



GENSCAPE™

North American Storage and Transportation Trends

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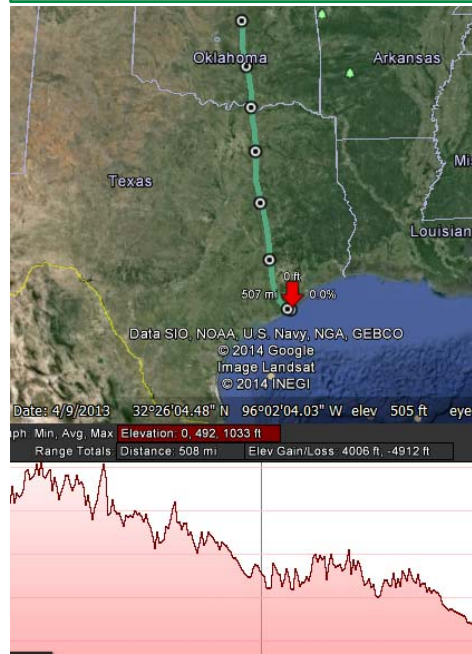
What we do

Genscape: How do they do it?

Genscape uses thermal and visual imagery to measure storage volumes.



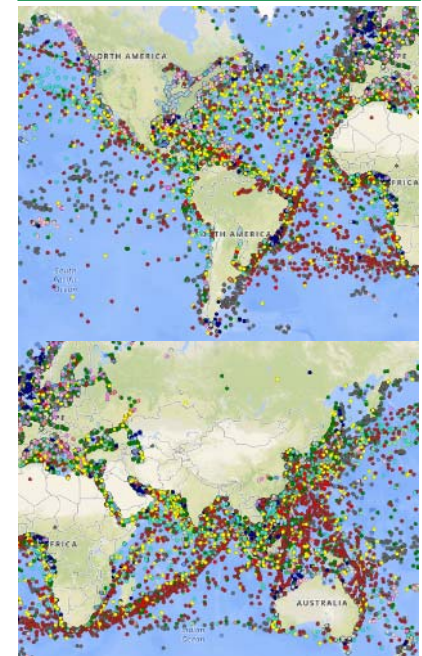
Genscape provides measured data on pipeline flows.



Genscape monitors activity at refineries to detect shutdowns, upsets, and flaring.

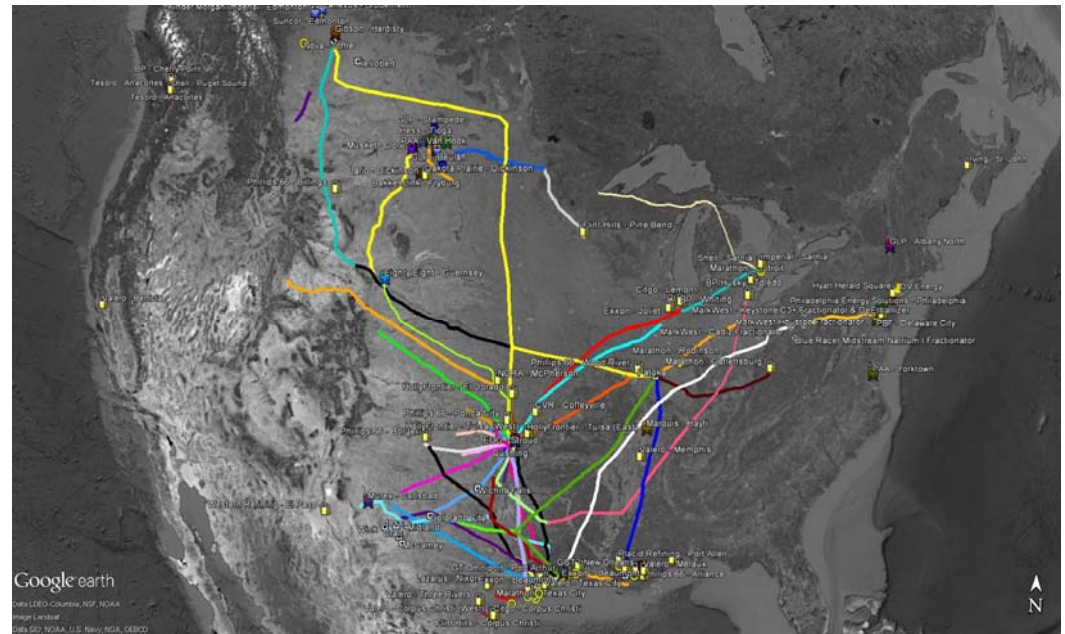


Genscape Vesseltracker monitors vessel movements around the globe.



Monitoring Stats – North America

Crude Oil Storage	342 mn bbls, weekly ~1900 tanks/week
Crude Oil Pipeline	12.5 mn bpd, 2x/hr 50 pipelines
Crude by Rail	2 mn bpd loading, daily 1.7 mn bpd unloading, daily
Refineries	13.6 mn bpd, 12x/hr (76% US) 470+ units
Product Tanks (Gasoline, Jet, Diesel, Ethanol)	65 mn bbls, weekly ~800 tanks
NGL Processing	59 units, 12x/hr
NGL Pipeline	2 mn bpd, 2x/hr



Monitoring Stats – Europe

Crude Oil Storage	342 mn bbls, weekly ~200 tanks/week
Crude Oil Pipeline	Forties Supply Chain
Refineries	5.1 mn bpd, 12x/hr 120+ units Belgium Czech Republic England France Germany Netherlands Scotland Spain
Product Tanks (Gasoil, Jet)	10.7mn MT, weekly ~800 tanks

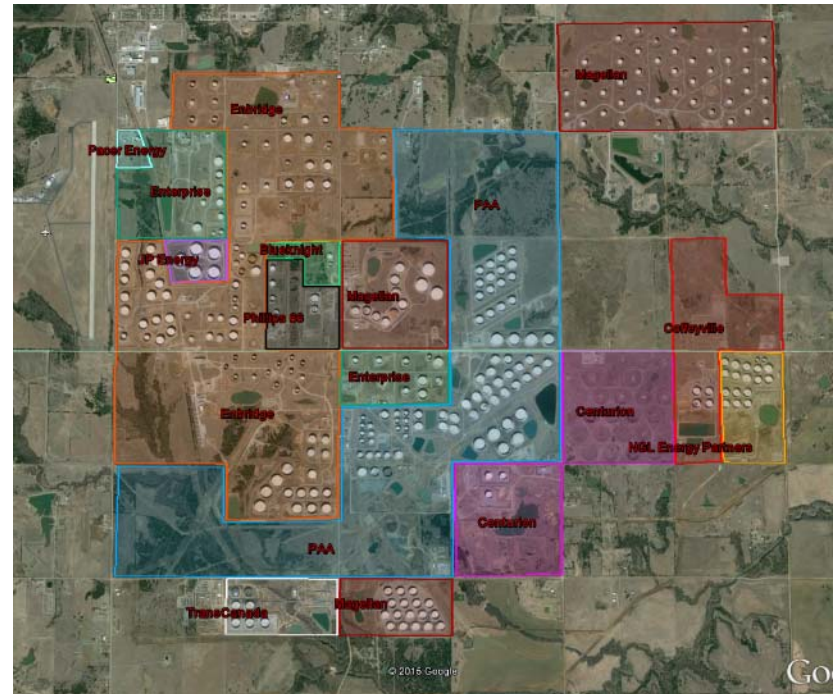




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Cushing – A History and a Look Forward

