Assumptions and Expectations for *Annual Energy Outlook 2016*: Oil and Gas Working Group

AEO2016 Oil and Gas Supply Working Group Meeting
Office of Petroleum, Gas, and Biofuels Analysis
December 1, 2015| 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DO NOT QUOTE OR CITE AS RESULTS ARE SUBJECT TO CHANGE

We welcome feedback on our assumptions and documentation

- The AEO Assumptions report http://www.eia.gov/forecasts/aeo/assumptions/
- Appendix 2.C and Appendix 2.D in the AEO Documentation http://www.eia.gov/forecasts/aeo/nems/documentation/ogsm/pdf/m063(2014).pdf
- We have restarted our working papers series http://www.eia.gov/workingpapers/
- And these working group meetings http://www.eia.gov/forecasts/aeo/workinggroup/

OGSM / Upstream

Oil and Gas Supply – Lower 48 onshore

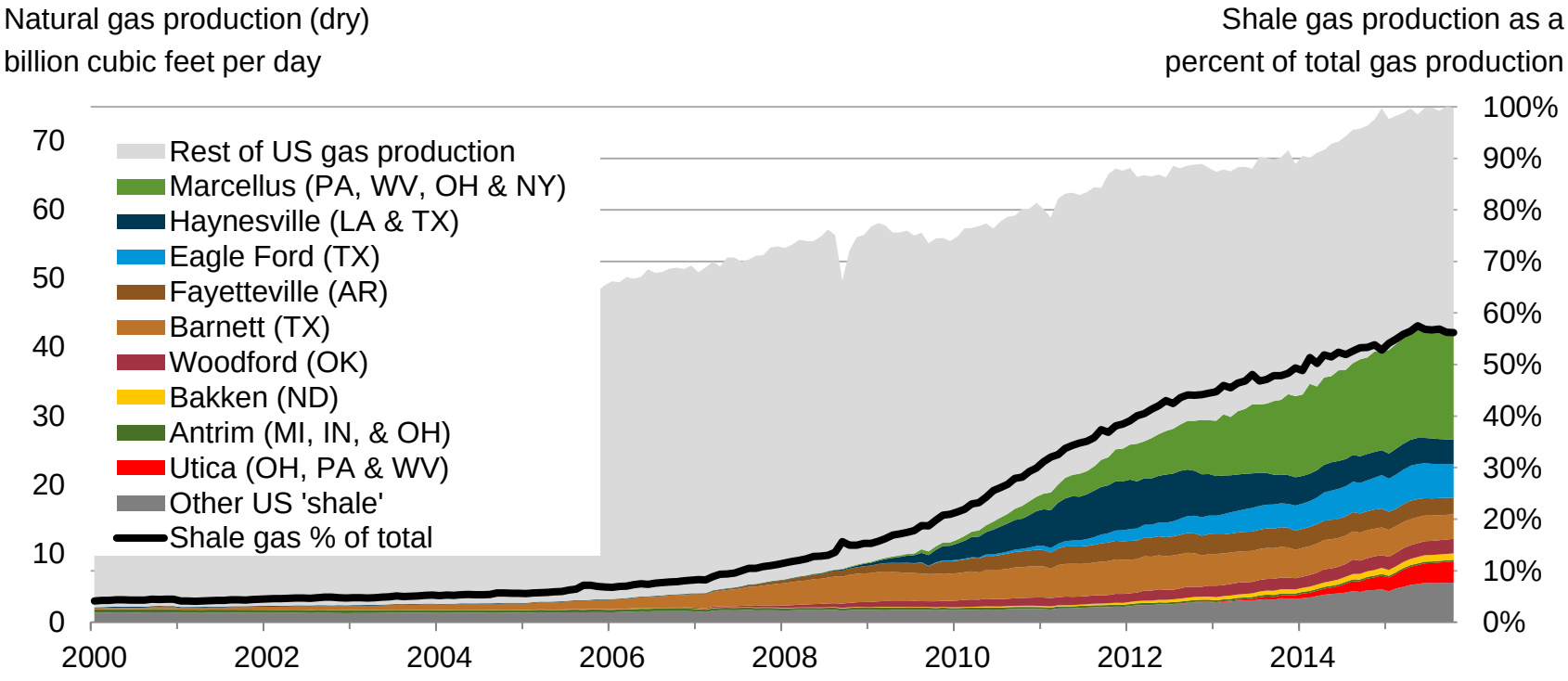
- Update NPGL factors as well as the composition shares of NGPLs (ethane, propane, butane, iso-butane, pentanes plus).

