubic feet



Source: EIA, Annual Energy Outlook 2016

Combination of increased tight oil production and higher fuel efficiency drives projected decline in oil imports

U.S. liquid fuels supply
million barrels per day

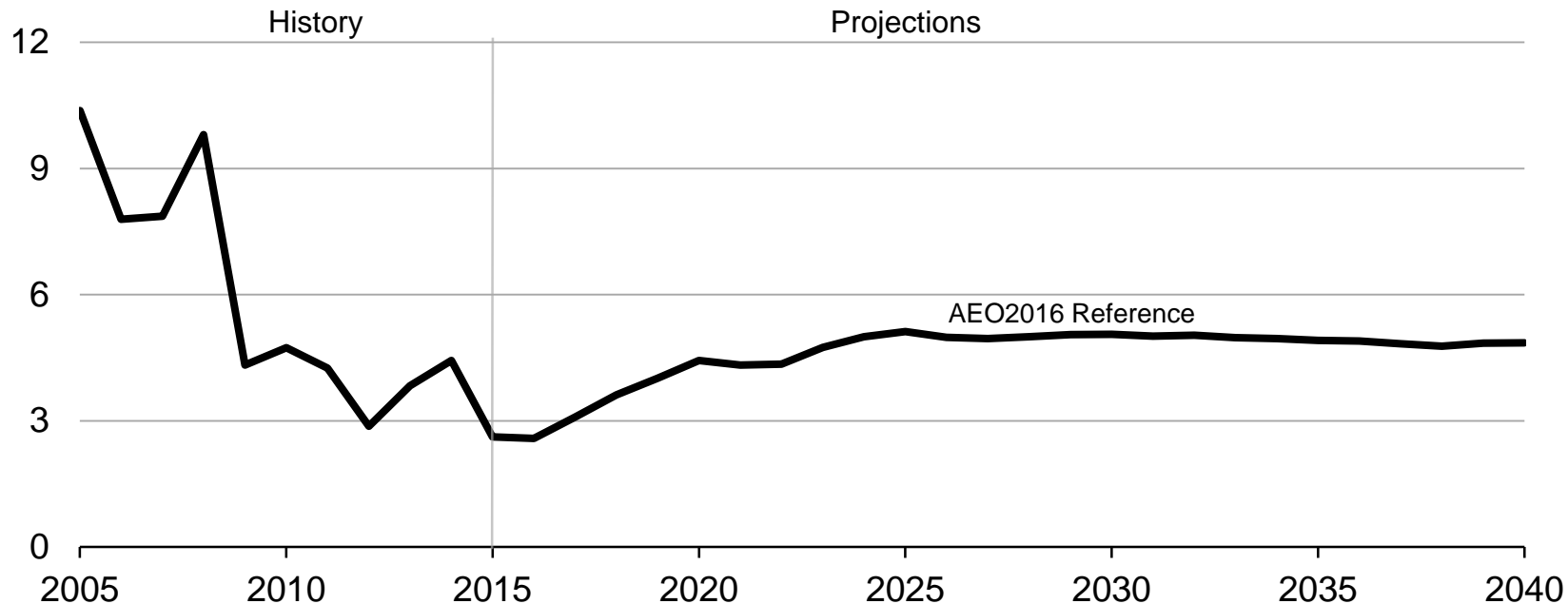


Note: "Other" includes refinery gain, biofuels production, all stock withdrawals, and other domestic sources of liquid fuels

Source: EIA, Annual Energy Outlook 2016

Natural gas prices are projected to remain below \$5/MMBtu through most of the projection period