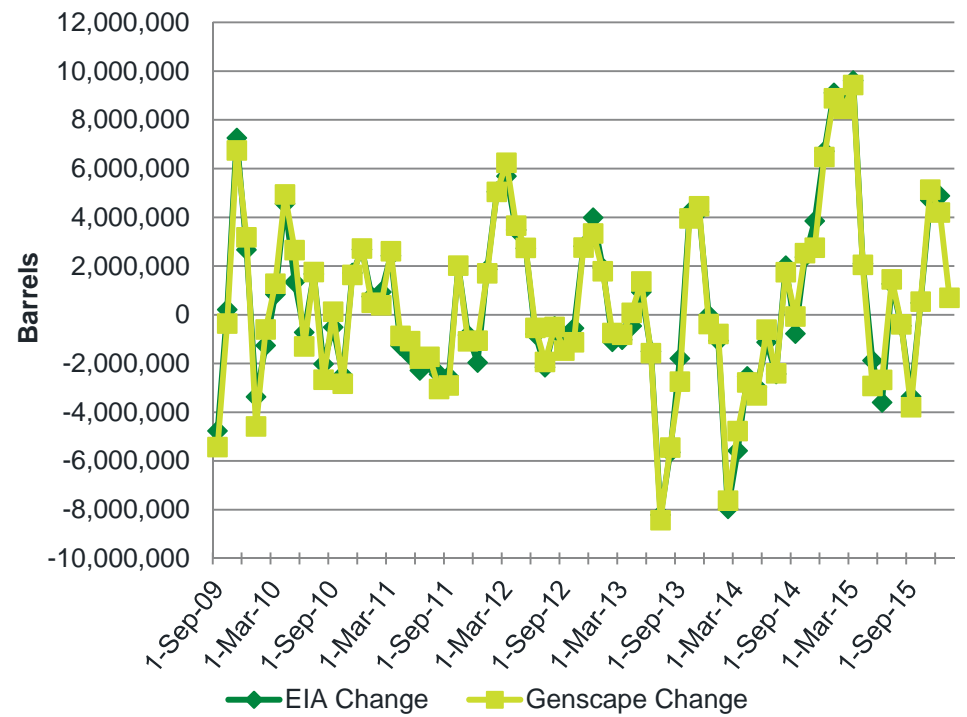
Cushing, OK



Genscape vs EIA Storage Methodology

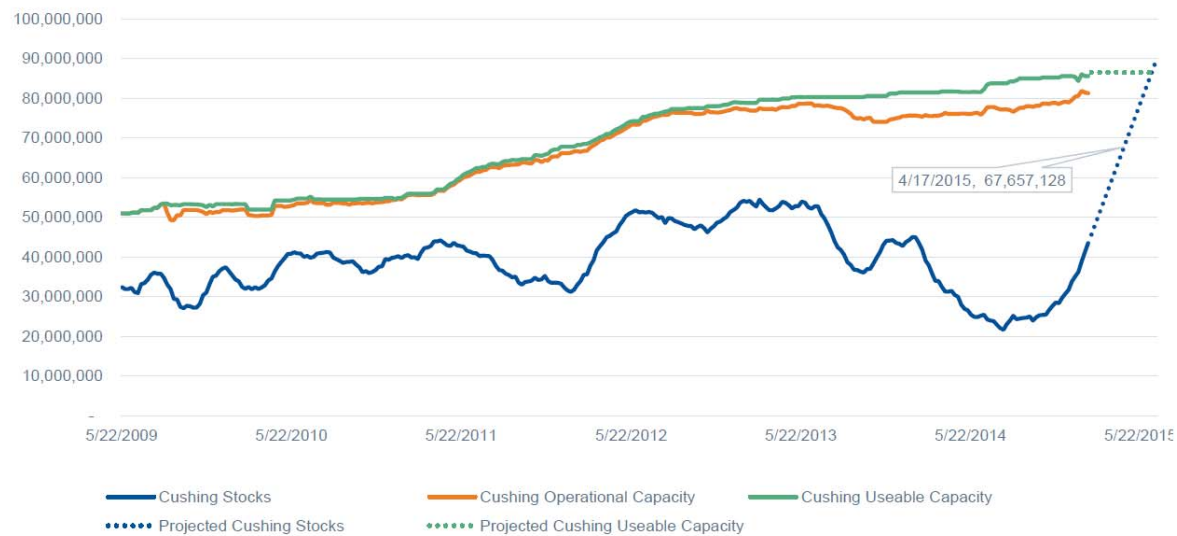


Monthly Cushing Stocks Change
Comparison



A Blast from the Past – Feb 2015

When Will Cushing Be Full



26

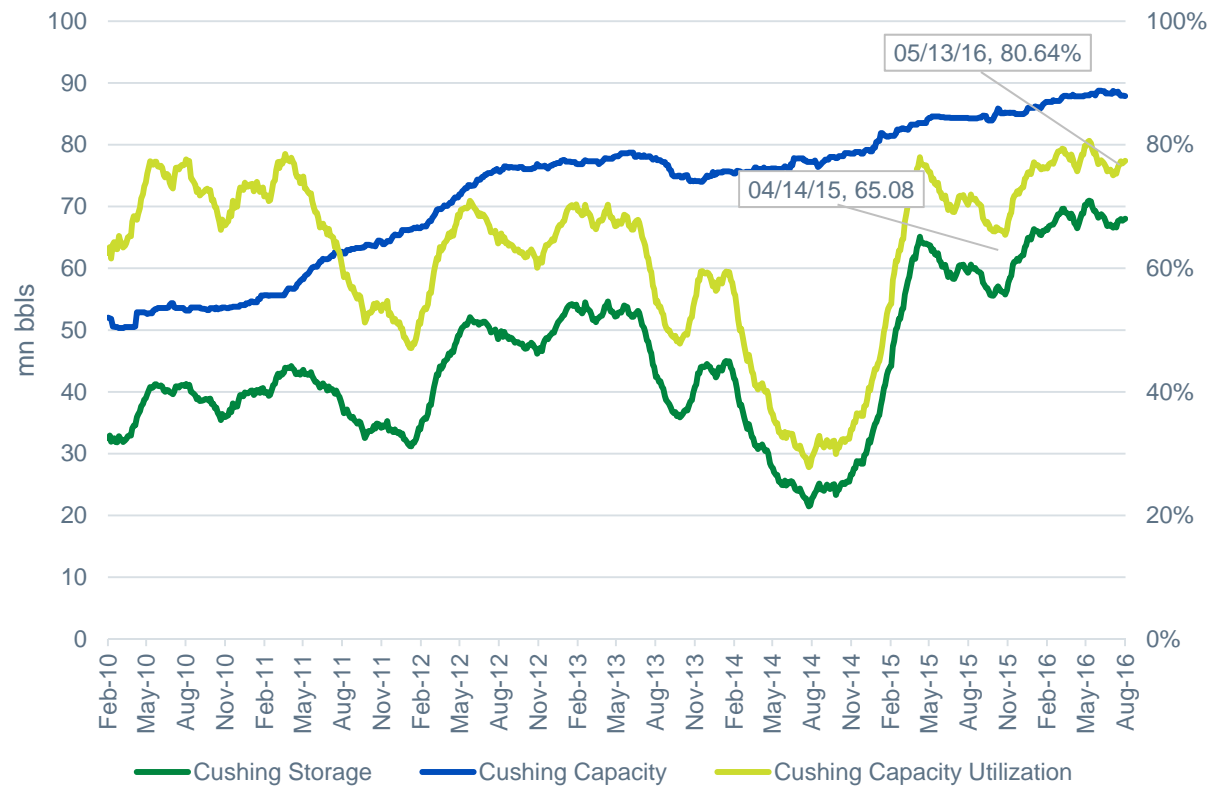
Cushing Storage and Its Impact on NA Crude Markets

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#StateofCushing

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Cushing Storage

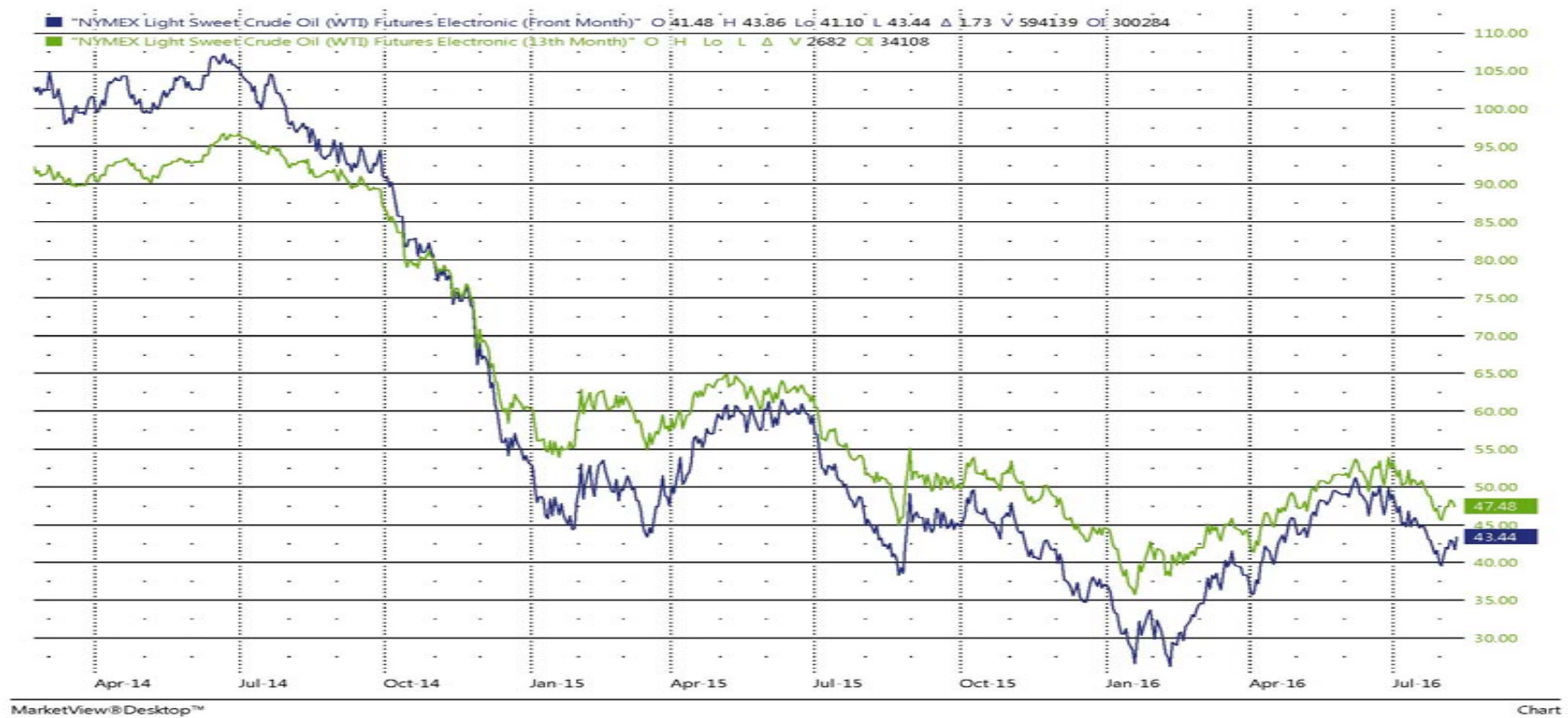


- Added ~4.4mn bbls capacity since April 2015
- Highest utilization and storage level on May 13, 2016:
 - 80.64%, 70.945mn bbls

