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The changing nature of Gulf of Mexico energy infrastructure.

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Energy infrastructure supporting E&P activities.

Louisiana has a plethora of critical energy infrastructure. A large portion of which originated to support offshore exploration and production activities.

Natural Gas Processing

LNG

Ports/Supply Base

Pipes

Refineries

Platform Fabrication

Natural Gas/LPG/NGL Storage

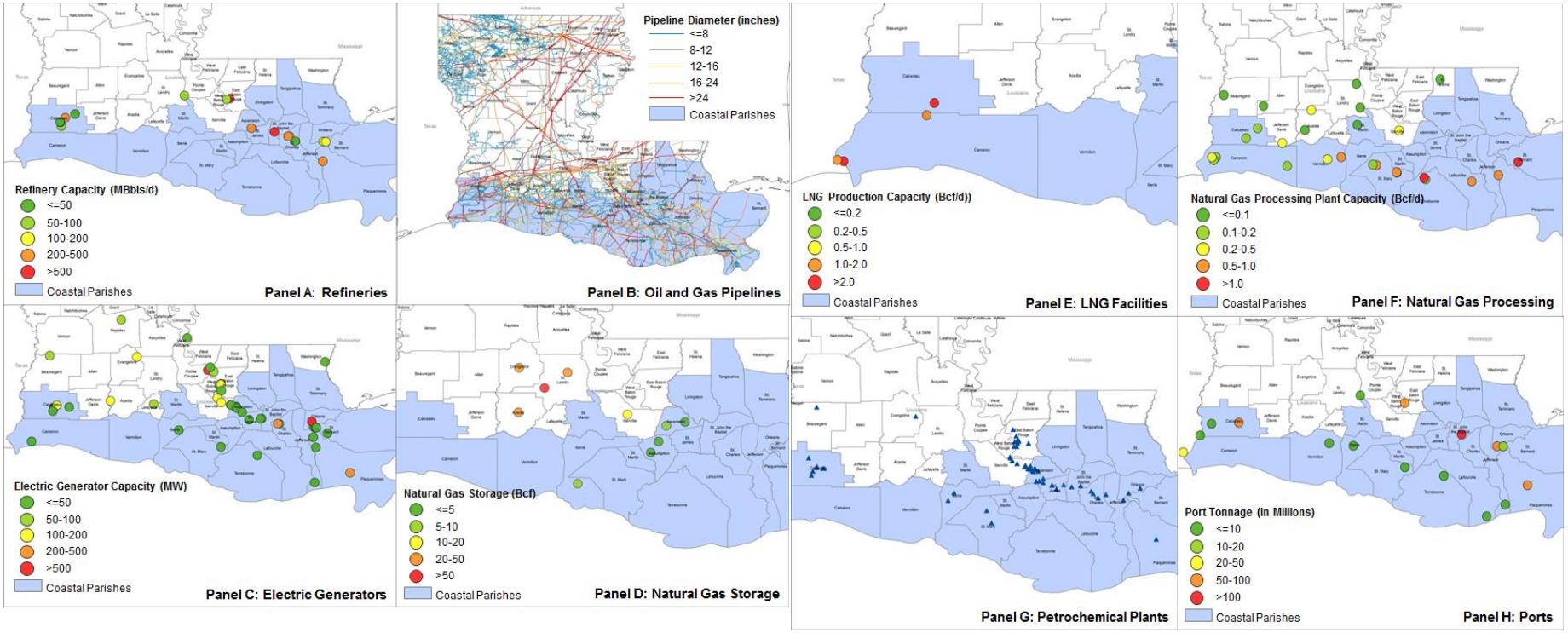
Petrochemical

Waste Handling Facilities

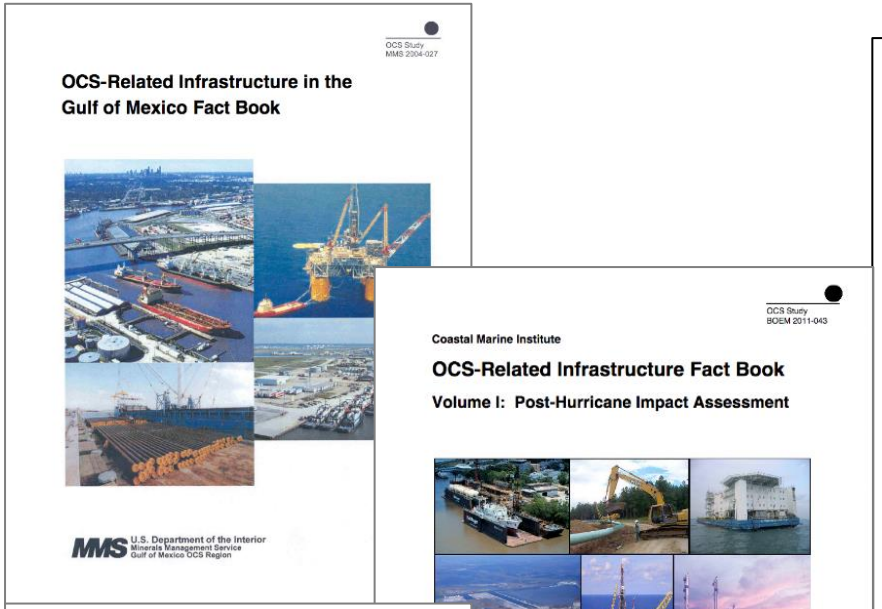
Electric Generation

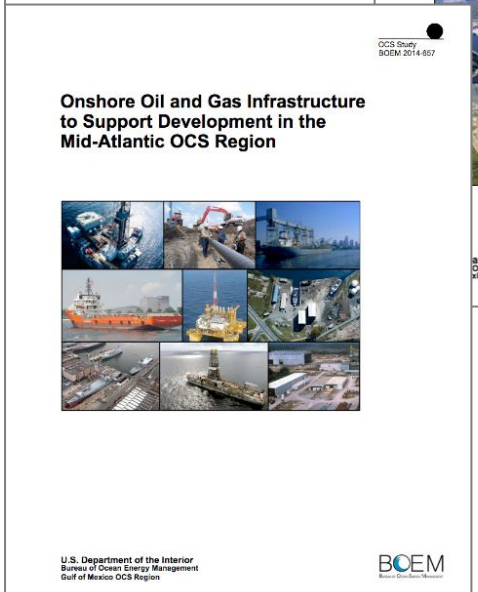
Louisiana's critical energy infrastructure.

A large portion of this infrastructure, in fact, is located in the coastal zone, not only in Louisiana, but various places along the Texas Gulf coast as well.



Prior BOEM factbook research and analysis.





Goals of past BOEM (MMS) "fact-book" projects has been to:

(1) describe and identify each of the relevant infrastructure categories and individual assets in the respective coastal areas (and develop GIS database to support this description)

(2) Explain their relationship to the offshore industry.