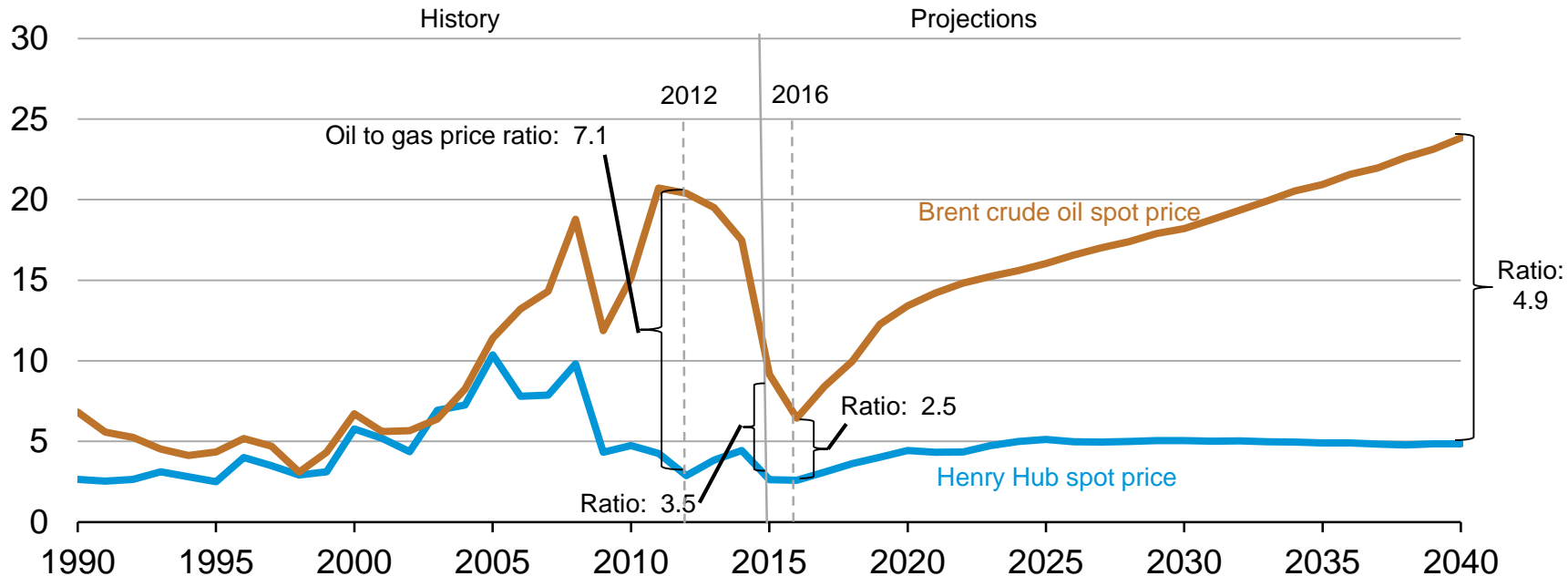
average Henry Hub spot prices for natural gas
2015 dollars per million Btu