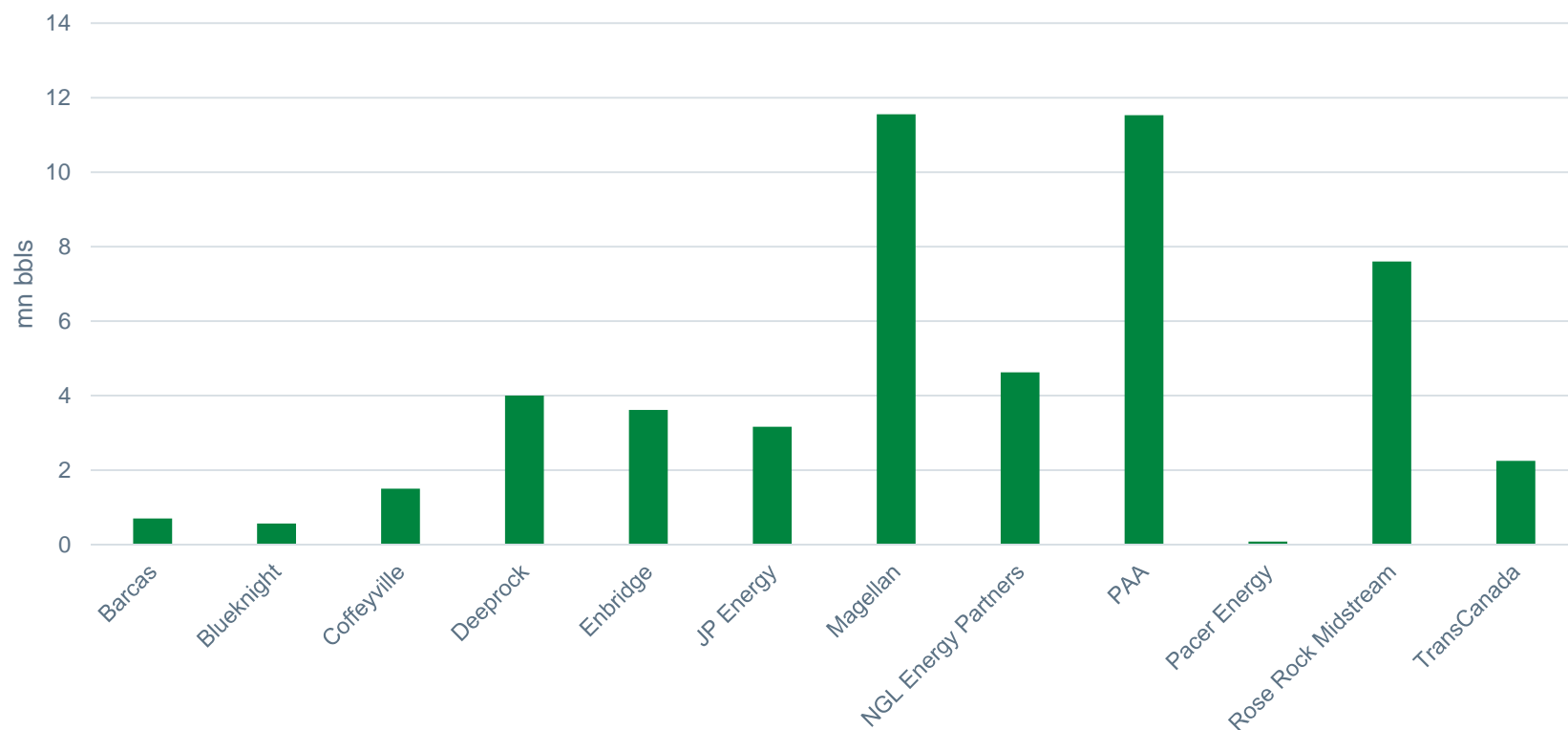
WTI Term Structure



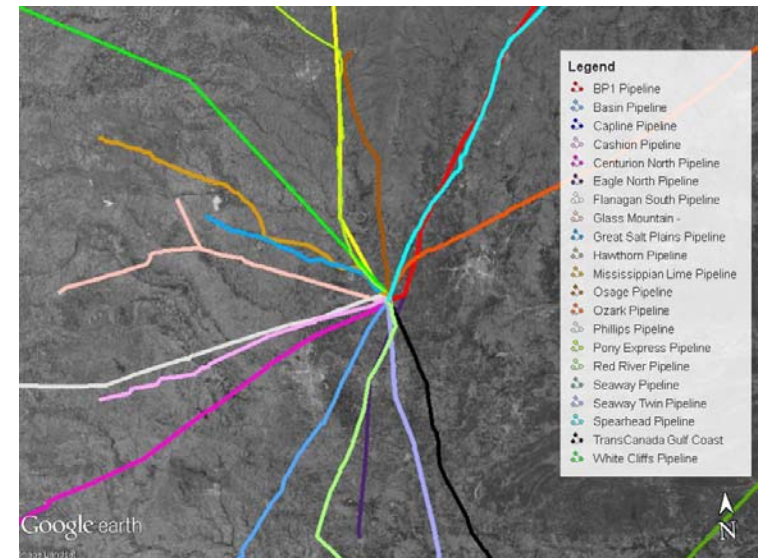
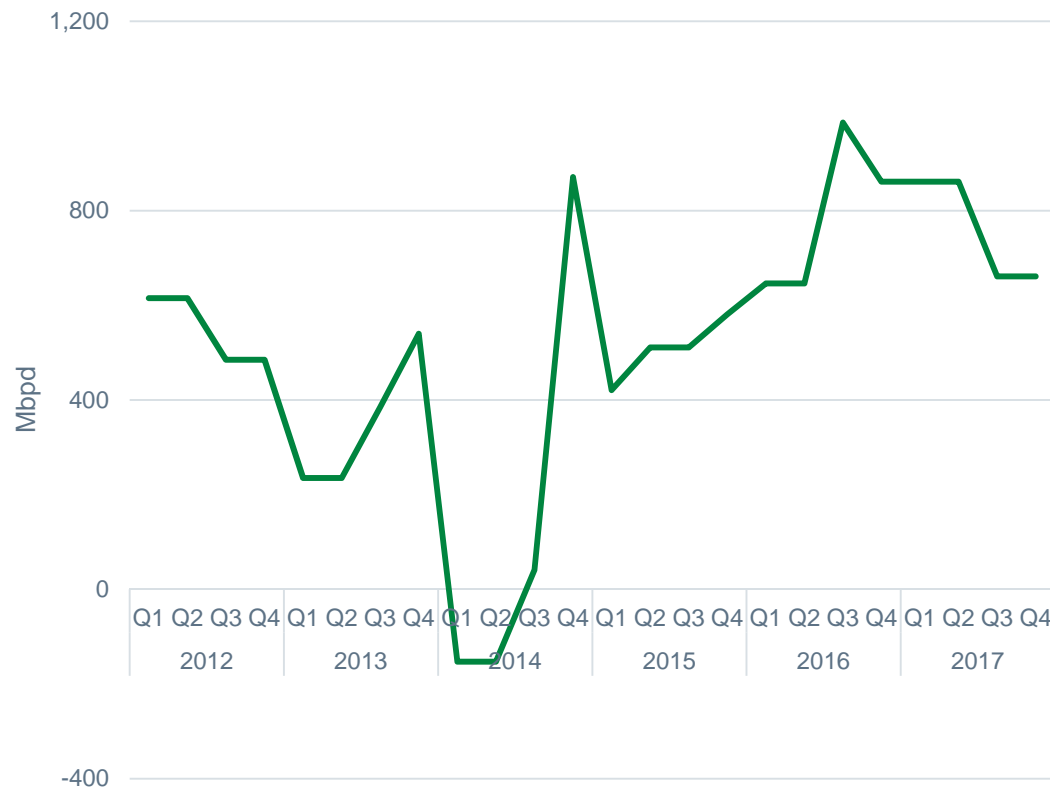
Price, Trends, Technicals and Fundamentals