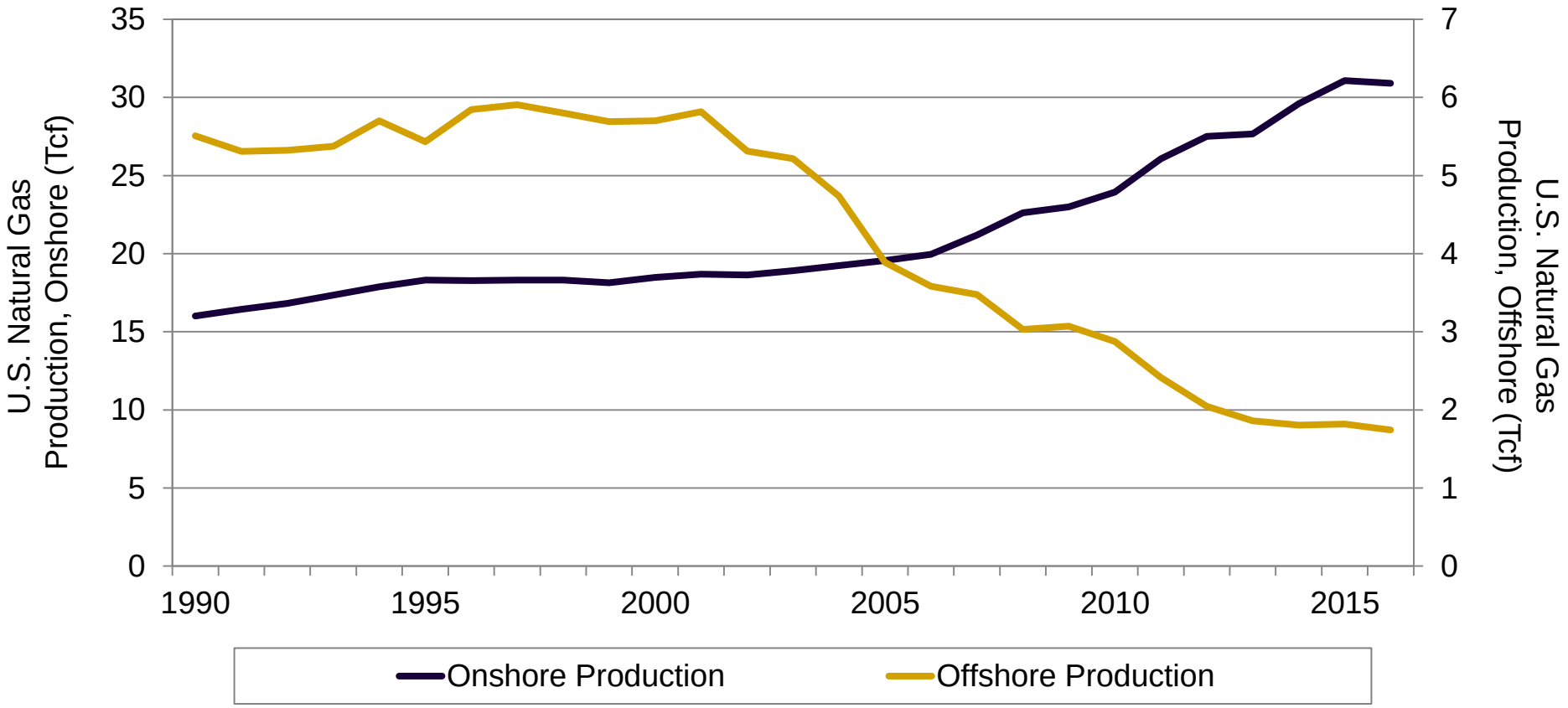
(3) Examine and explain infrastructure organization and structure (from industrial and labor market perspective).

(4) Examine recent changes and the outlook for infrastructure development.

Industry Changes

U.S. natural gas production – onshore v. offshore

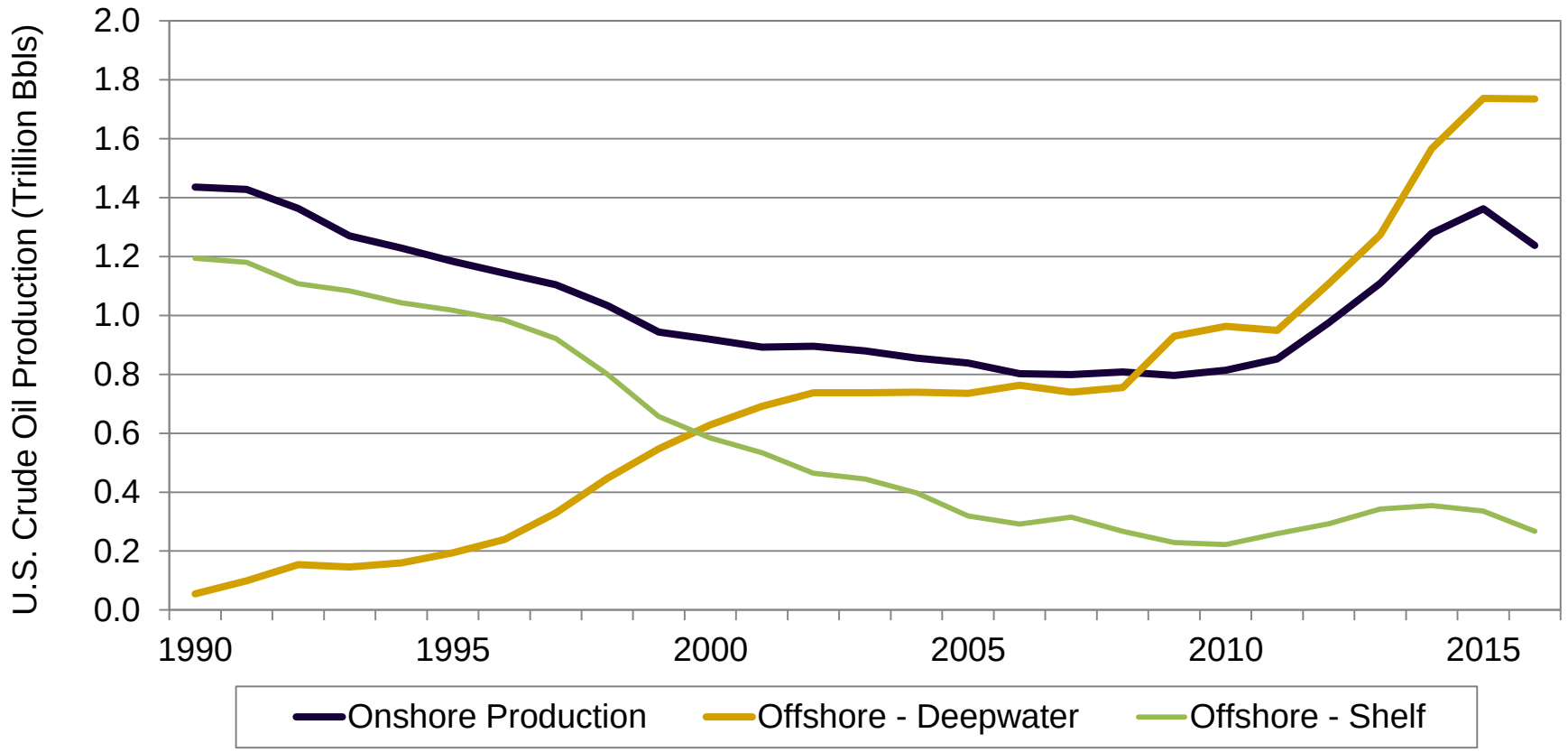
Offshore natural gas production has fallen 70 percent in the last 15 years, at an average annual rate of 8 percent. Onshore production has increased 65 percent since 2001, and 30 percent since 20100



Source: U.S. Energy Information Administration.