Source: EIA, Annual Energy Outlook 2016

Difference between U.S. natural gas and crude oil prices grows through 2040

energy spot prices
2015 dollars per million Btu

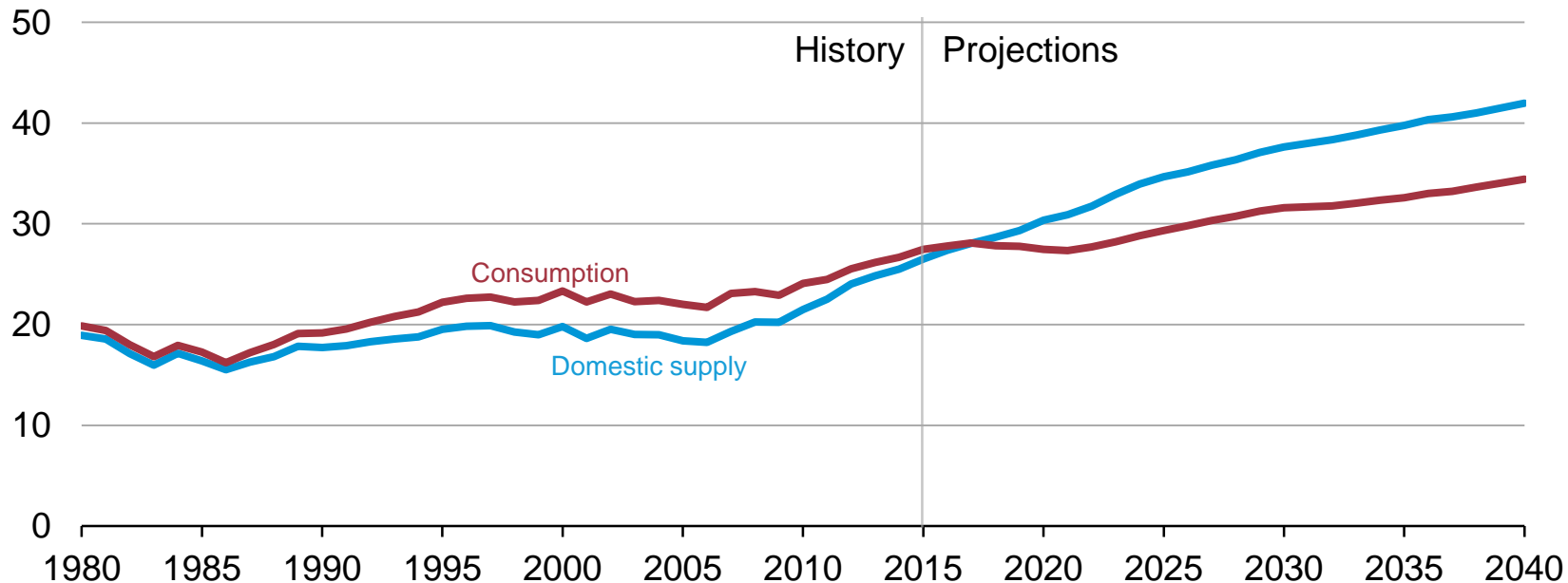


Source: EIA, Annual Energy Outlook 2016

Natural Gas Markets

U.S. natural gas production exceeds consumption, making the United States a net natural gas exporter in the very near future