Total Cushing Storage Expansion Since 2009



Cushing Connected Pipeline Capacity Changes



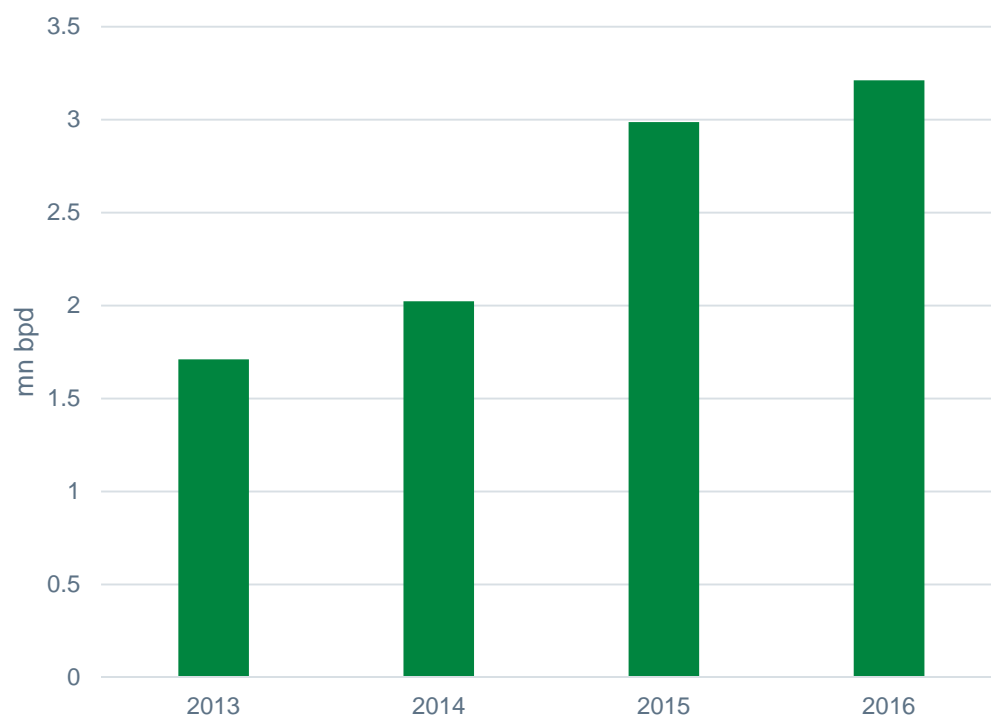
Genscape Monitoring

Total: 91%

Outgoing: 86%

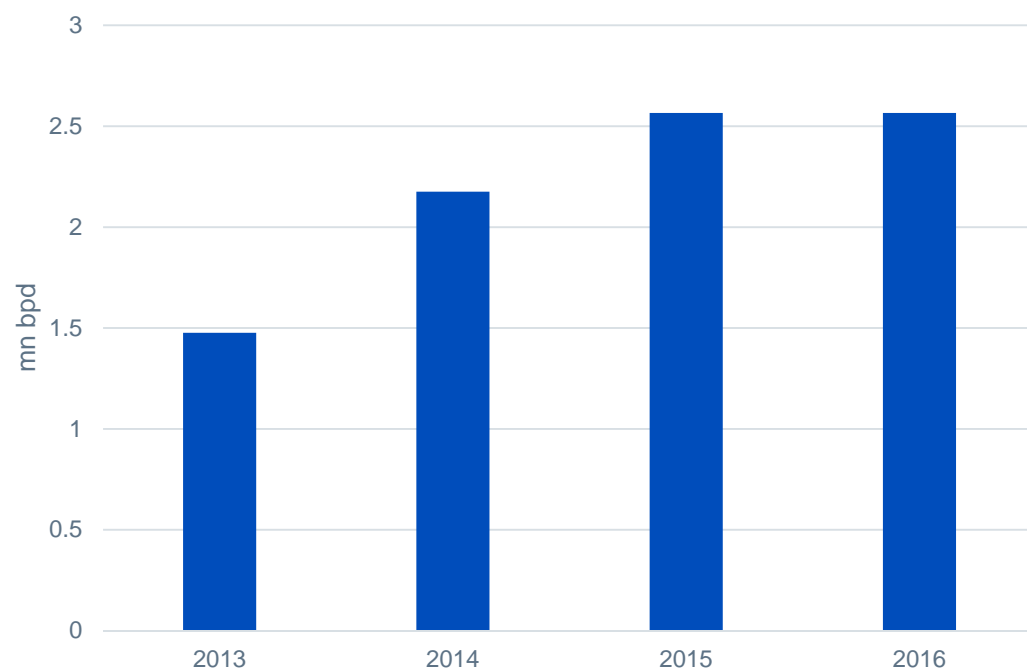
Incoming: 95%

Cushing Incoming Pipeline Capacity



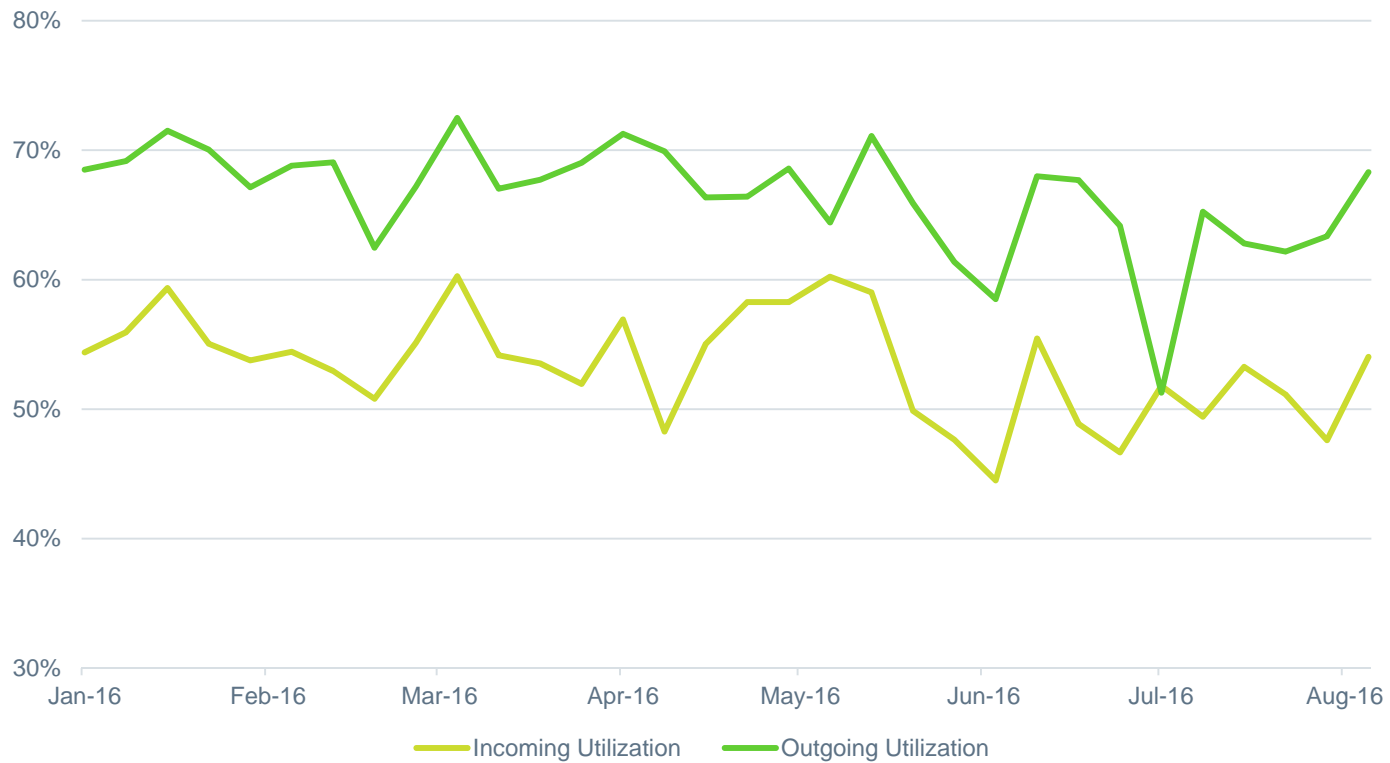
Pipeline	Capacity (bpd)
2014	
Pony Express	230,000
Centurion South Reversal	60,000
Flanagan South	600,000
White Cliffs Twin	74,000
2015	
Pony Express Expansion	90,000
Magellan SCOOP	70,000
2016	
White Cliffs Expansion	65,000

Cushing Outgoing Pipeline Capacity

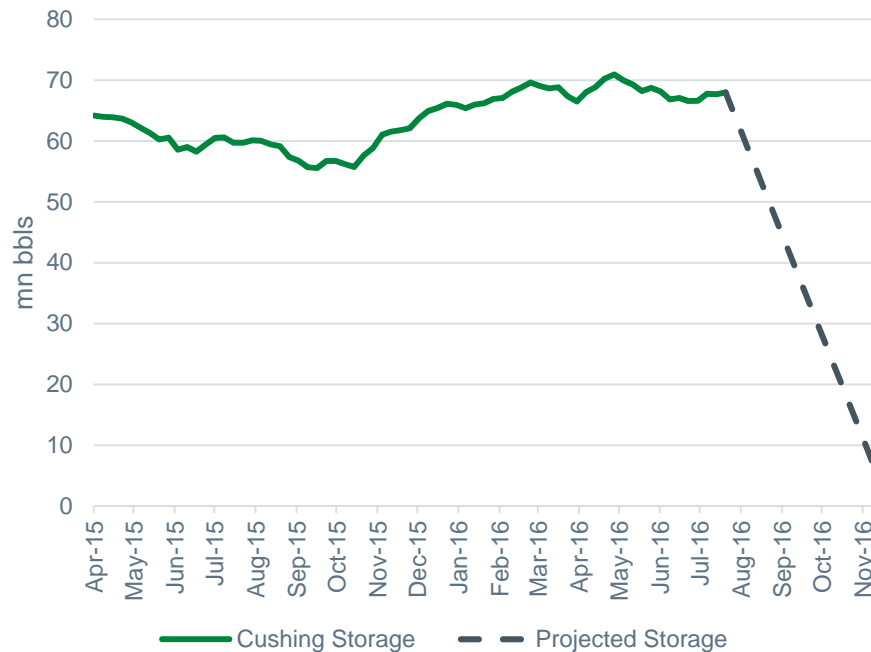


Pipeline	Capacity (bpd)
2013	
Seaway Expansion	250,000
2014	
TransCanada Gulf Coast	700,000
Centurion South Reversal	-60,000
2015	
Seaway Twin	450,000

Cushing Connected Pipeline Utilization



How fast could the glut empty?



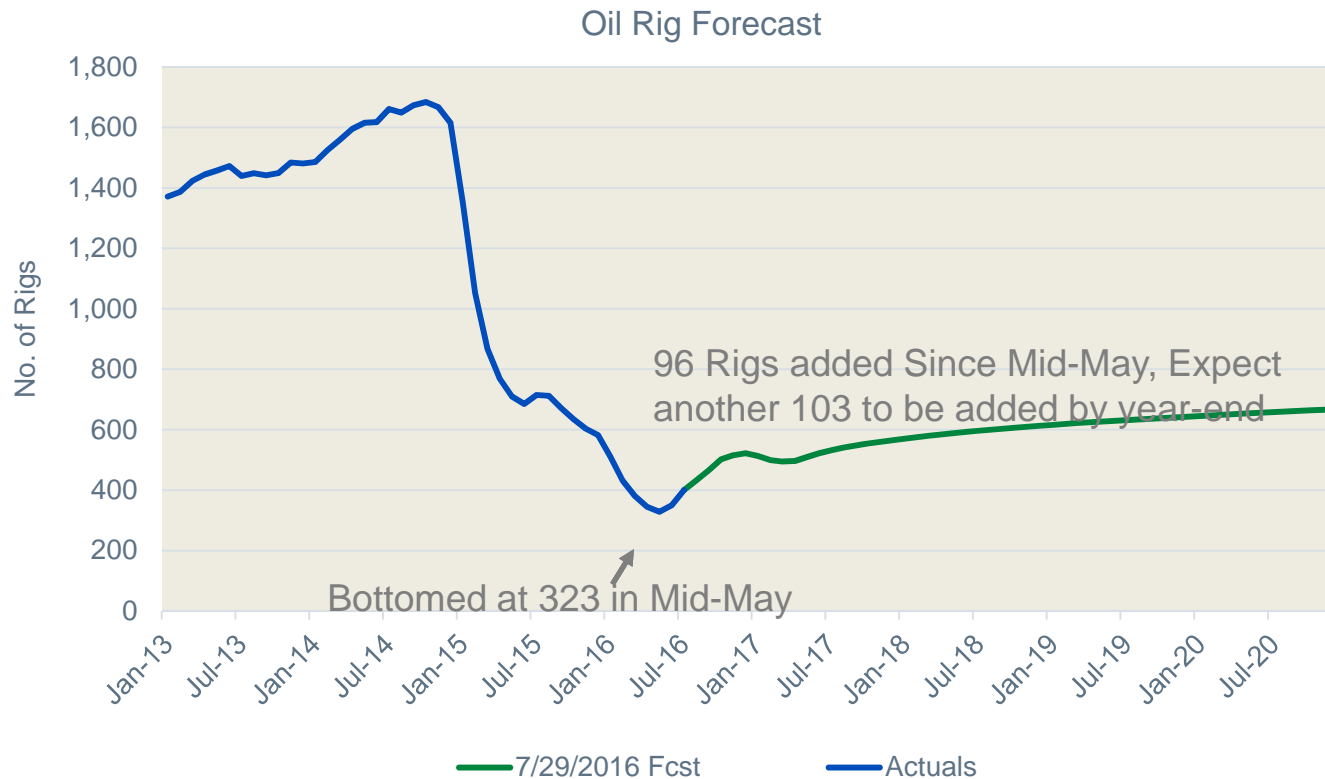
- Cushing storage levels have increased at an average rate of 40,000 bpd since Oct. 2015
- Empty storage space on Cushing to Gulf Pipelines is 500,000-600,000 bpd
- Cushing could drain about 3.5mn bbls/week to minimums in ~4 months
- Cushing drained an average 1.25mn bbls/week in 2013 when Seaway was fully reversed