U.S. Crude Oil Production – Onshore v. Offshore

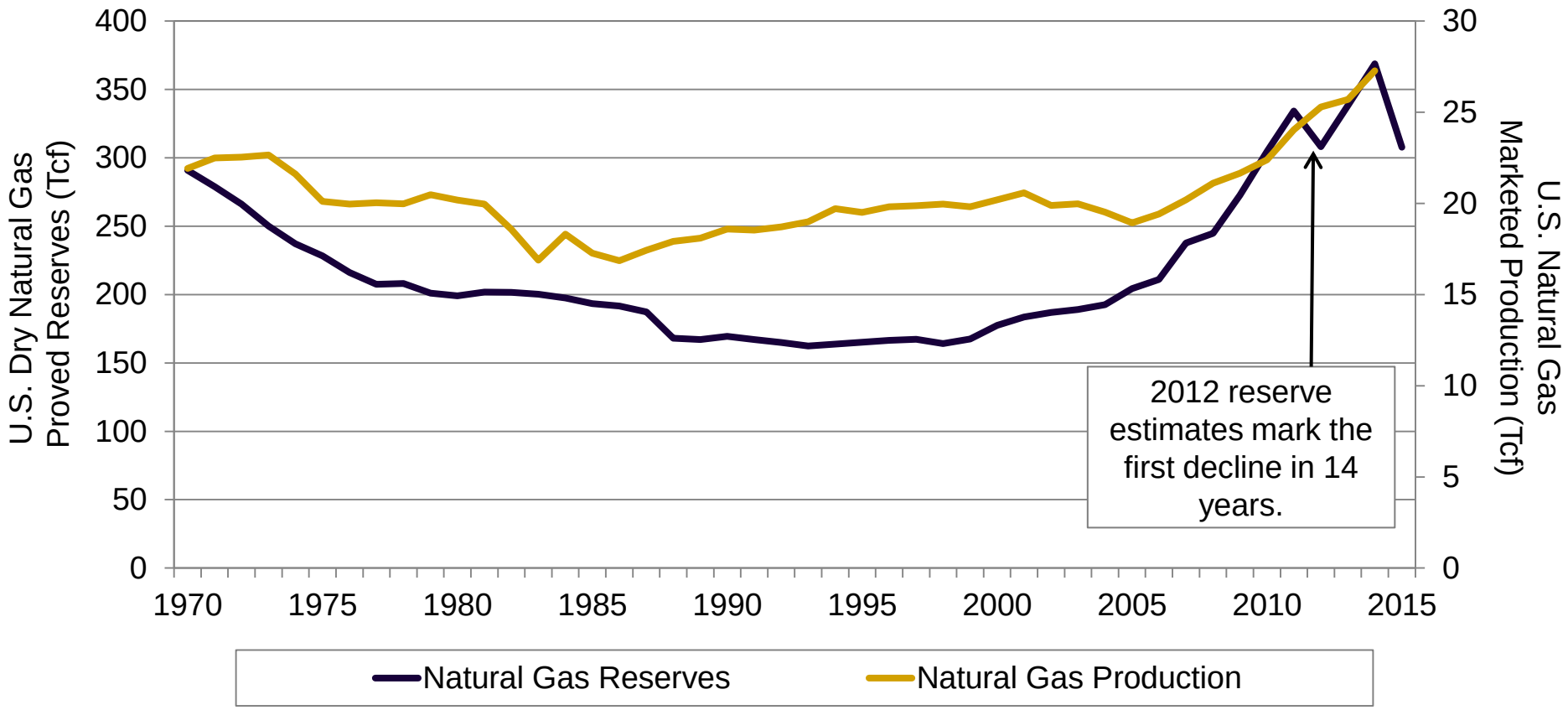
Onshore and offshore crude oil production have followed similar trends. Onshore production has increased 52 percent since 2010; offshore production has increased almost 70 percent, which is mostly attributable to deepwater production.



Source: U.S. Energy Information Administration.

Changes in reserves and production

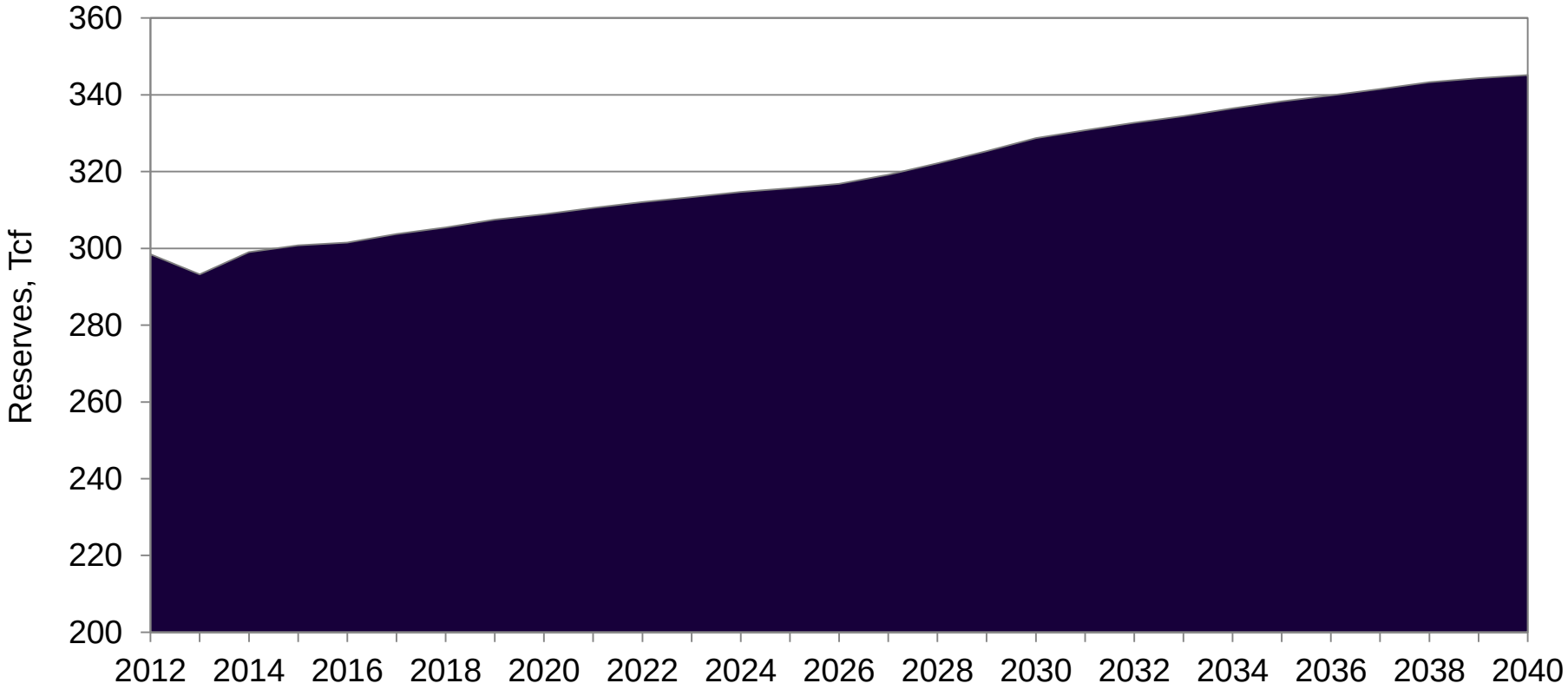
Natural gas production and reserves are at levels not seen since the 1970s and both U.S. natural gas production and reserves are now at an all time recorded peak.



Source: Energy Information Administration, U.S. Department of Energy.