- Update EURs as time allows – focus on PA Marcellus first since production reporting has changed from six-month totals to monthly (started Jan. 2015).

- Revise OGSM representation of production profiles and costs change over time because of technology changes. (early work of a two year project)

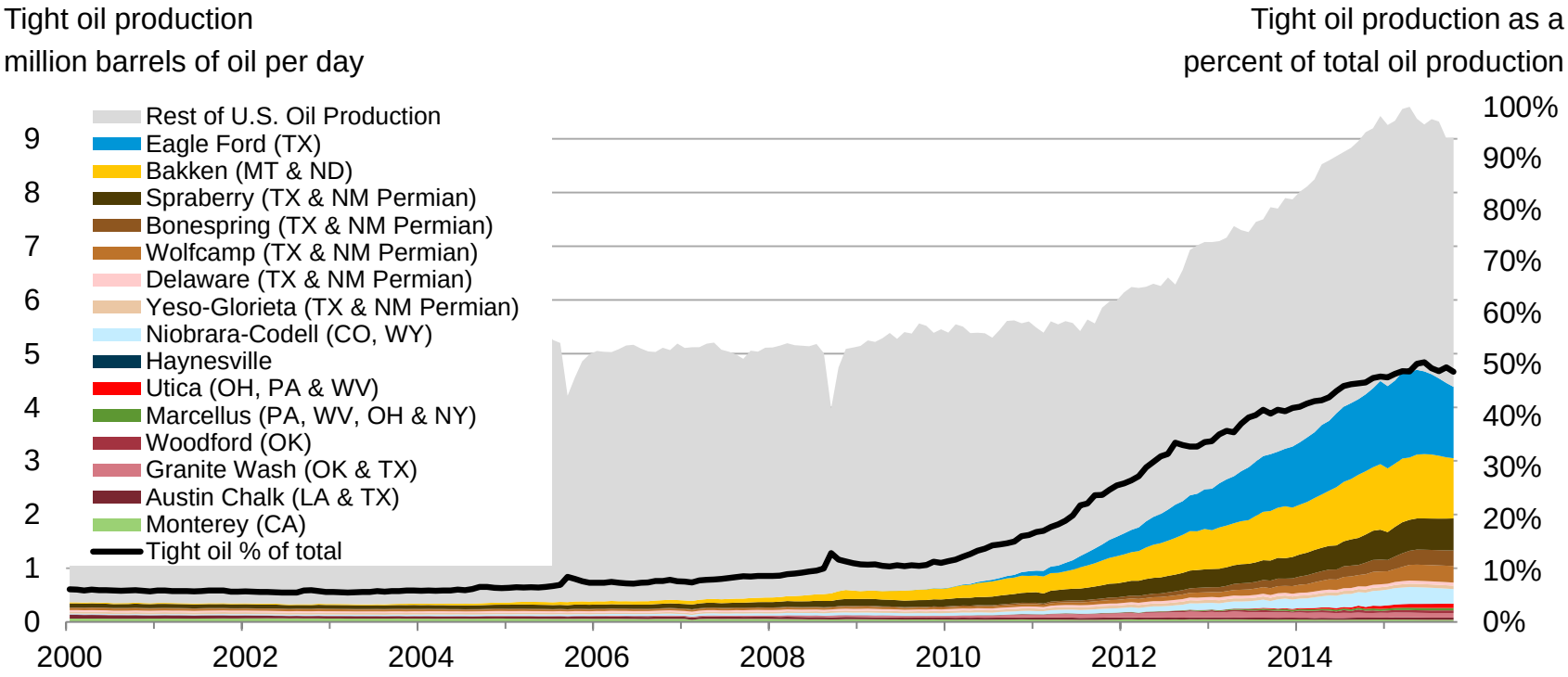
- Revise assumptions pertaining to price responsiveness of drilling, as needed to reflect analysis incorporated into the STEO.

Estimated U.S. shale gas production was 42.0 Bcf/d in October 2015 about 56% of total U.S. dry production (74.8 Bcf/d)



Sources: EIA Natural Gas Monthly, STEO through October 2015 and Drilling Info.