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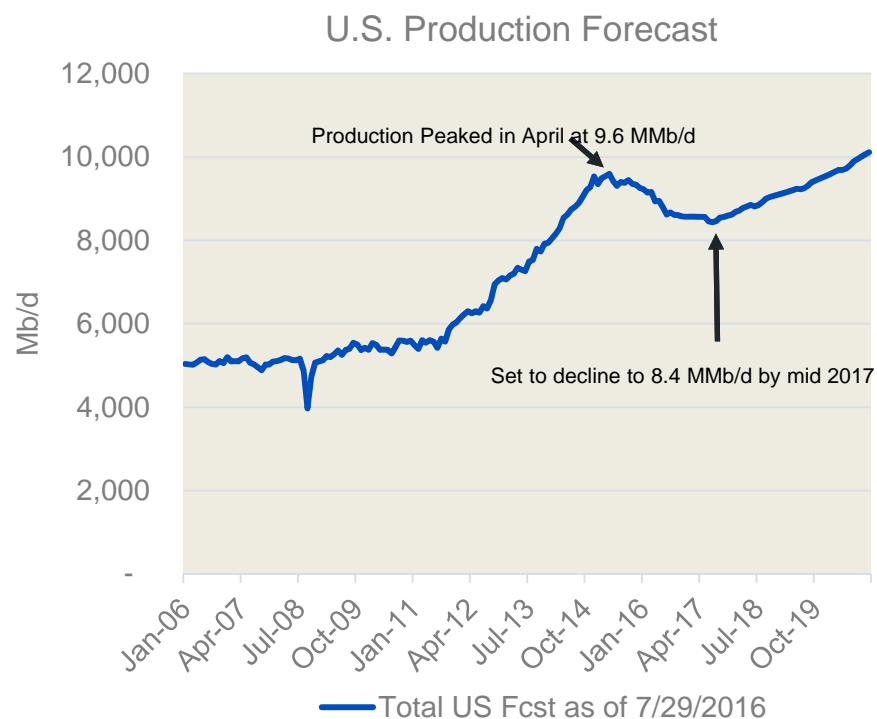
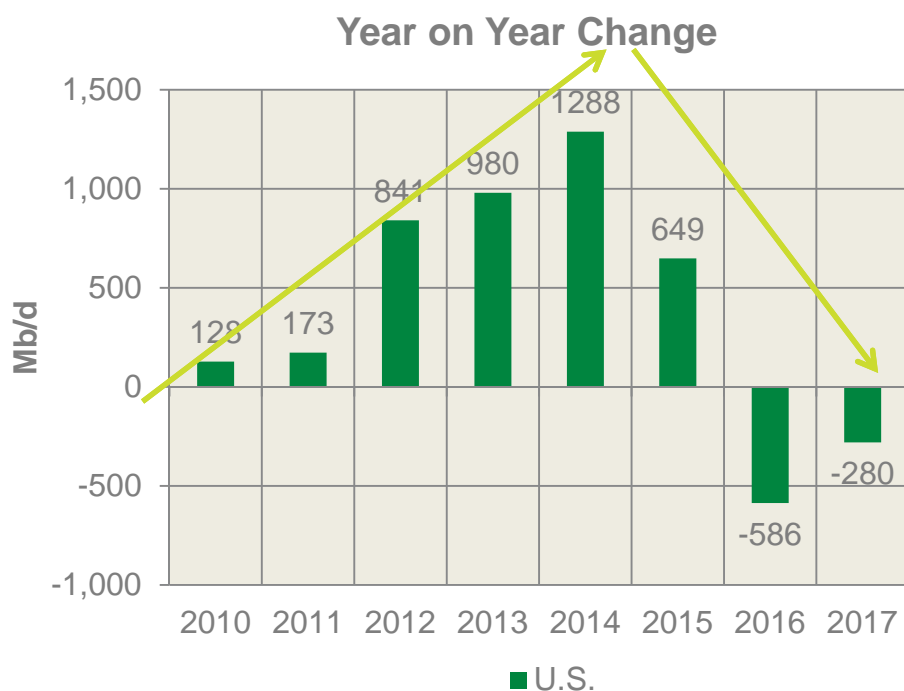
North American Production

Oil Rigs Have Increased +96 Since Reaching Bottom at 323 in Mid-May



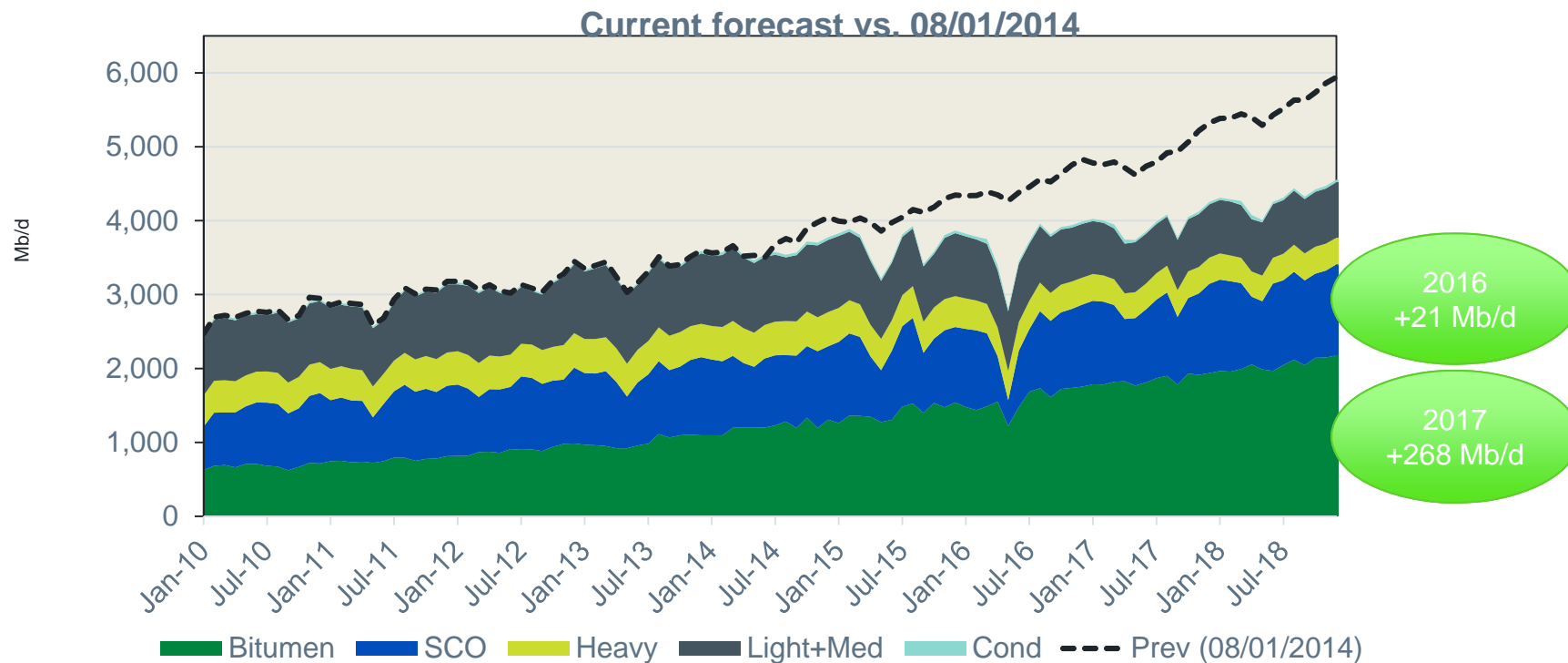
Source: Spring Rock as of 7/29 Main Forecast

U.S. Crude Oil Production Is Declining, But Will Start to Grow Again Mid-2017



Source: Spring Rock

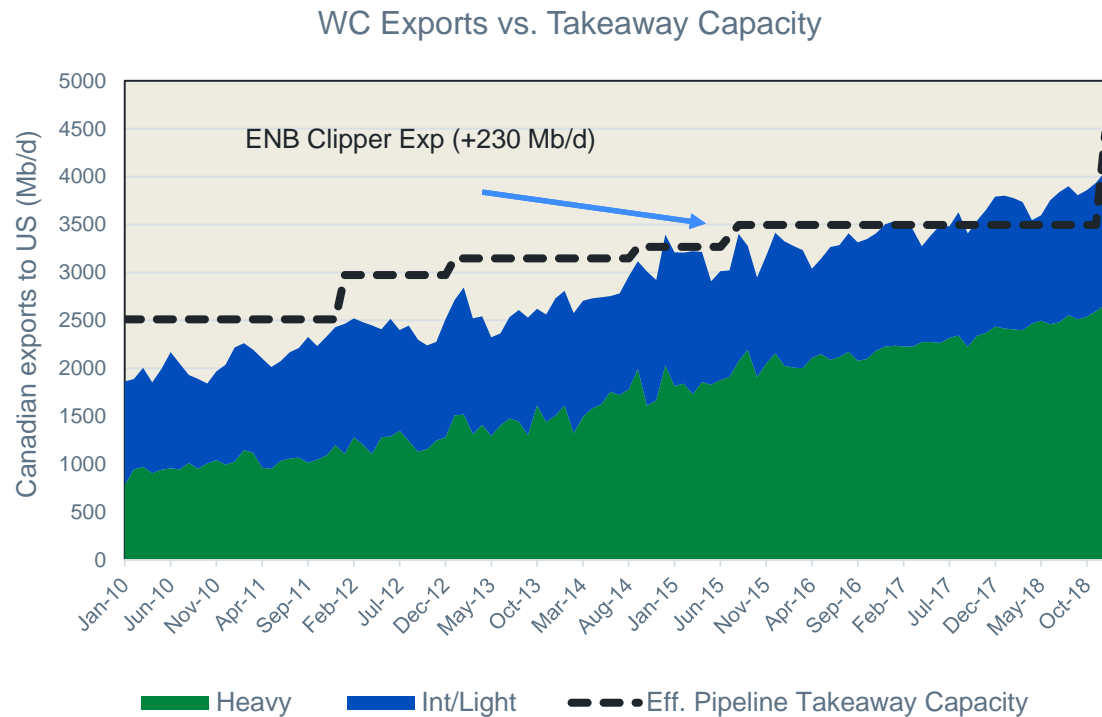
Canadian Supply Forecast Revised Down, But Still Expecting Growth From Oil Sands



Short term conventional forecast downward revision alongside significant oil sands permit pushbacks

Source: Spring Rock

Where is the crude going: Imports into U.S.