Annual Energy Outlook, natural gas reserves

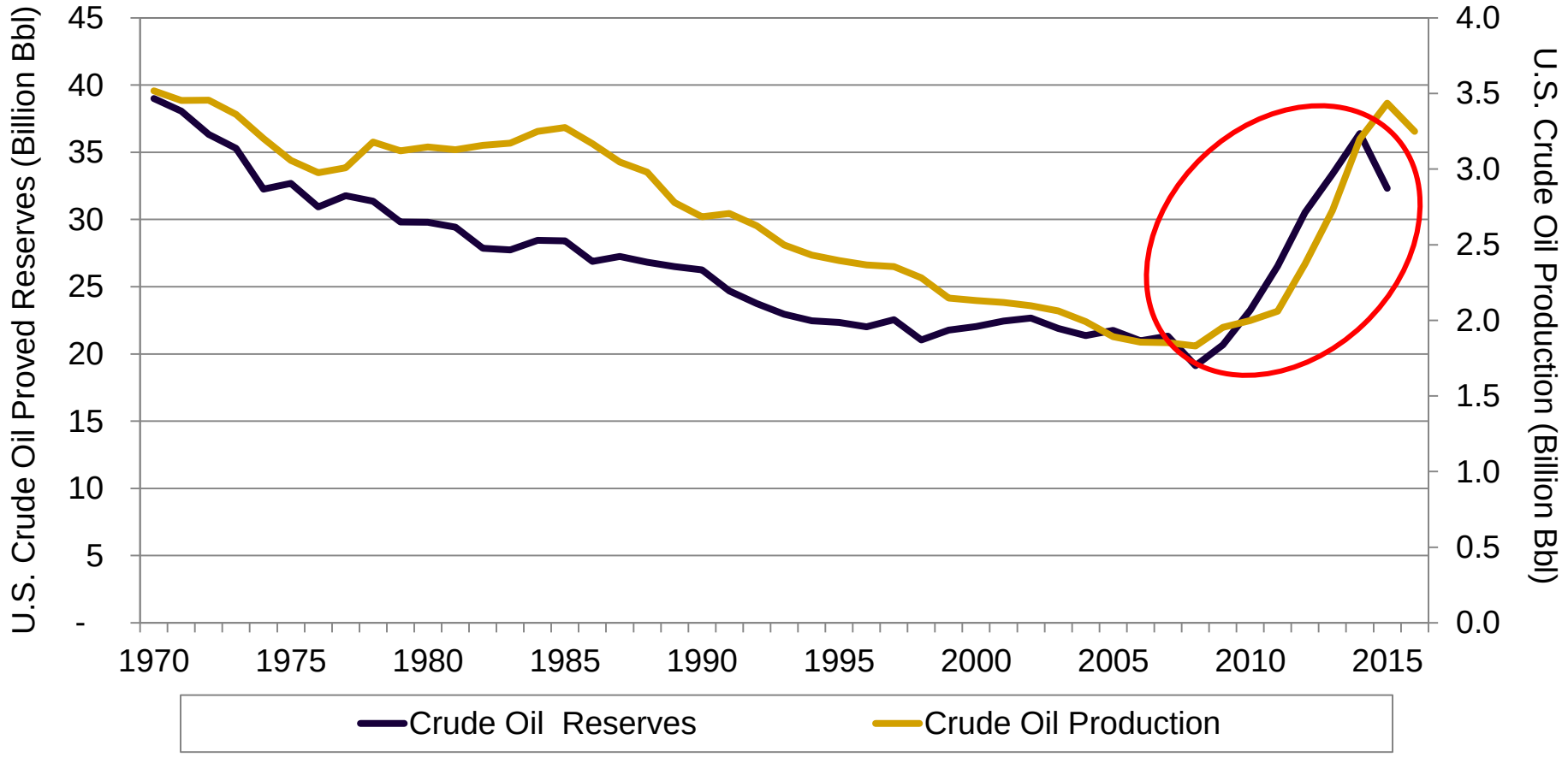
Unconventional resources are not a "flash in the pan" and are anticipated to continue to increase over the next two decades or more.



Source: Energy Information Administration, U.S. Department of Energy

Changes in crude oil reserves and production

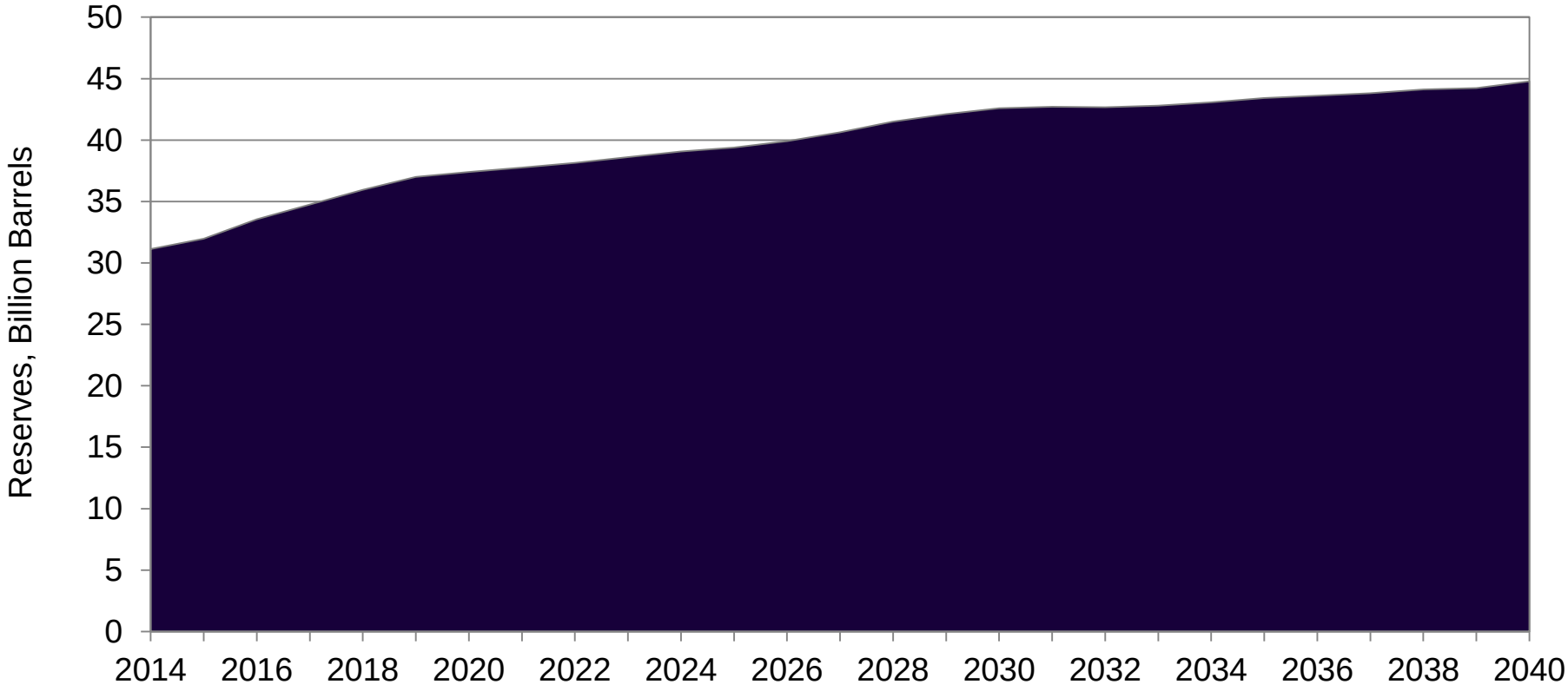
Crude oil production and reserves are climbing back to levels not seen since the early 1980s (reserves).



Source: Energy Information Administration, U.S. Department of Energy.