Estimated U.S. tight oil production was 4.4 MMbbl/d in October 2015 about 49% of total U.S. oil production (9.0 MMbbl/d)

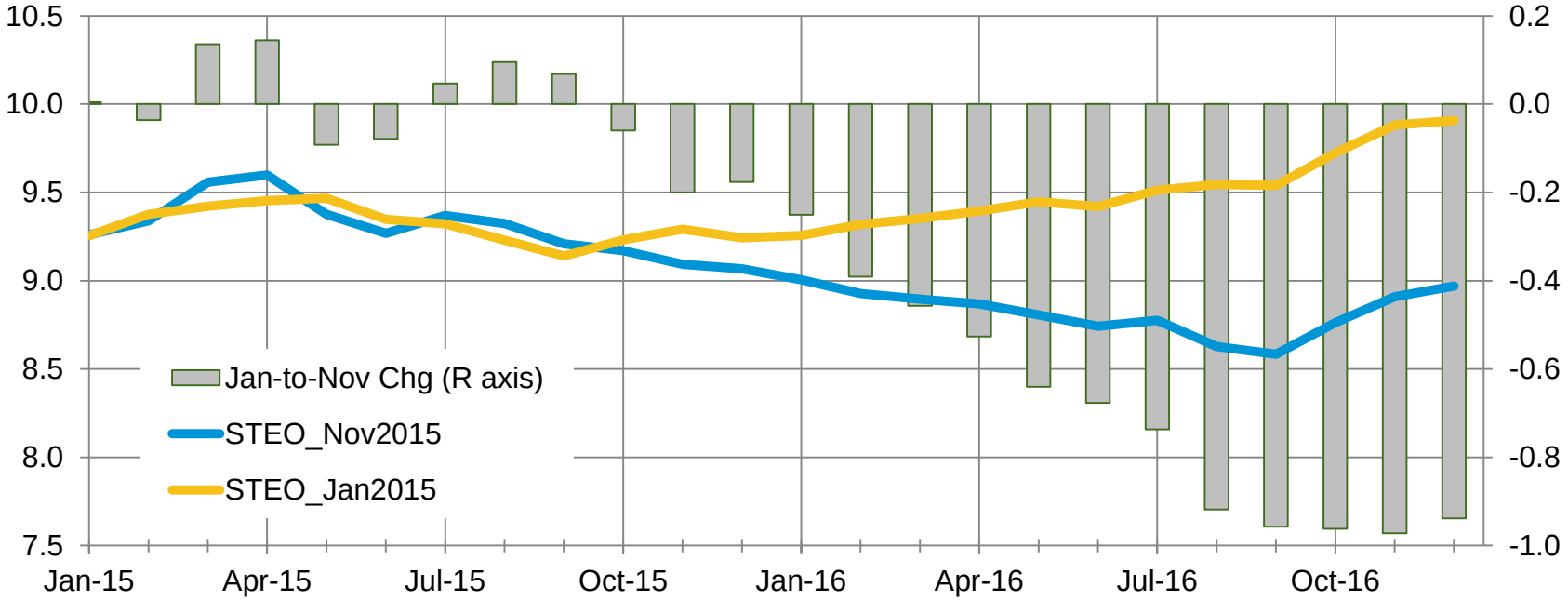


Sources: EIA derived from state administrative data collected by DrillingInfo Inc. Data are through October 2015 and represent EIA's official tight oil estimates, but are not survey data. State abbreviations indicate primary state(s).

January 2015 STEO forecast of U.S. oil production generally within 150,000 b/d for each month in 2015, but 2016 is much lower because prices have not rebound

U.S. crude oil production
million barrels per day

Change between Jan. & Nov. 2015 STEO forecasts of U.S. crude oil production
million barrels per day



Source: EIA Short-Term Energy Outlooks, January 2015 and November 2015

Oil and Gas Supply – Offshore GOM and Alaska

- Update assumptions for announced discoveries in the GOM (earliest start year, field size, production profiles)

- Revise resource assumptions for the offshore North Slope to reflect Shell's disappointing results in the Chukchi Sea, BOEM canceling upcoming Arctic lease sales, and Repsol deferring exploration in the Arctic