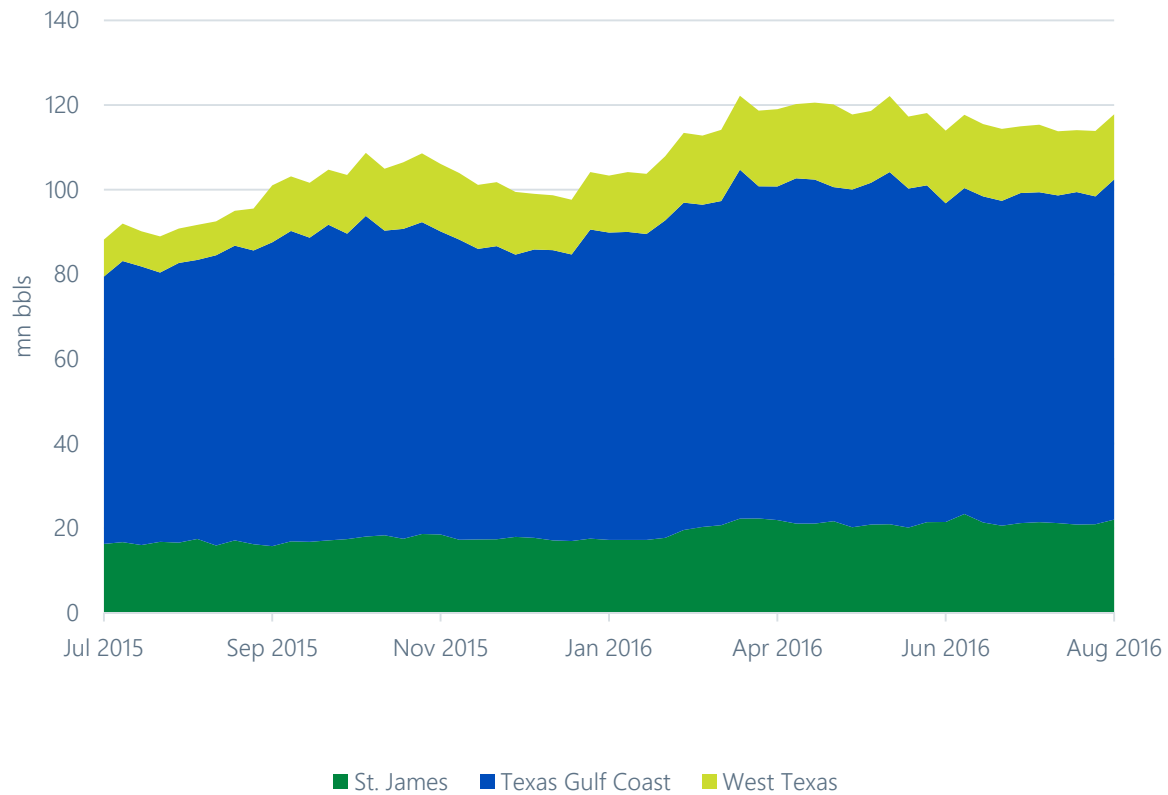
- Pipes will start to fill even with decline in conventional production
- Given our supply forecast, rail will be needed in late 2018 unless ENB has means to increase throughput
- Rail will likely be priced into differentials as market becomes tighter



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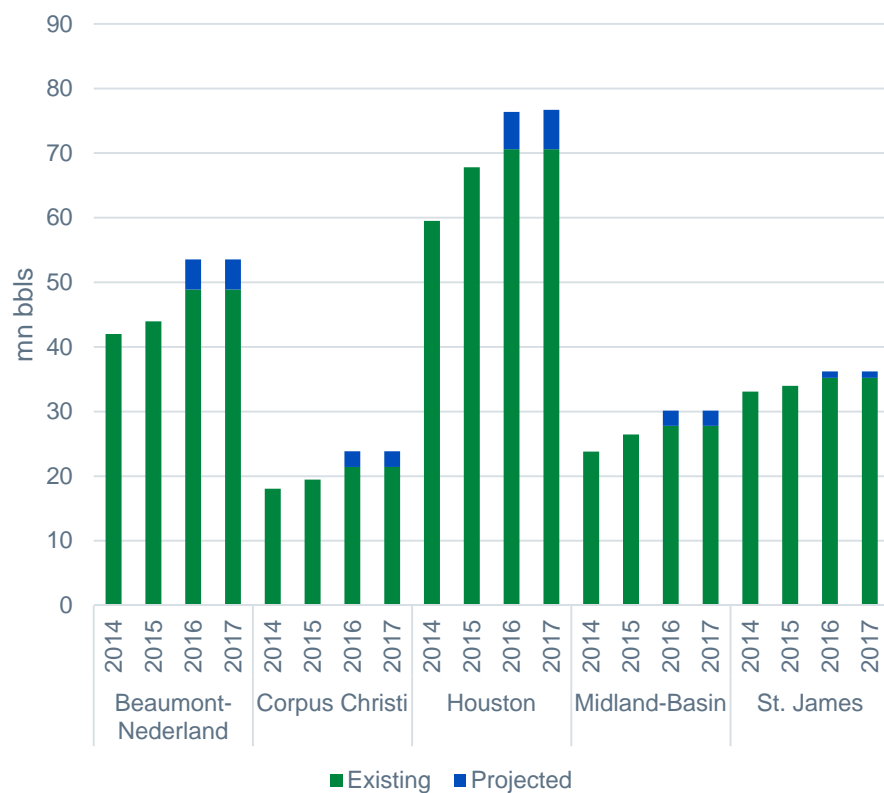
PADD 3 and Total US Crude Stocks?