Annual Energy Outlook, crude oil reserves

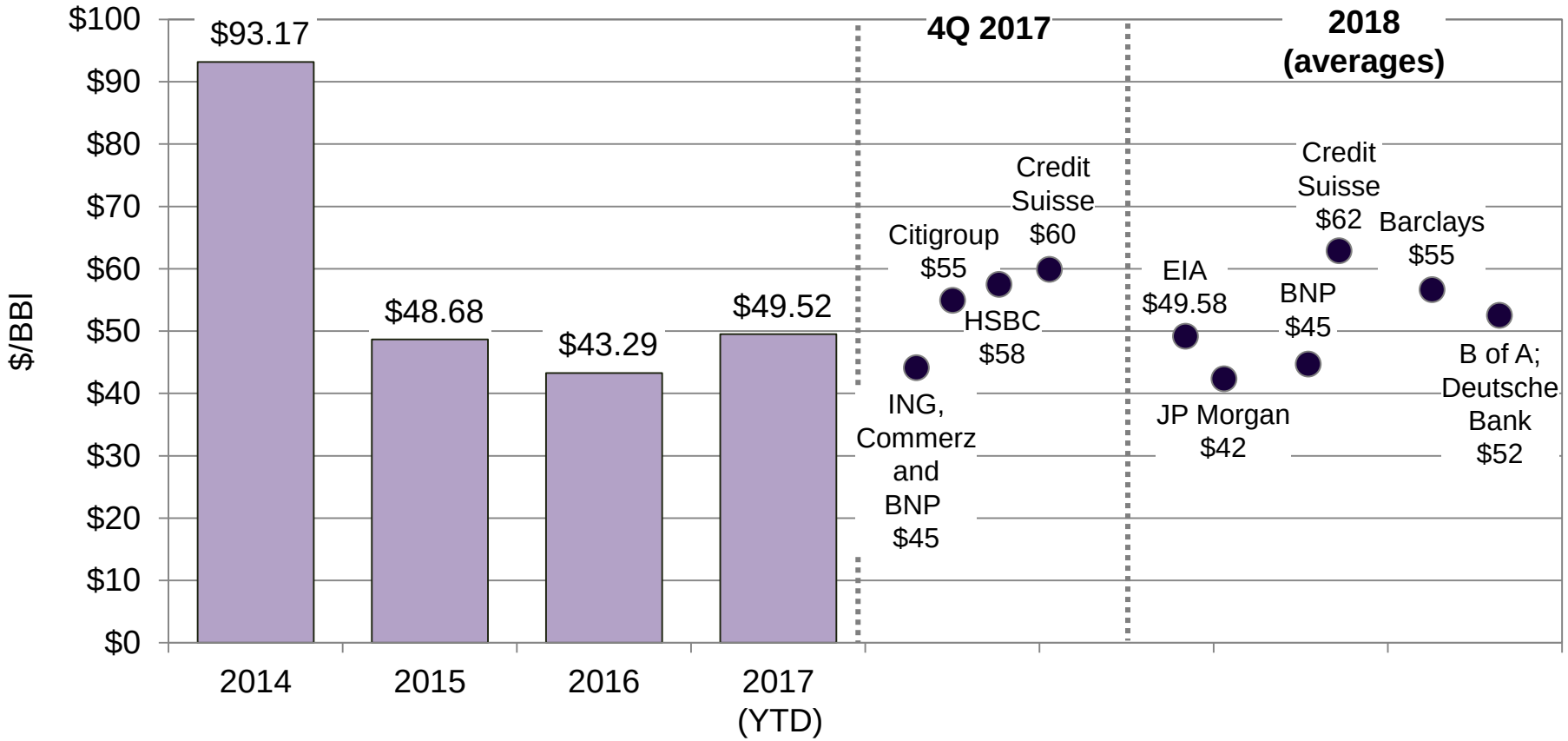
Crude oil reserves are expected to increase 20 percent by 2020 and increase by another 20 percent by 2040.



Source: Energy Information Administration, U.S. Department of Energy

Current crude oil prices and near-term outlook

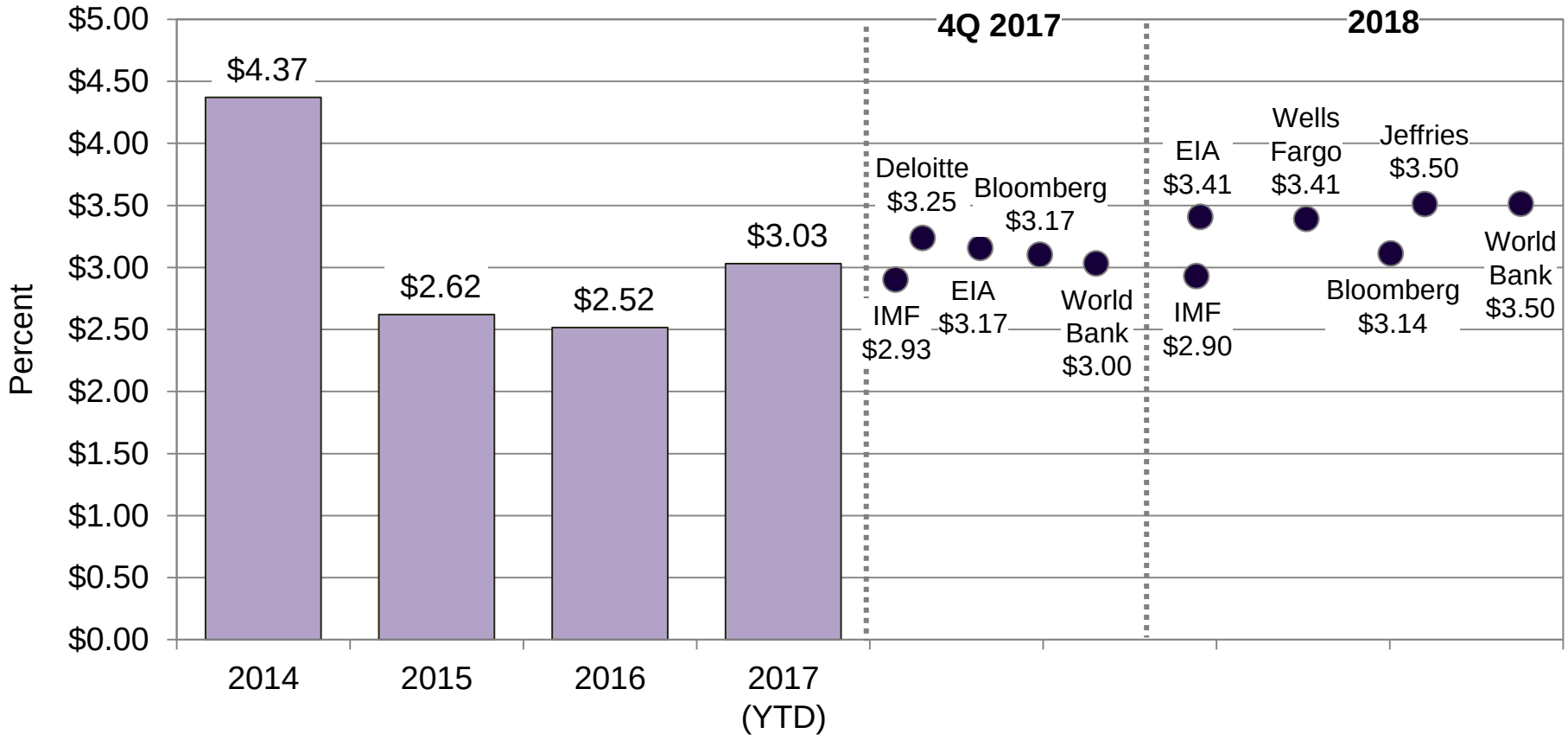
Banks have downgraded their oil price expectations, to average $53 per barrel in 2018. Prices are expected to stay below $60 per barrel in 2019.