Lower 48 offshore announced discoveries

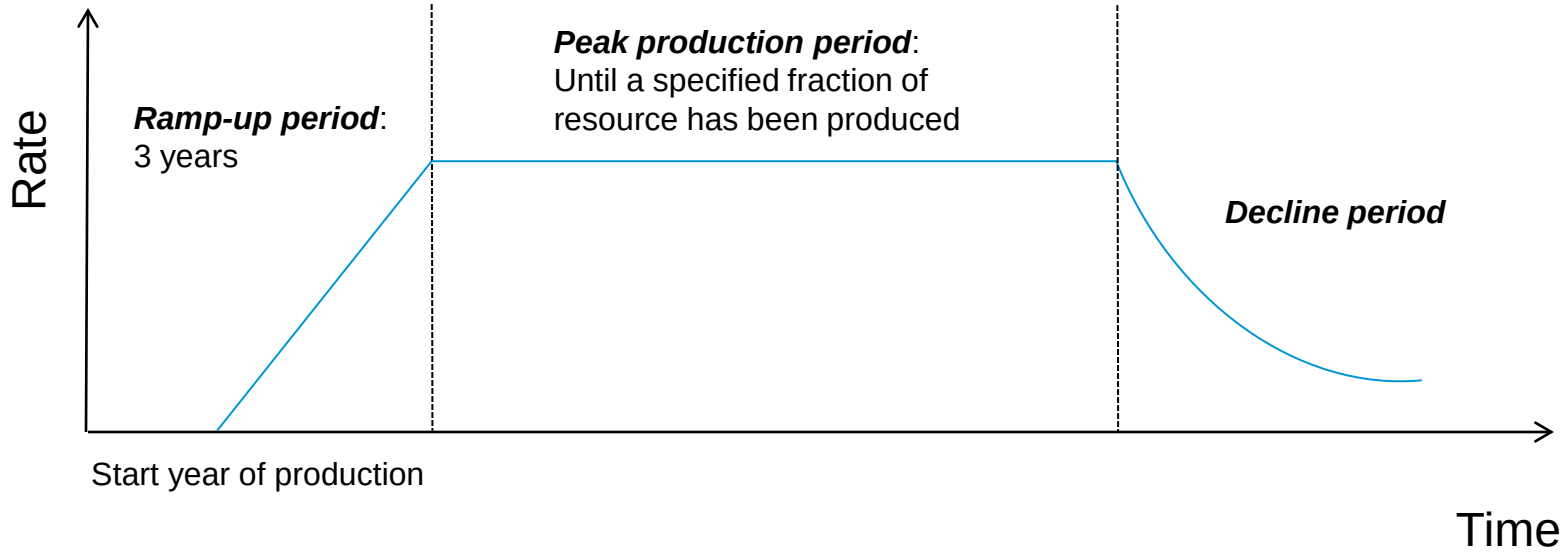
Field name	Field nickname	Water Depth (Feet)	Year of Discovery	Start Year of Production	Resource size (MMBoe)
AC865	GOTCHA	7844	2006	2019	80
DC353	VICKSBURG	7457	2009	2019	325
GB427	CARDAMOM DEEP	2720	2009	2015	182
GB506	BUSHWOOD	2700	2009	2019	65
GC432	SAMURAI	3400	2009	2017	60
GC468	STAMPEDE-PONY	3497	2006	2018	372
GC512	STAMPEDE-KNOTTY HEAD	3557	2005	2018	372
GC903	HEIDELBERG	5271	2009	2016	400
KC102	TIBER	4132	2009	2017	692
KC292	KASKIDA	5894	2006	2020	691
KC736	MOCCASIN	6759	2011	2021	350
KC872	BUCKSKIN	6978	2009	2018	200

Field name	Field nickname	Water Depth (Feet)	Year of Discovery	Start Year of Production	Resource size (MMBoe)
KC919	HADRIAN NORTH	7000	2010	2020	372
KC964	HADRIAN SOUTH	7983	2009	2015	182
LL370	DIAMOND	9975	2008	2018	75
LL400	CHEYENNE EAST	9187	2011	2020	12
MC199	MANDY	2478	2010	2020	20
MC392	APPOMATTOX	7290	2009	2017	325
MC762	DEIMOS SOUTH	3122	2010	2015	75
MC771	KODIAK	5006	2008	2018	182
MC792	WEST BOREAS	3094	2009	2015	182
MC984	VITO	4038	2009	2020	365
SM217	FLATROCK	10	2007	2017	200
MC768	KAIKIAS	4575	2014	2024	100
WR029	BIG FOOT	5235	2006	2018	200

Lower 48 offshore announced discoveries (cont.)