U.S. energy production and consumption
quadrillion Btu

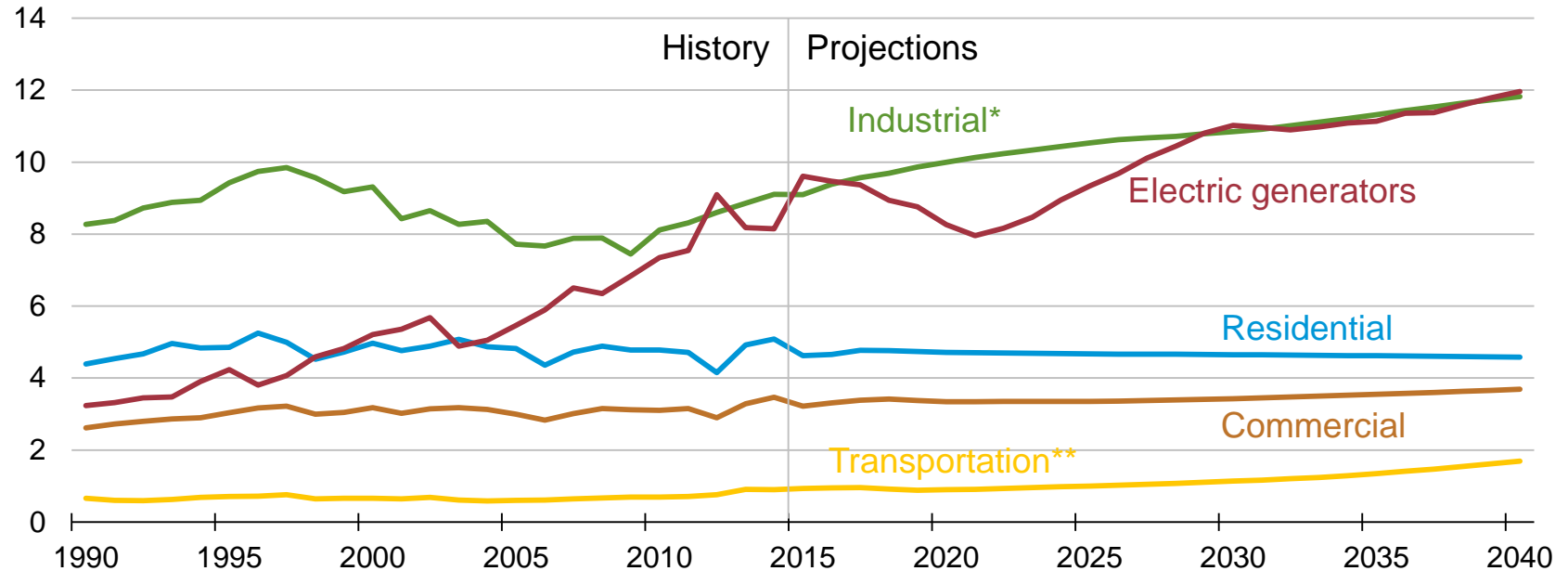


Source: EIA, Annual Energy Outlook 2016

Natural gas consumption by sector, 1990-2040

Dry natural gas

Trillion cubic feet per year



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

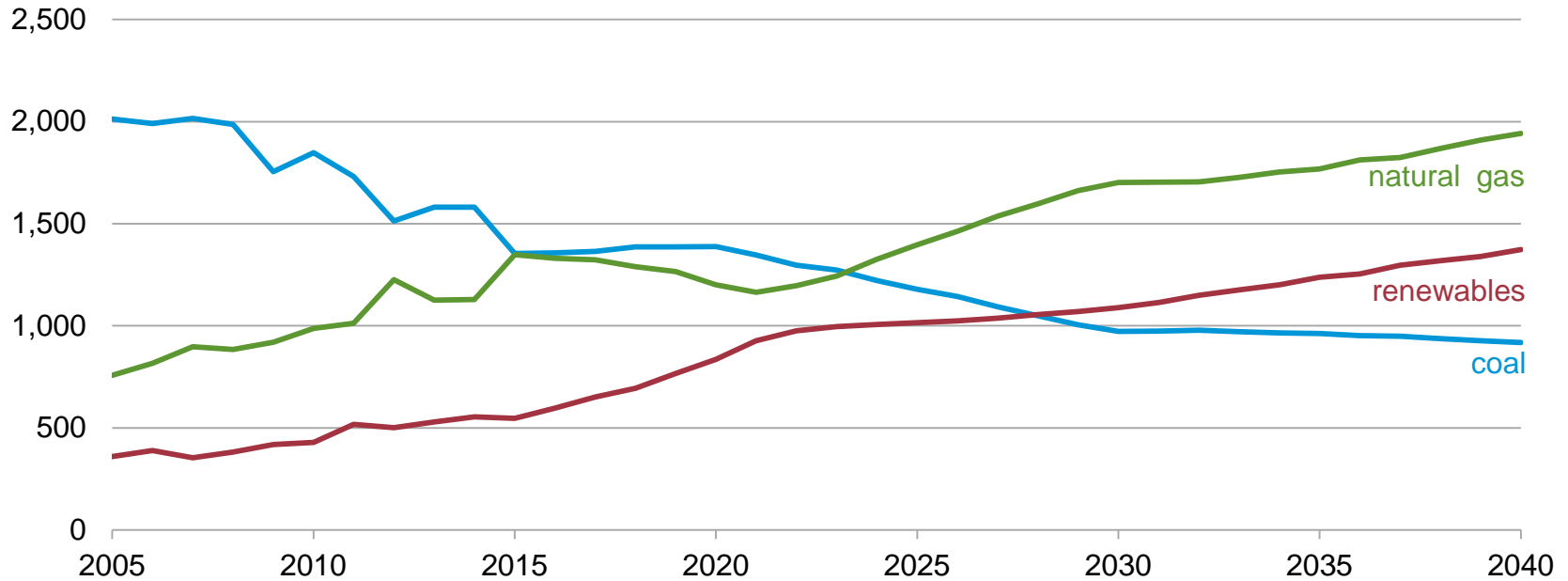
** Includes pipeline fuel

Source: EIA, Annual Energy Outlook 2016

Net electricity generation by fuel

electric generation by fuel