PADD 3 Storage



- Genscape monitors ~55% PADD 3 Capacity
- LOOP = 67-69mn bbls capacity

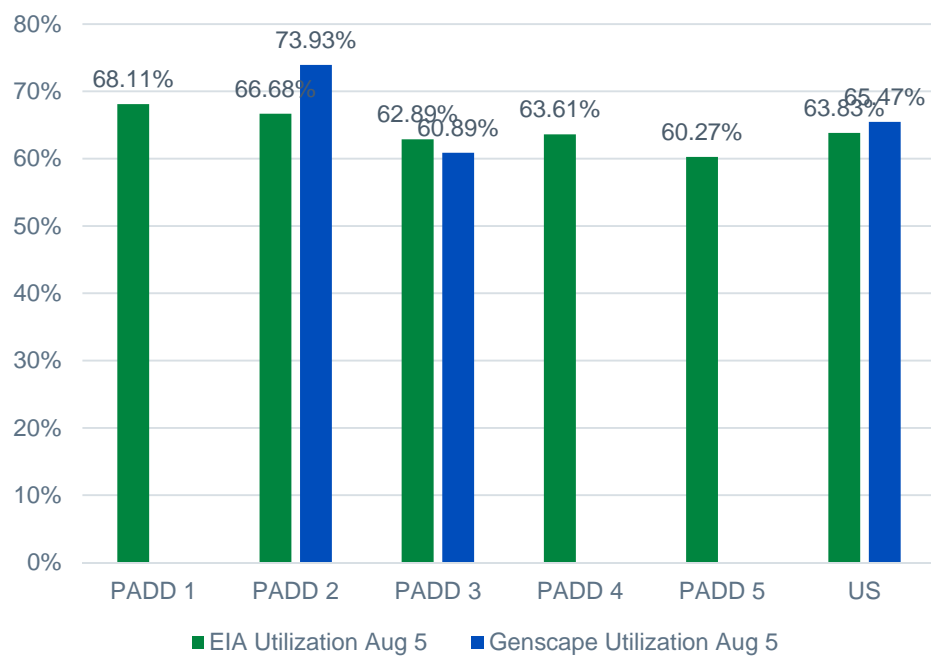
PADD 3 Capacity Growth



US Storage

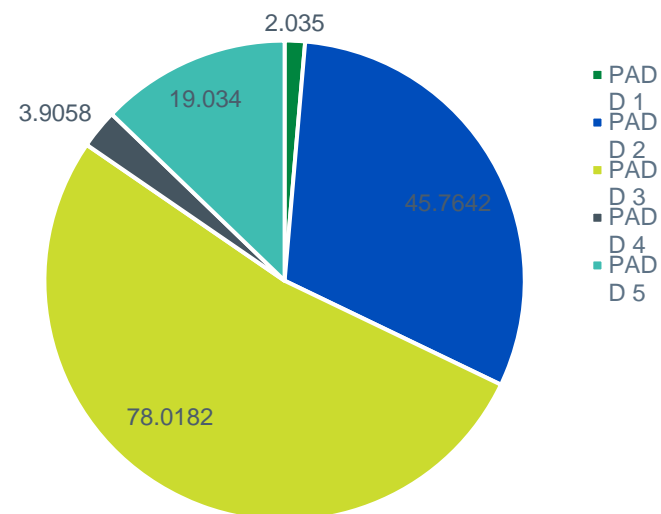
Capacity Utilization

*Aug. 5, 2016

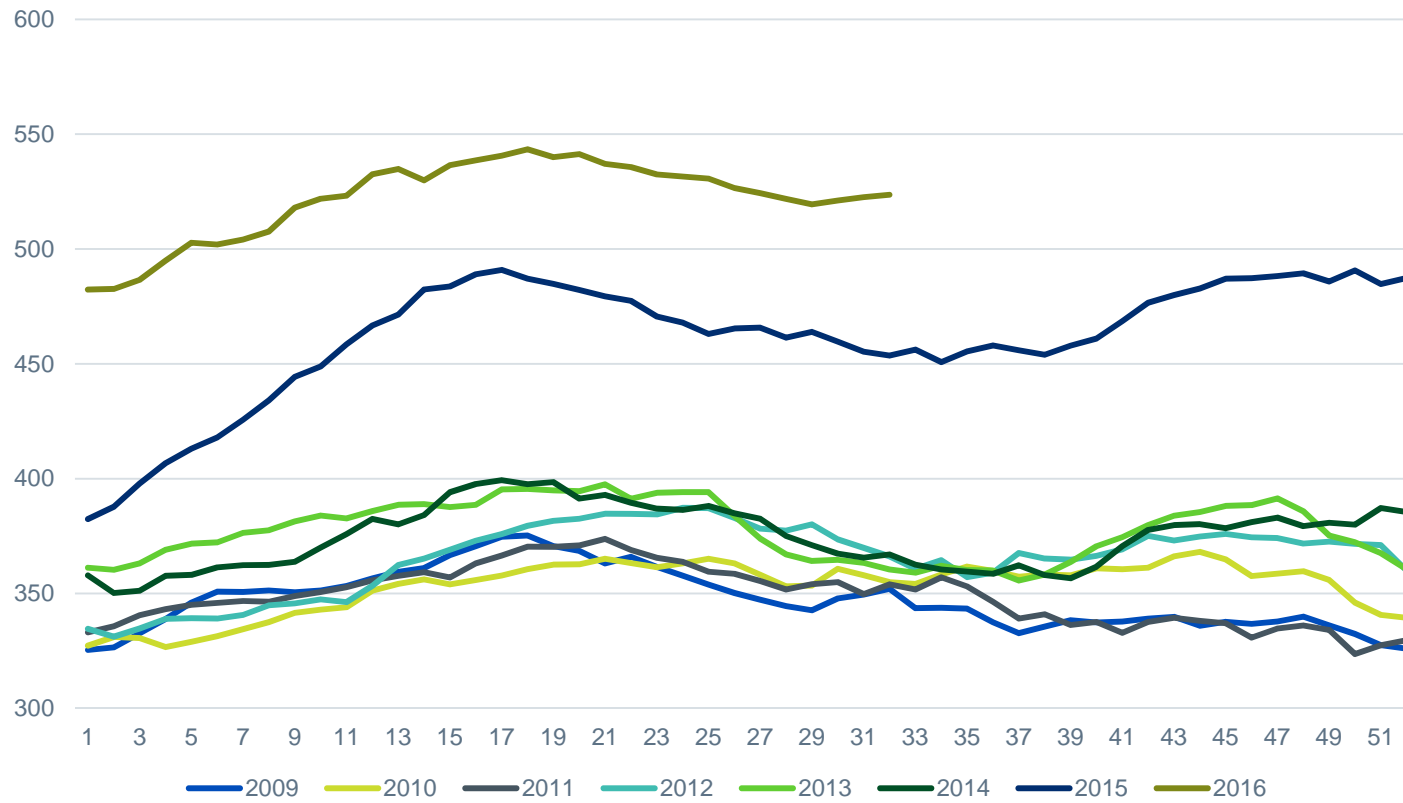


Available Capacity

*Adjusted for pipeline fill, assumes 80% utilization limit
Aug. 5, 2016



US Year Over Year Total Crude Stocks

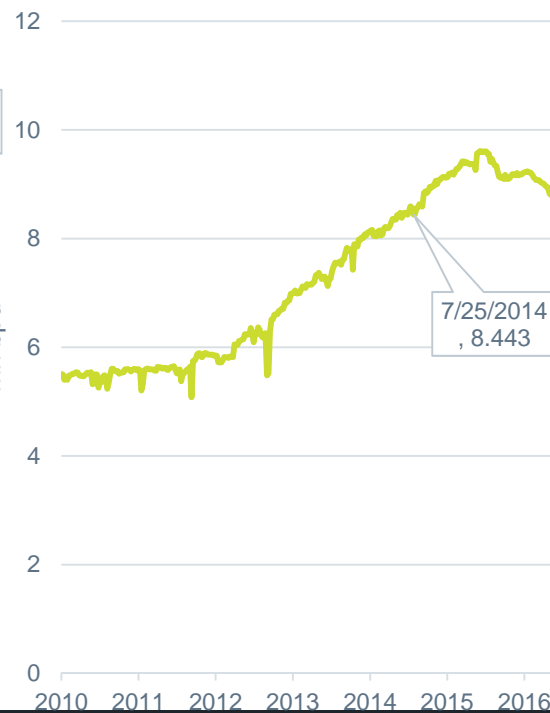


Price Effect of Excess Supply

NYMEX Light Sweet Crude Oil (WTI) Futures Electronic (Front Month)



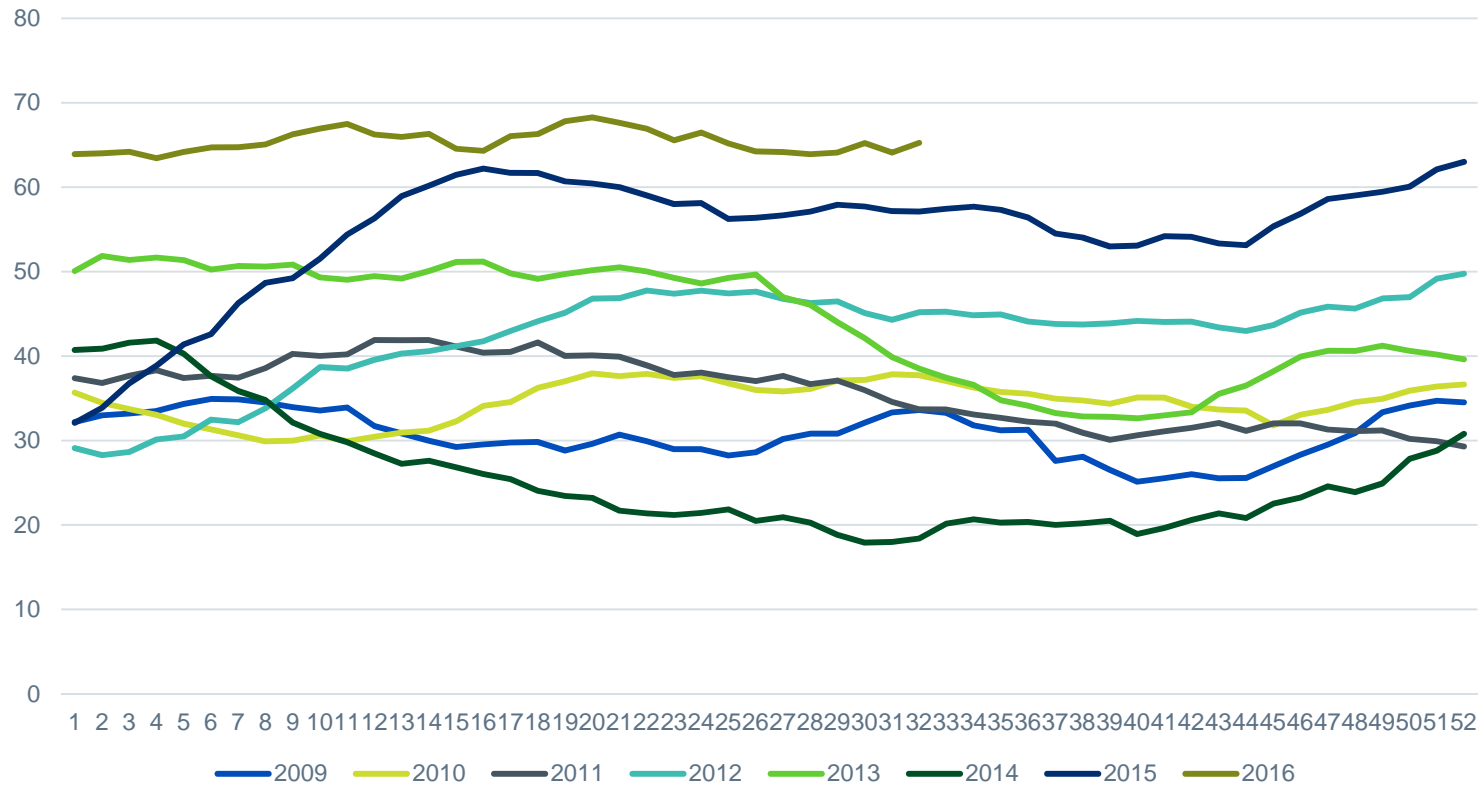
EIA Crude Oil Production Domestic Production