Field name	Field nickname	Water Depth (Feet)	Year of Discovery	Start Year of Production	Resource size (MMBoe)
WR052	SHENANDOAH	5750	2009	2017	182
WR508	STONES	9556	2005	2018	250
WR627	JULIA	7087	2007	2018	600
MC948	GUNFLINT	6138	2008	2016	90
KC093	GILA	4900	2013	2017	692
MC782	DANTZLER	6580	2013	2017	75
MC698	BIG BEND	7273	2012	2020	65
MC026	AMETHYST	1200	2014	2017	60
MC525	RYDBERG	7500	2014	2019	100
AC815	SILVERTIP	9280	2004	2015	89
MC300	MARMALARD	6148	2012	2015	60
MC431	SON OF BLUTO 2	6461	2012	2017	100
GB959	NORTH PLATTE	4400	2012	2022	693
GC823	PARMER	3821	2012	2022	44
SE039	PHOBOS	8500	2013	2018	100
WR095	YUCATAN NORTH	5860	2013	2020	90
MC126	HORN MOUNTAIN DEEP	5400	2015	2017	90
GC807	ANCHOR	5183	2015	2025	1392
KC010	GUADALUPE	4000	2014	2024	450
GC040	KATMAI	2100	2014	2024	100
WR160	YETI	5895	2015	2025	175
DC398	GETTYSBURG	5000	2014	2024	100
MC079	OTIS	3800	2014	2018	44
KC642	LEON	1865	2014	2024	357
GC643	HOLSTEIN DEEP	4326	2014	2016	250

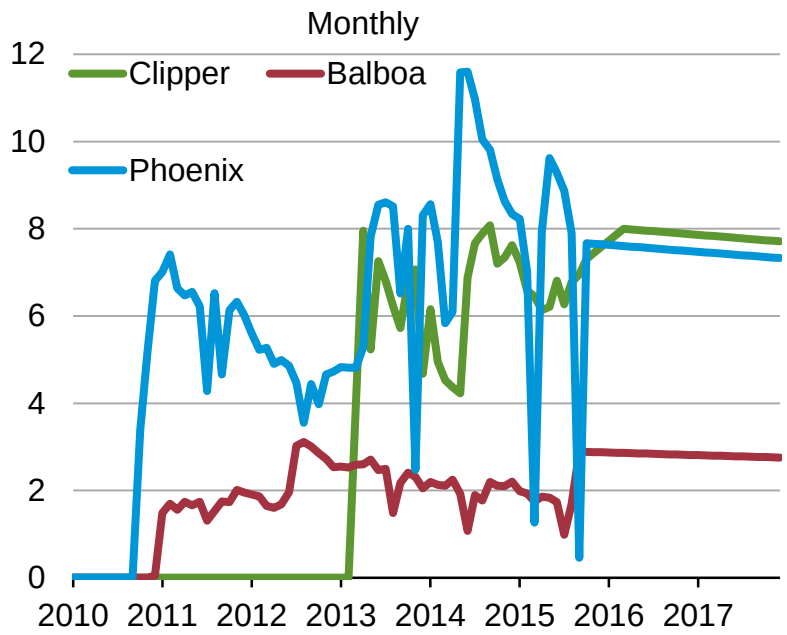
Representation of offshore Gulf of Mexico production profiles for announced discoveries