Source: U.S. Energy Information Administration; Wall Street Journal

Current natural gas prices and near-term outlook

Natural gas prices are expected to stay below $3.50 per MMBtu in 2017 and under $3.75 in 2018.

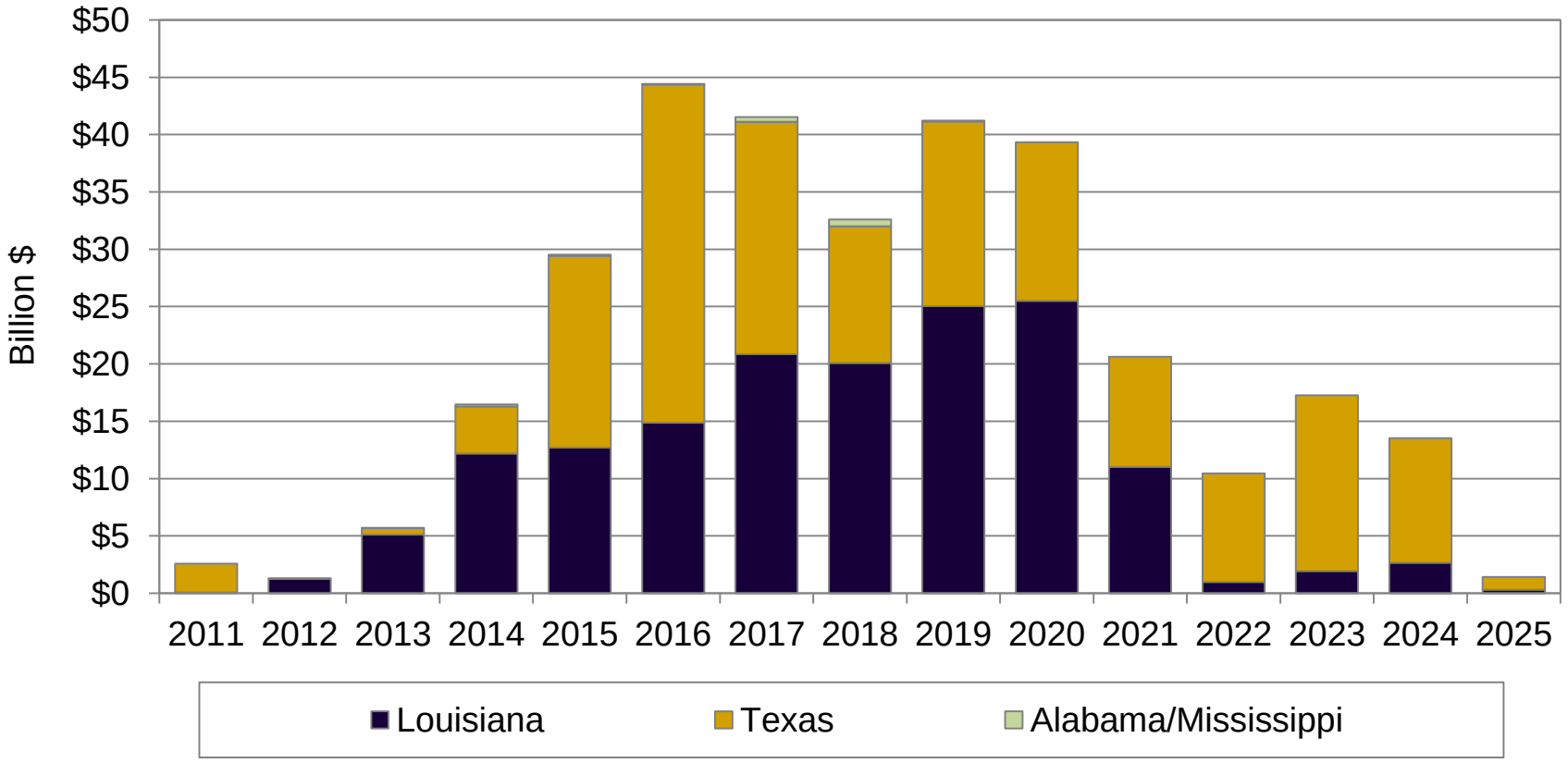


Source: Energy Information Administration, U.S. Department of Energy.

Infrastructure Development

Gulf of Mexico region – state-specific total capital expenditures

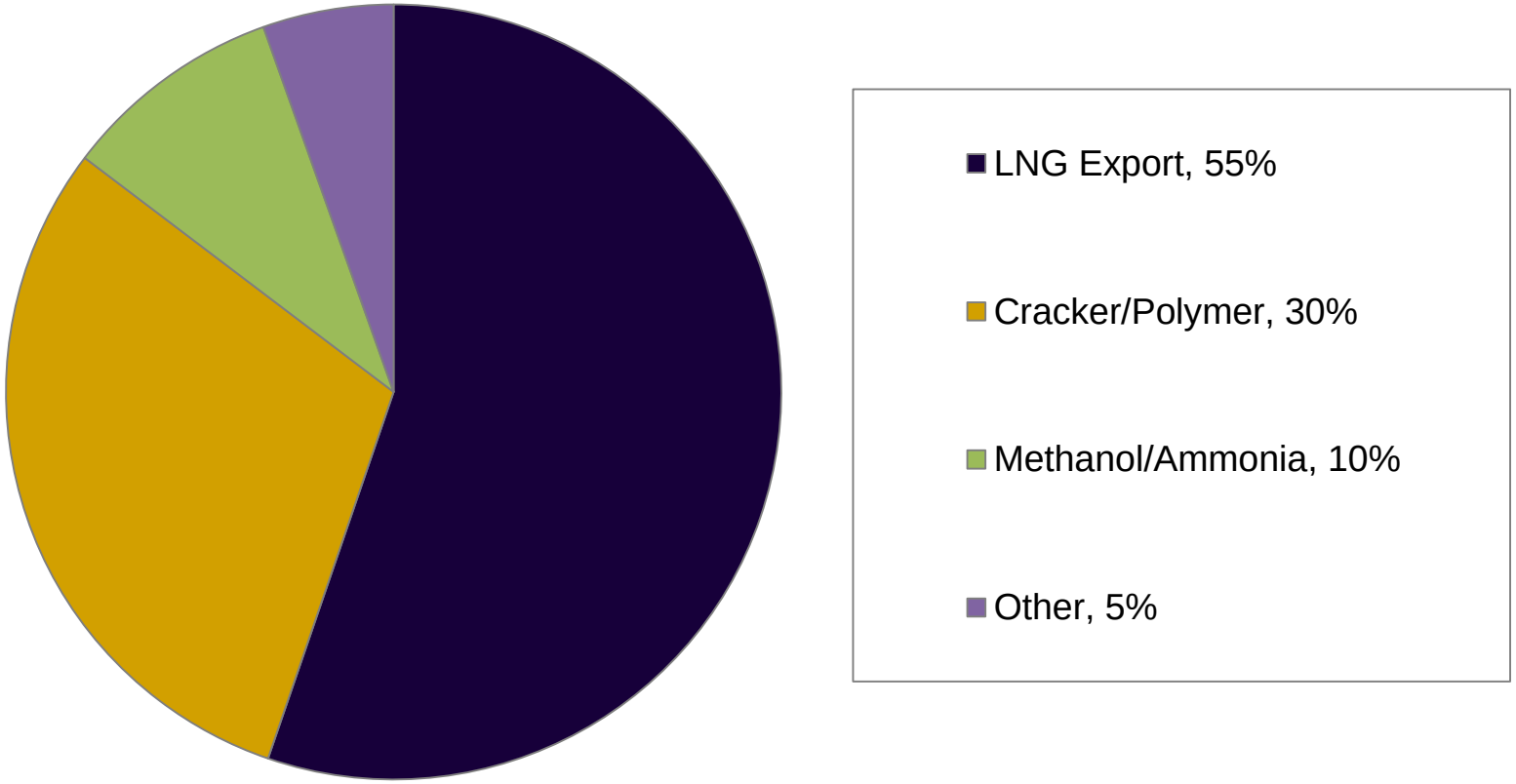
The continued low natural gas price outlook has facilitated considerable development of over $318 billion: $100 billion already completed, $218 billion remaining.