billion kwh

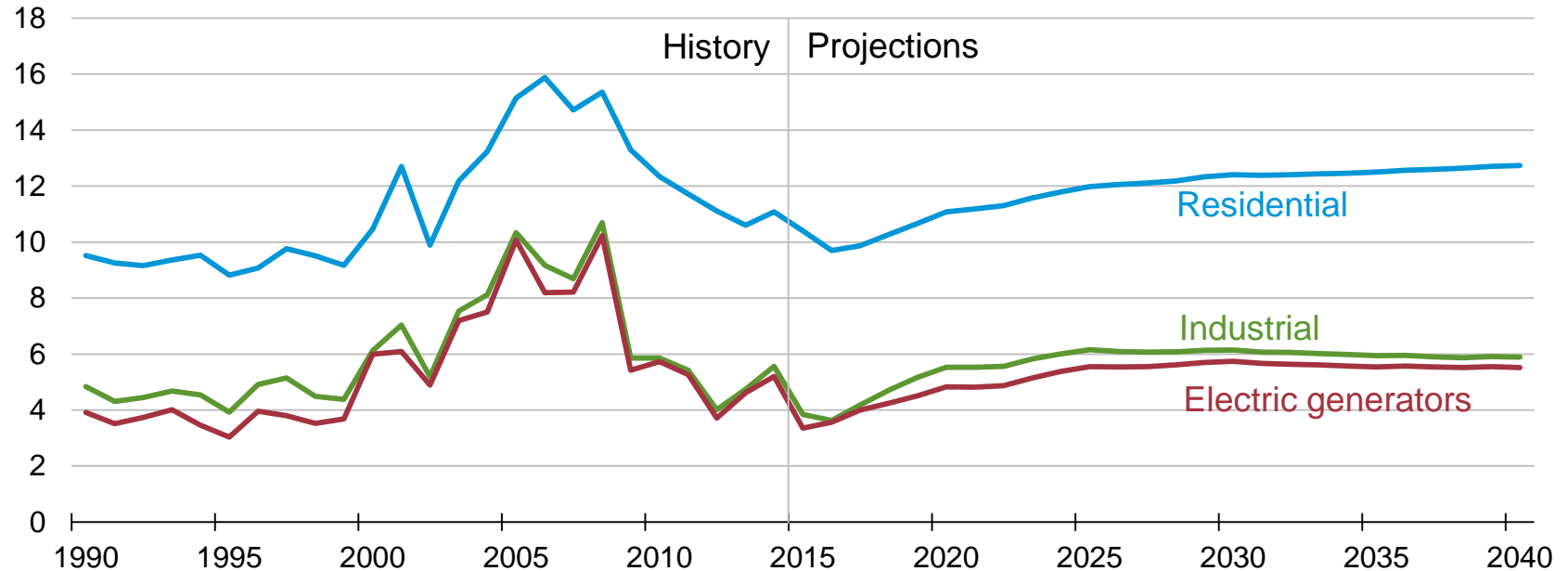


Source: EIA, Annual Energy Outlook 2016

Natural Gas End-User Prices, 1990-2040

Natural Gas End-User Prices

2015 dollars per thousand cubic feet

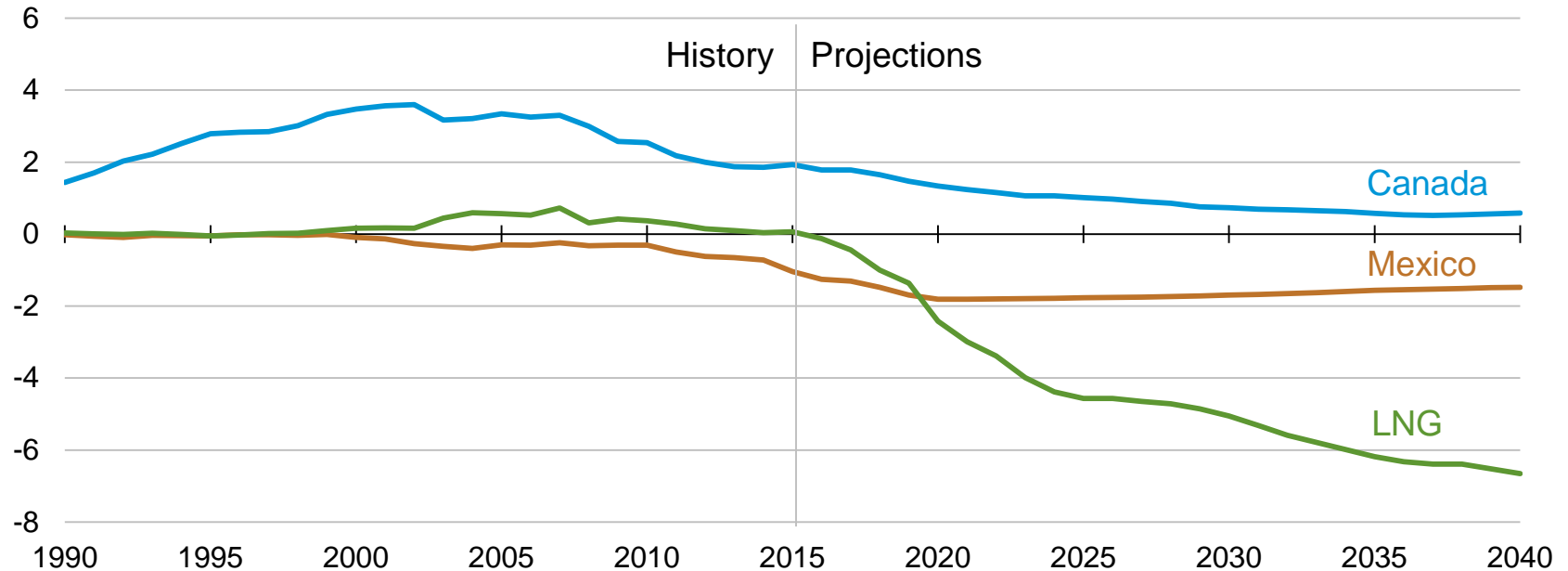


Source: EIA, Annual Energy Outlook 2016

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

Dry natural gas

Trillion cubic feet per year

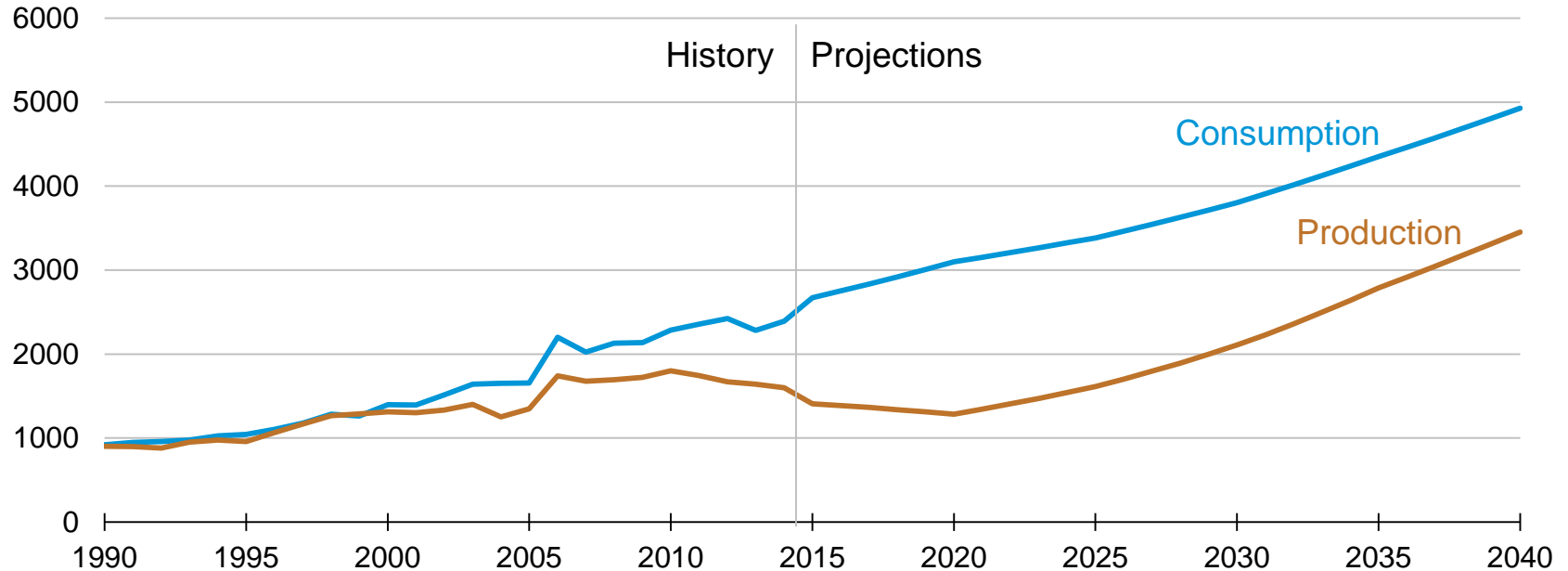