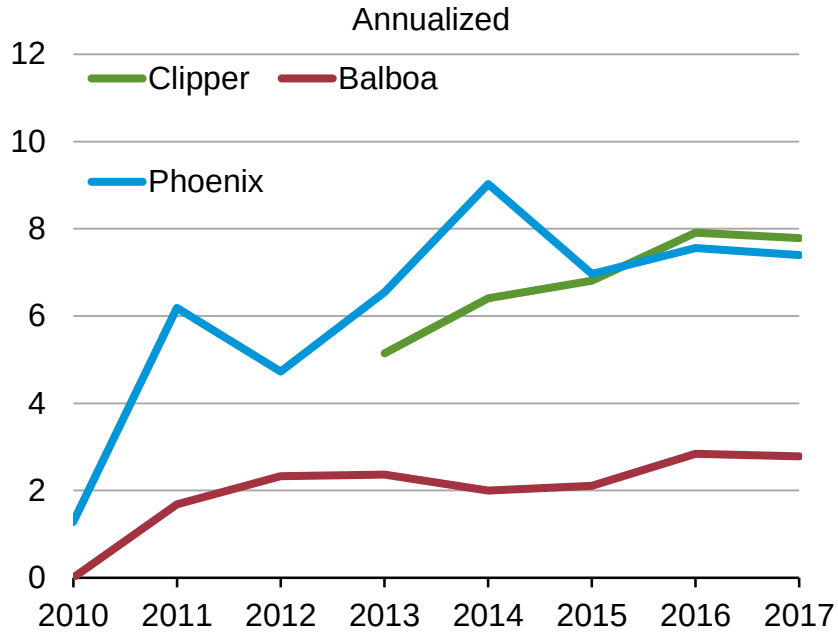


Examples offshore Gulf of Mexico field-level production profile

crude oil production

thousand barrels per day





Source: EIA, preliminary analysis for Annual Energy Outlook 2016

NGTDM

NGTDM “overhaul”/redesign project is schedule to be completed in the spring

- NGTDM “overhaul”/redesign project
  - A redesigned NGTDM will allow for better representation of domestic flows and prices.
  - In tandem with the Global Hydrocarbon Supply Model project, it will also ultimately result in better representation of natural gas imports and exports.

AEO 2016 updates agenda

- LNG exports
  - Increased number of projects under construction
  - Recategorization of fuel used at marine export facilities
- Pipeline exports
  - Canada (less LNG exports, more production, more imports to U.S.)
  - Mexico (less consumption and LNG imports, less exports from U.S.)
- Natural gas as a vehicle fuel
  - Compressed natural gas vehicle fuel price (change in data)
  - Change in LNG motor fuels tax -- $/gallon to $/DGE

Increased levels LNG export liquefaction capacity under construction should result in higher LNG exports in early period.

Site	Location	Total capacity	Start export
Sabine Pass (1-4)	Louisiana	2.20 bcf/d	2015
Cove Point	Maryland	0.82 bcf/d	2017
Corpus Christi	Texas	2.14 bcf/d	2018
Cameron	Louisiana	1.70 bcf/d	2018
Freeport	Texas	1.80 bcf/d	2018
Sabine Pass (5-6)	Louisiana	1.40 bcf/d	2018
Total		10.06 bcf/d	

Source: FERC

Note: Sabine Pass train 5 under construction according to news reports, not FERC. For some of these the start dates are near the end of the indicated year.

Fuel used at marine liquefaction facilities

- Since we started projecting LNG exports out of the Lower 48 states, we have included these fuel use volumes in the lease and plant fuel category.
- Within the OES survey/data, these volumes are/will be included in the pipeline and distribution fuel use category.
- For AEO2016 we will move these volumes to pipeline fuel use and footnote the tables accordingly.

Canada

- IEO2015 is showing increased consumption in Canada, but lower LNG exports, both of which are taken as exogenous in the AEO.

- The IEO2015 is also projecting higher production for Canada. The AEO's production equations have yet to be reviewed, although expect to increase shale potential.

- Net impact will likely be increased imports from Canada.

Mexico

- With the buildout of pipeline in Mexico to bring U.S. (and eventually Mexican) gas to markets in the south, LNG import assumptions will be lower, consistent with IEO2015.

- However, the IEO2015 projection for consumption in Mexico is notably lower than the IEO2014.

- Net impact will likely be decreased exports to Mexico.

Natural gas used as vehicle fuel

- CNG
  - EIA is no longer publishing a CNG price
  - Next best option is to use EERE's Clean Cities Alternative Fuel Price Report
    - Quarterly report of at-the-pump retail prices, include federal and state motor fuel taxes
    - Gathered from Clean Cities coordinators and stake holders and averaged for 7 regions
    - No information on effective price paid for nonretail (i.e., fleet) uses.
  - Plan to estimate retail CNG price net of motor fuels tax as a function of commercial natural gas price and diesel price, then add motor fuels tax back for projection. Assume a discount for fleet vehicles, based on AEO2015 retail markups.
- LNG
  - Change tax to be based on energy content level, not gallons, per recent Act.