Source: Louisiana State University, Center for Energy Studies.

Gulf of Mexico region: total proposed capital expenditures by sector

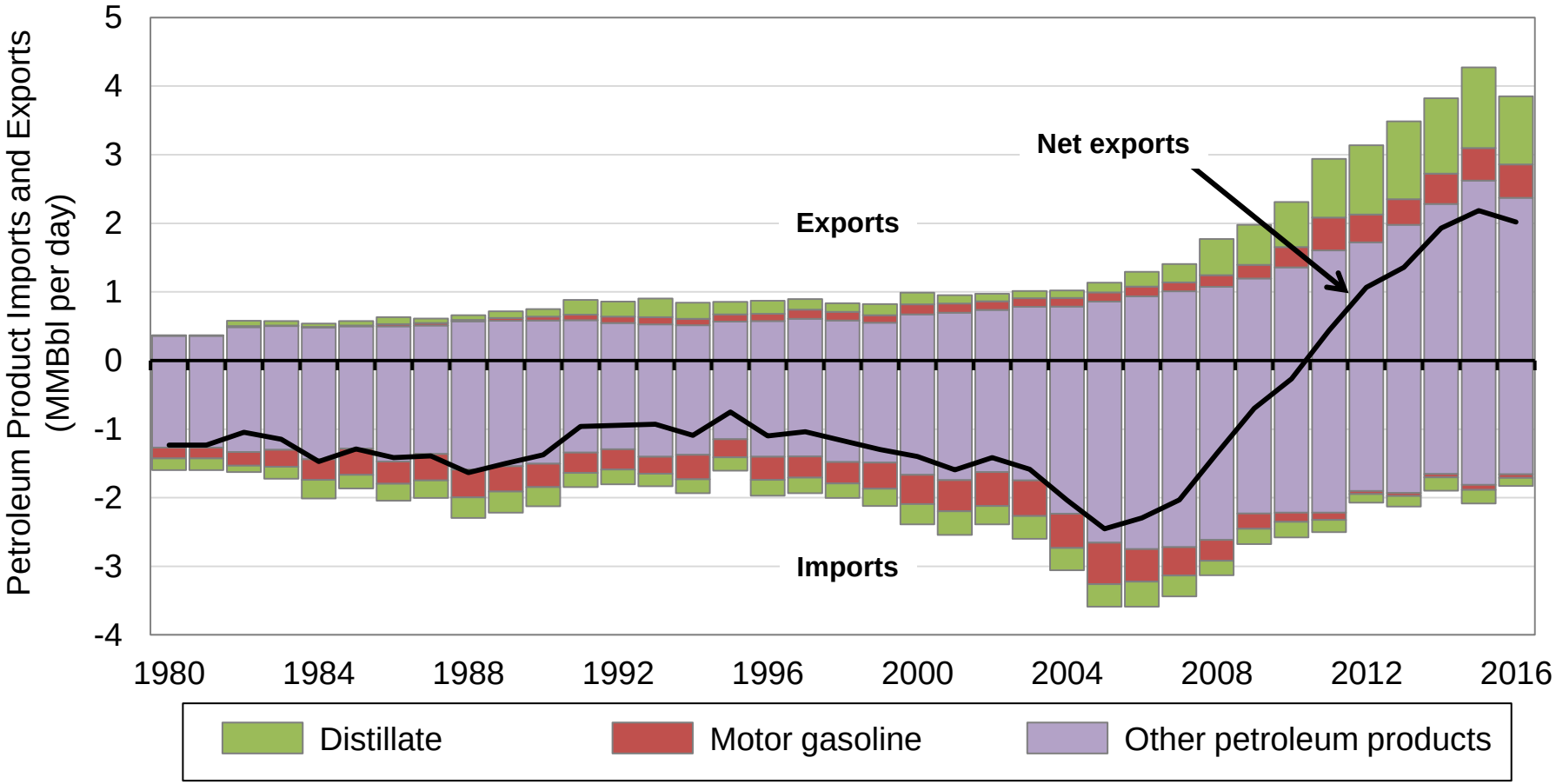
Of the proposed facility expansions in the Gulf of Mexico region, LNG export facilities comprise the majority of proposed capital spending.



Source: Louisiana State University, Center for Energy Studies.

U.S. petroleum product imports and exports

In 2011, the U.S. became a net exporter of petroleum products. Net exports have increased 360 percent since then.



Source: Energy Information Administration, U.S. Department of Energy.

U.S. Recent and Upcoming Natural Gas Pipelines

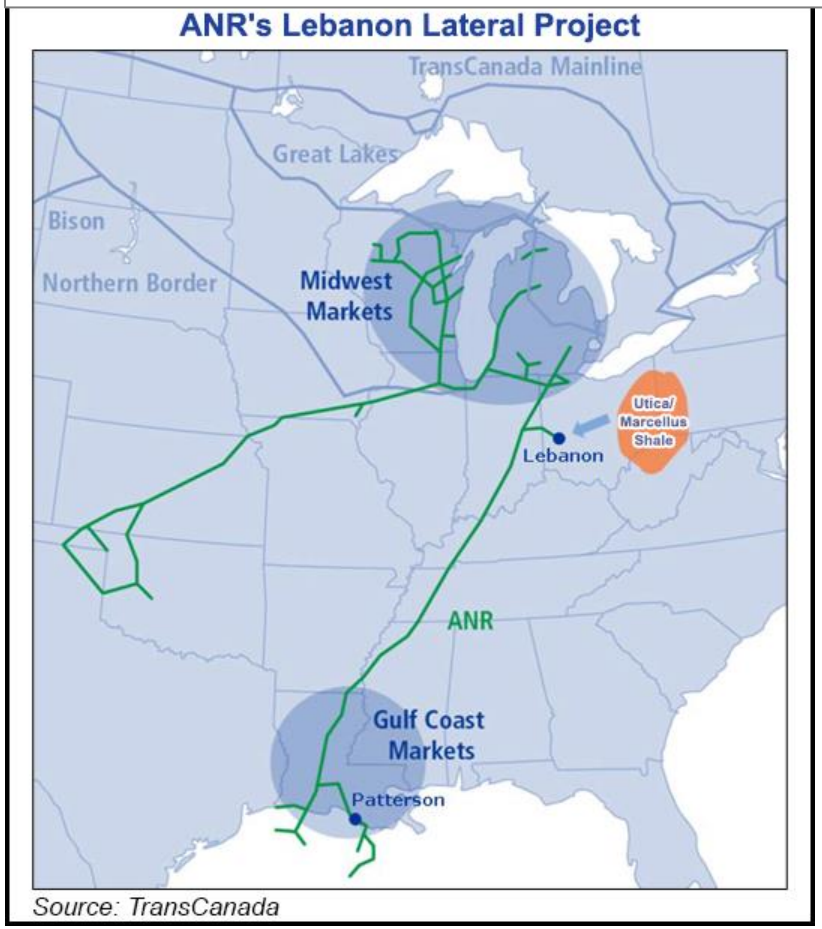
Pipeline operators have responded to the increase in natural production, particularly in the shale regions, with a flurry of construction activity. Thirteen operators have announced 27 projects that are expected to be built through the end of the decade.