Source: EIA, Annual Energy Outlook 2016

Mexico consumption and production

Dry natural gas

Billion cubic feet per year

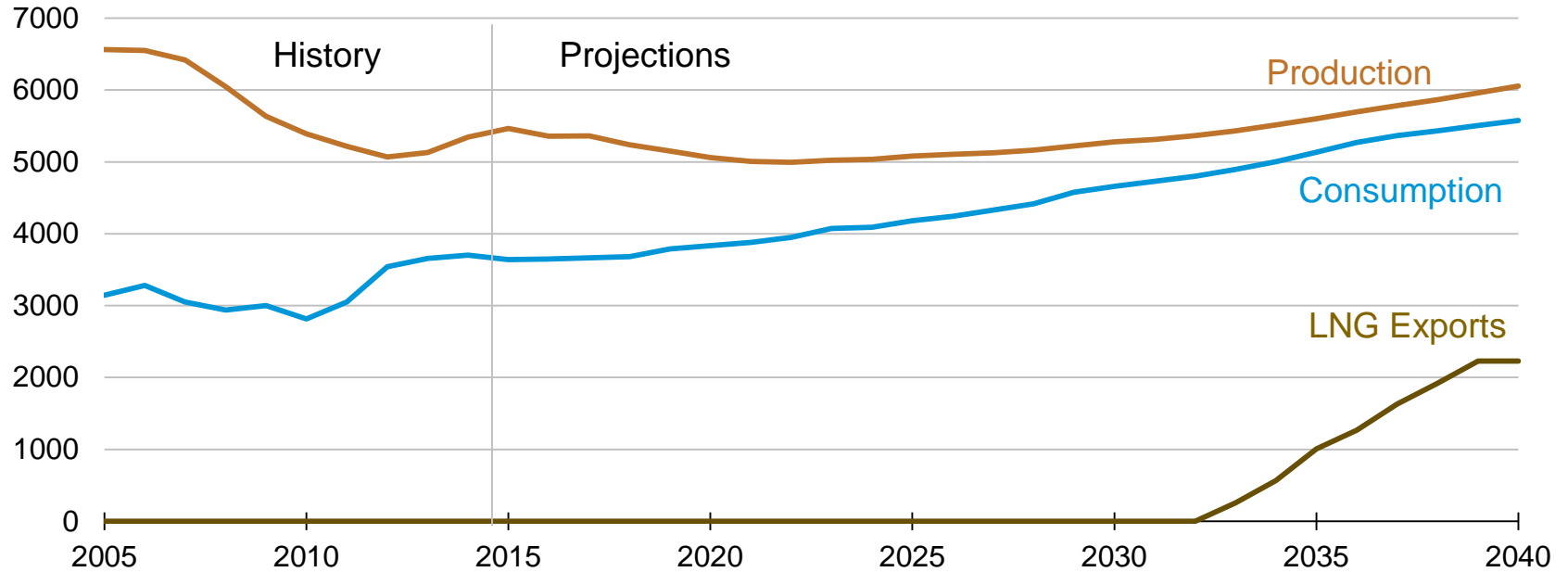


Source: EIA, Annual Energy Outlook 2016

Canada consumption and production

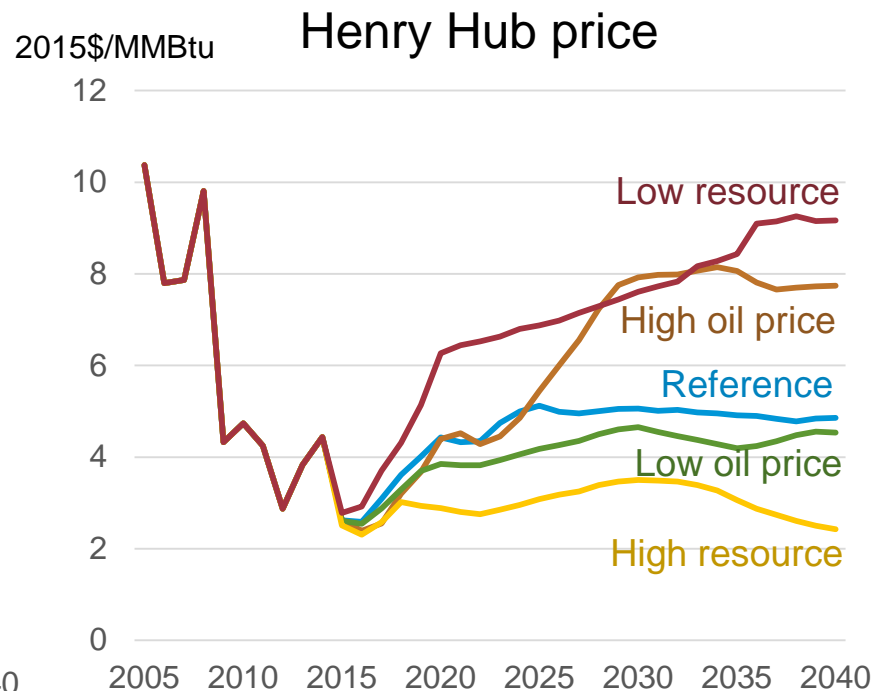
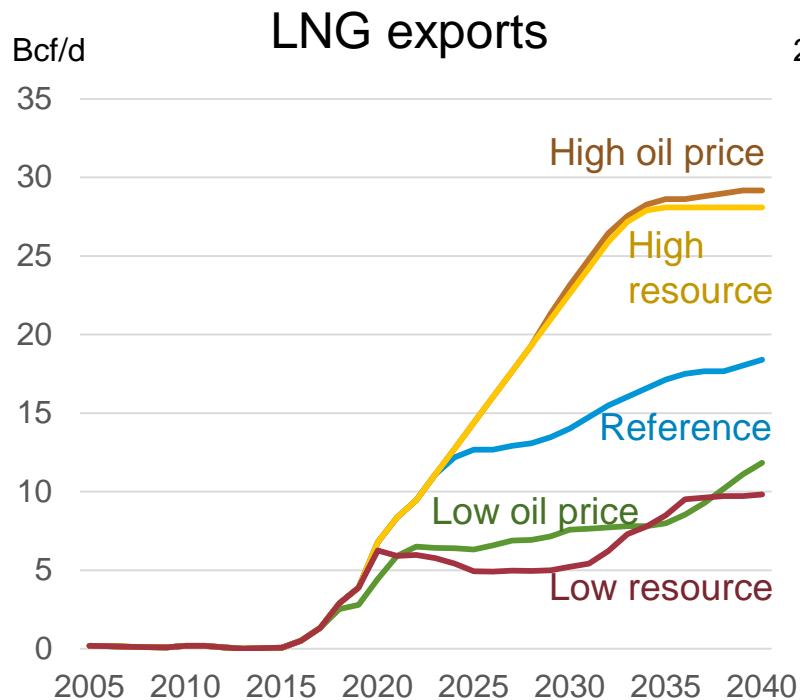
Dry natural gas

Billion cubic feet per year



Source: EIA, Annual Energy Outlook 2016

LNG exports vary significantly across cases in response to world oil prices and oil and gas resource assumptions



We welcome feedback on our assumptions and documentation

- The AEO Assumptions report <http://www.eia.gov/forecasts/aeo/assumptions/>
- NEMS Model Documentation
 - Oil and gas supply
[http://www.eia.gov/forecasts/aeo/nems/documentation/ogsm/pdf/m063\(2014\).pdf](http://www.eia.gov/forecasts/aeo/nems/documentation/ogsm/pdf/m063(2014).pdf)
 - Natural gas transmission and distribution
[http://www.eia.gov/forecasts/aeo/nems/documentation/ngtdm/pdf/m062\(2014\).pdf](http://www.eia.gov/forecasts/aeo/nems/documentation/ngtdm/pdf/m062(2014).pdf)
- Working papers series <http://www.eia.gov/workingpapers/>
- And these working group meetings
<http://www.eia.gov/forecasts/aeo/workinggroup/>

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Next Working Group Meeting

Tentatively planned for late September 2016.

Will present preliminary results for *AEO2017*.