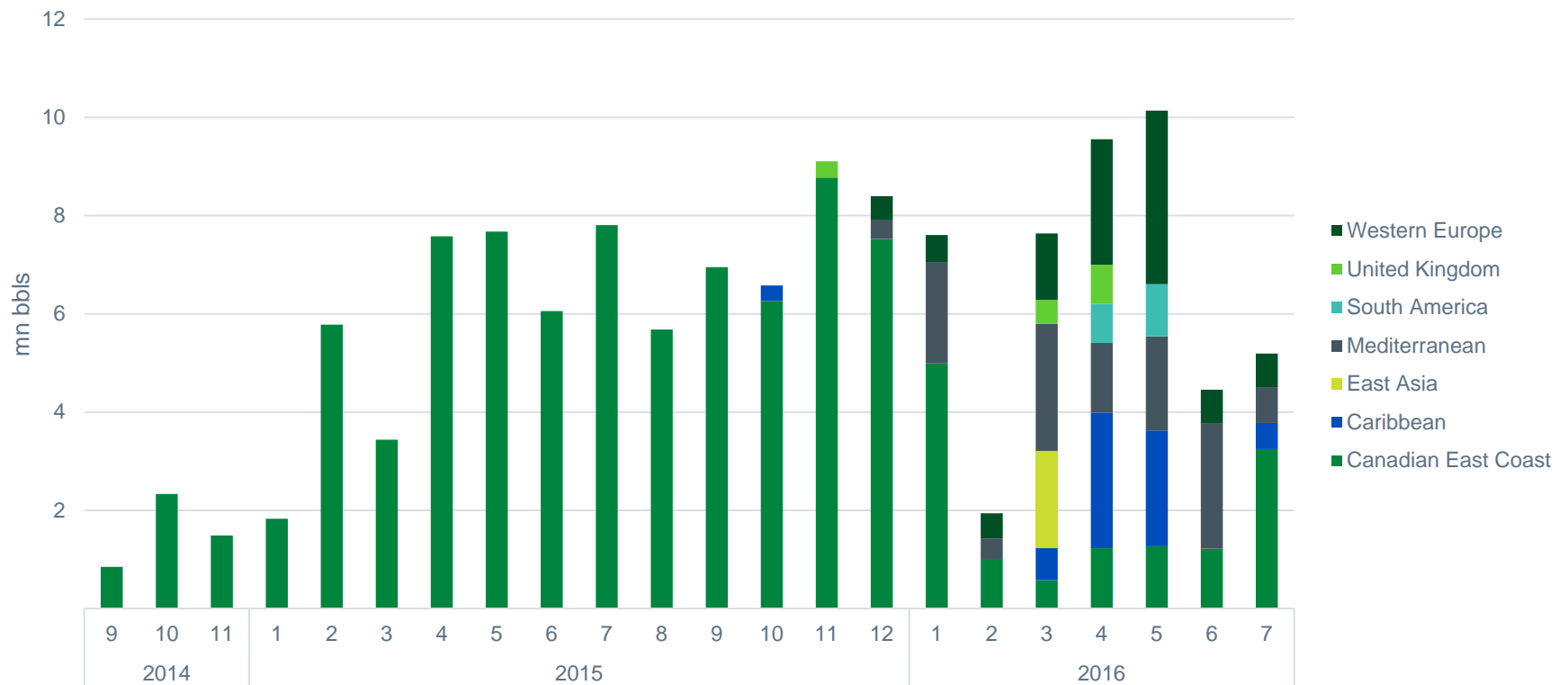
Crude Oil Production, OPEC Total



Cushing Year Over Year Crude Stocks



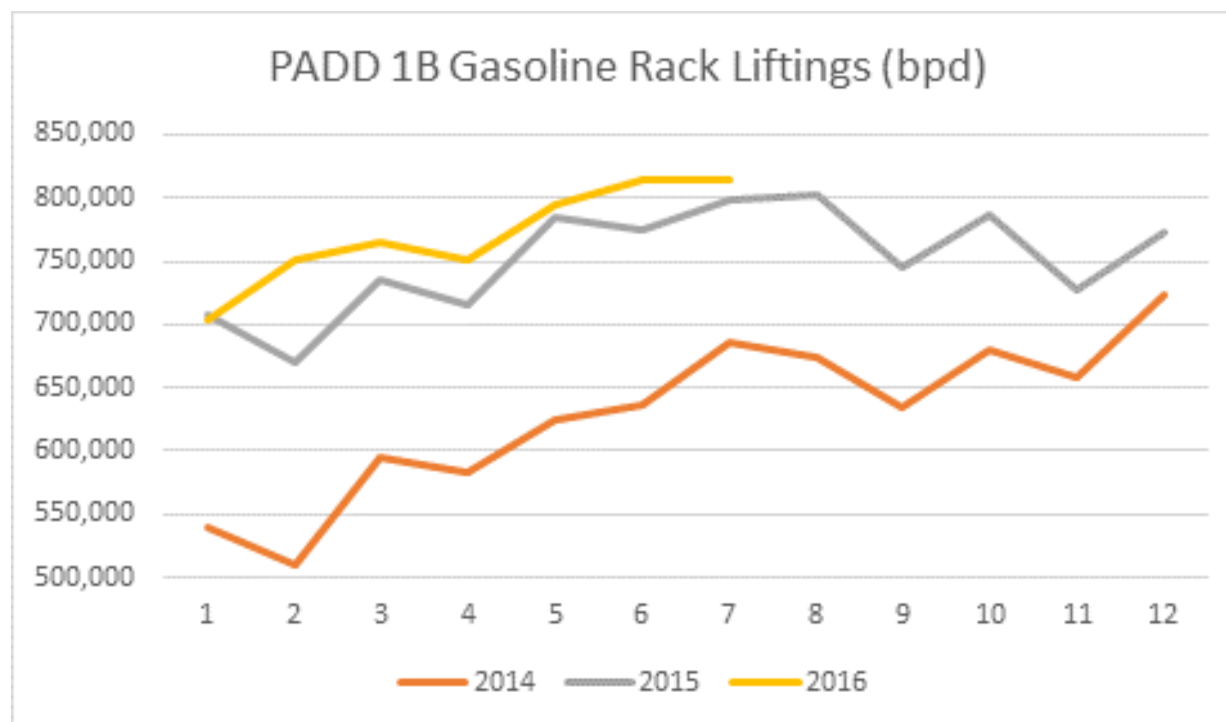
US Exports



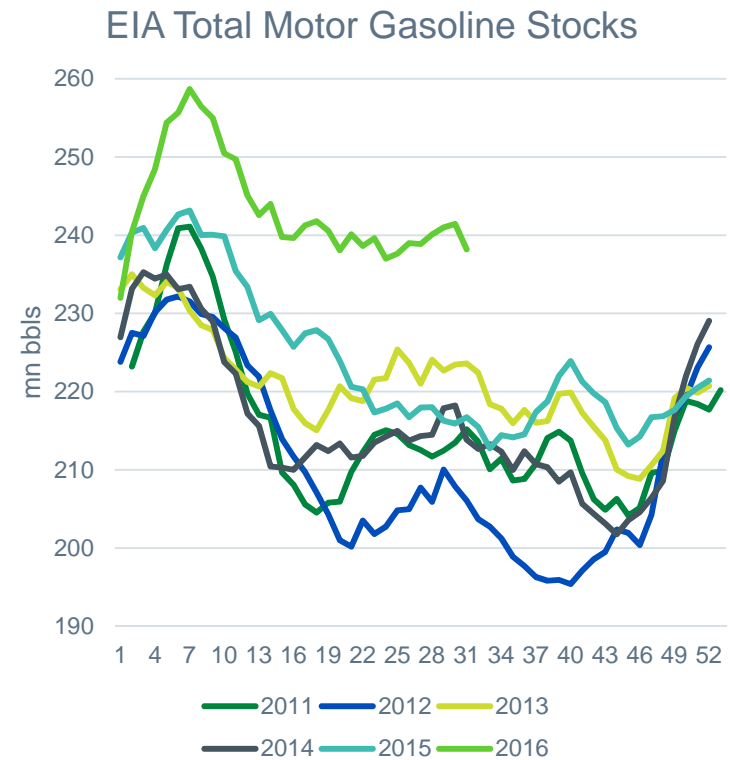
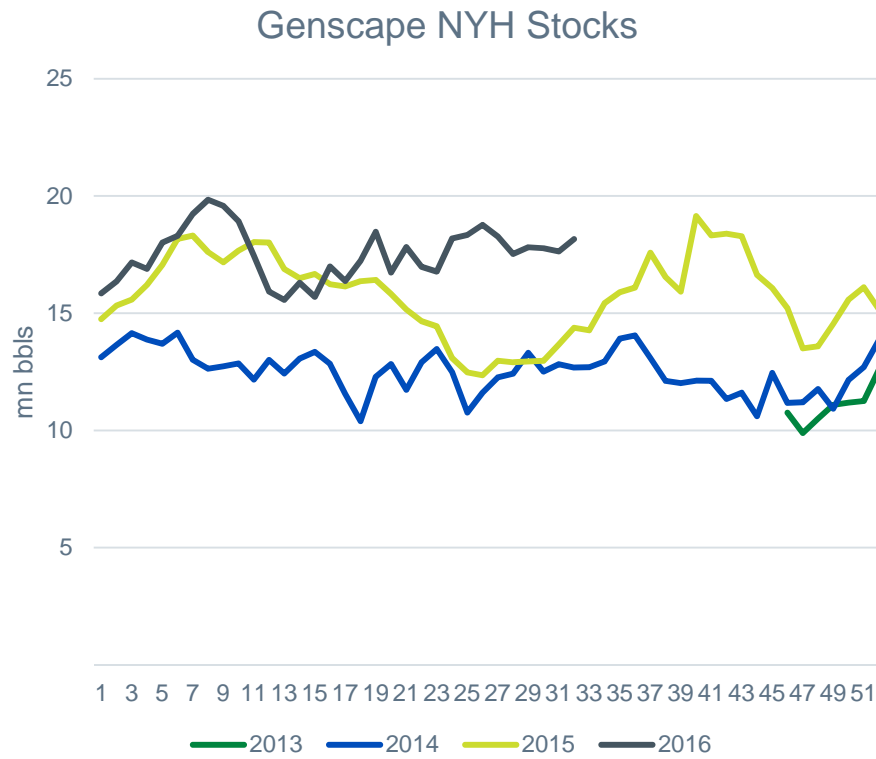


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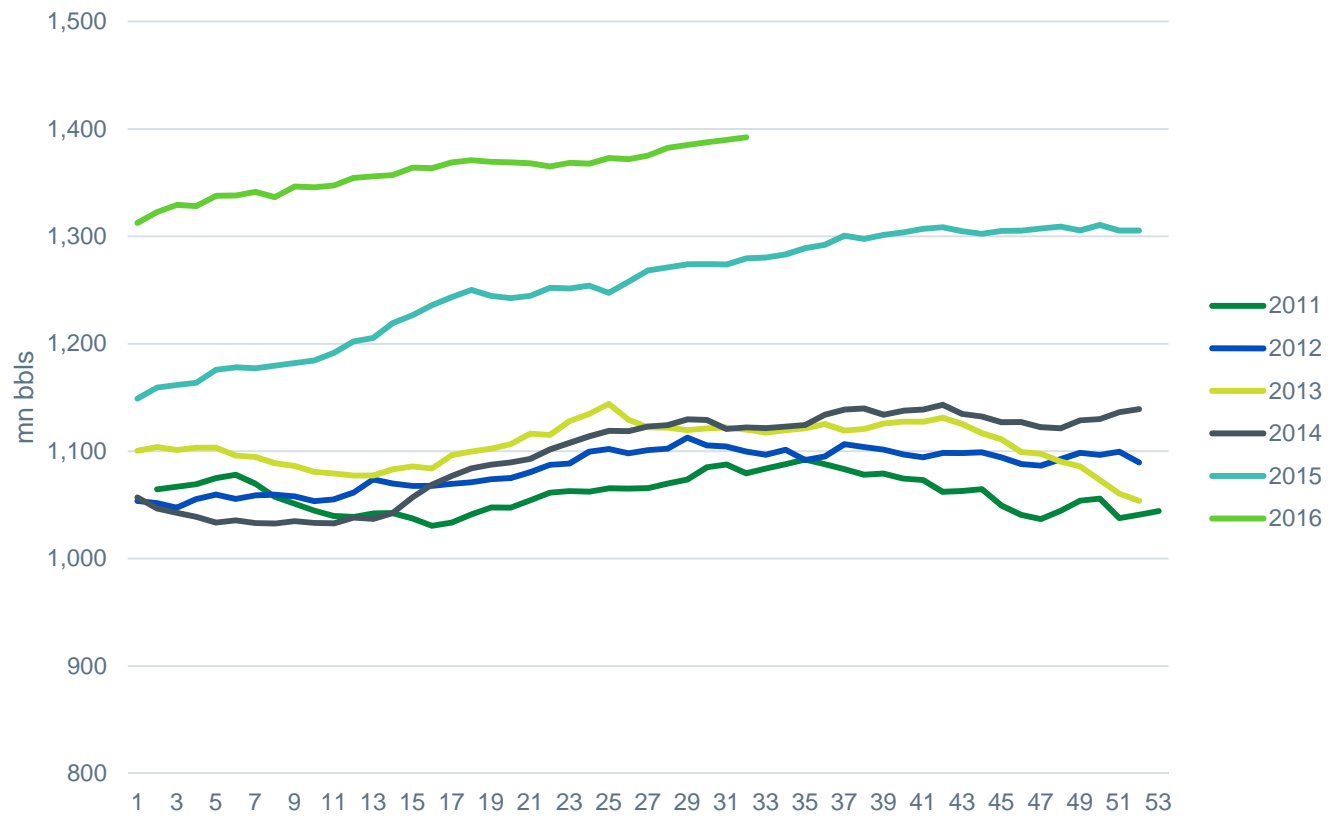
It's Not Just Crude Stocks Setting Records



Gasoline Stocks Year over Year



US Total Crude and Products Year Over Year



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