Pipeline Operator/Project Name	Status	Year In-Service	State(s)	Region(s)	Additional Capacity (MMcf/d)
ANR Pipeline					
Lebanon Lateral Project	Completed	2014	OH	Northeast	350
Lebanon Lateral Project Phase 3	Announced	2017	OH	Northeast	
Lebanon Lateral Project Phase 2	Announced	NA	IN,OH	Northeast	290
Southeast Mainline System Reversal	Announced	NA	IN,KY,TN,MS,AR,LA	Northeast,Southwest	1,000
Cheniere Creole Trail Pipeline					
Creole Trail Expansion Project 1	Completed	2015	LA	Southwest	765
Creole Trail Expansion Project 2	Approved	2016	LA	Southwest	765
Columbia Gas Transmission					
West Side Expansion Project (Gulf Bi-Direction)	Completed	2013	KY,TN,MS,LA	Southeast,Southwest	540
West Side Expansion Project (Smithfield III)	Completed	2014	PA,WV,KY	Northeast,Southeast	444
Cameron Access Project	Approved	2017	LA	Central	800
Rayne XPress Project	Filed	2017	KY,TN,MS,LA	Southeast,Southwest	621
Iroquois Gas Pipeline					
South to North project	Announced	2017	NY,CN	Northeast,Canada	650
Natural Gas Pipeline Company of America					
Gulf Coast Market Expansion Project	Announced	2019	IL,AR,TX	Midwest,Southwest	750
Panhandle Eastern Pipeline					
Panhandle Backhaul Project	Approved	2017	OH,IN,IL	Northeast	750
Rockies Express Pipeline					
Zone 3 East-to-West Project	Completed	2015	OH,IN,IL	Northeast,Midwest	1,200
Pipeline Zone Three Capacity Enhancement	Construction	2016	OH,IN,IL	Northeast,Midwest	800
Tennessee Gas Pipeline					
Utica Backhaul Transportation	Completed	2014	PA,TN	Northeast,Southeast	500
Texas Eastern Transmission					
Uniontown to Gas City Expansion Project (U2GC)	Completed	2015	PA,OH,IN	Northeast,Midwest	425
Ohio Pipeline Energy Network	Completed	2015	OH,KY,TN,AL,MS,LA	Northeast,Southwest	550
Gulf Markets Expansion (bi-directional)	Approved	2017	PA,OH,WV,KY,TX	Northeast,Central	650
Lebanon Extension Project	Filed	2017	PA	Northeast	102
Adair Southwest Project	Filed	2017	PA,WV,OH,KY	Northeast,Southeast	200
Access South Project	Filed	2017	PA,WV,KY,TN,AL,MS	Northeast,Midwest	320
Texas Gas Transmission					
Ohio-Louisiana Access project	Construction	2016	OH,IN,KY,TN,MS,LA	Northeast,Southwest	626
Northern Supply Access Project	Filed	2017	OH,IN,KY,TN,MS,LA	Northeast,Southeast	384
Transcontinental Gas Pipeline					
Atlantic Sunrise Project (bi- directional)	Approved	2017	PA,VA,NC,SC,GA,AL	Northeast,Central	1,700
Trunkline Gas Co					
Trunkline Backhaul Project	Applied	2017	IL,KY,TN,MS	Midwest,Southwest	750
Vector Pipeline					
2017 Vector Pipeline Mainline	Announced	2017	MI	Midwest	1,300

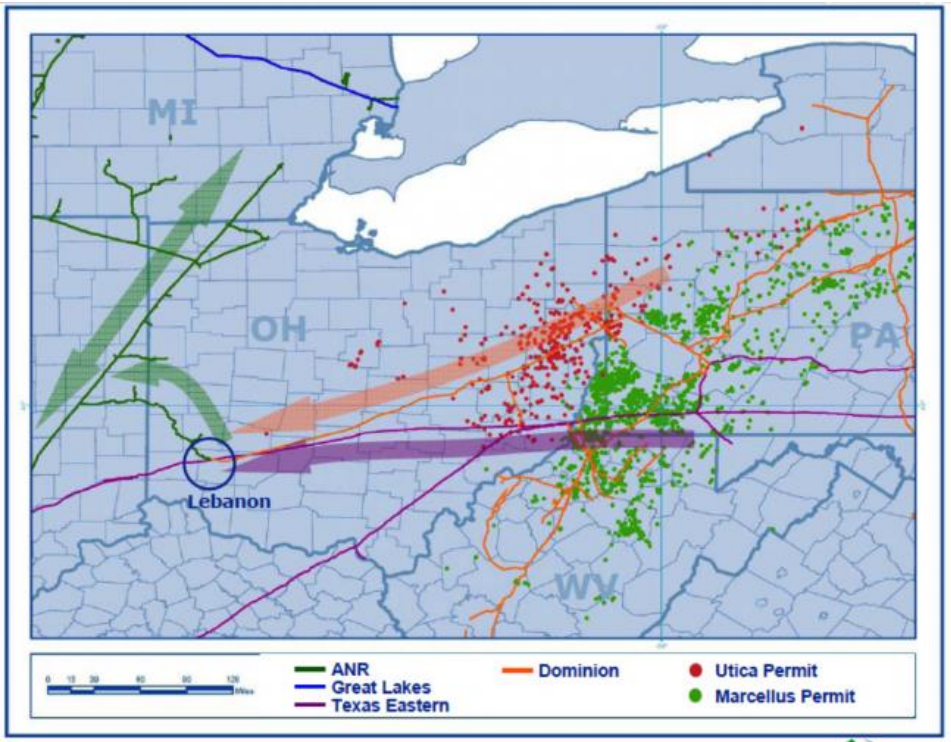
Source: U.S. Energy Information Administration

Natural Gas Pipeline Reversal

ANR Pipeline's Southeast line was constructed to transport gas from south Louisiana, north to Michigan. The Lebanon Lateral was built as a joint venture between ANR and Texas Eastern to bring additional supplies into northeast markets by delivering gas into Texas Eastern and Dominion systems. Today, those supplies are not longer needed as Appalachian production is displacing those long haul supplies. Flows have been reversed on the Lebanon Lateral, as well as the Southeast line, moving gas north and south.



Source: TransCanada



TransCanada

Examples of other selective industry changes

Infrastructure Category	GOM Outlook	Influencing Factors
Petrochemicals	↑	low natural gas prices; diverse sources; low volatility.
Refineries	↑	low crude oil prices, diverse crude quality, diverse sources.
Power Generation	↔	flat intrinsic growth because of efficiency measures; new end uses.
Pipelines	↑	diverse resource mix; northeast constraints; re-purposing, re-orientation opportunities.
Storage	↓	No supply volatility; ample storage of intrinsic growth.
Gas Processing	↑	Growing liquids market
Shipyards, bases, and marine terminals	↓	Decreasing offshore activity.
LNG	↑	Increasing export oppportunites; abundant, diverse supplies.

Conclusions

Conclusions

- Offshore activity has been abysmal and has led to considerable deterioration of offshore service sector activity along GOM.
- Drilling and exploration preference is strongly biased to onshore unconventional production, with the exception of a limited amount of offshore crude oil development, much of which was planned several years in advance.
- Offshore impacts of decreasing and low prices has not translated to supporting infrastructure since (a) this infrastructure is being re-purposed to handle new domestic resources and (b) using coastal locations to leverage new energy export economy.
- Advantages of this development is that if and when offshore activity does re-emerge, new, improved and modern infrastructure will be in place to service and support that production.

Questions, comments, and discussion

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