

S&P Global Platts Energy Symposium:

Natural Gas Technical Workshop

Simon Thorne
Mark Callahan
Ryan Ouwerkerk
Samer Mosis
Eric Janssen
John Hilfiker

October 11, 2018



Notice to Attendees

Platts is committed to full compliance with all applicable antitrust laws. Accordingly this natural gas methodology forum will be conducted in strict compliance with both the letter and the spirit of all applicable antitrust laws.

Platts expects participants to comply with all antitrust laws and not to use this event to coordinate their commercial activities. Any activity that could create even the appearance of a restriction or distortion of competition must be avoided. To ensure compliance with antitrust laws, Platts and all participants shall keep strictly within the Conference agenda, as circulated.

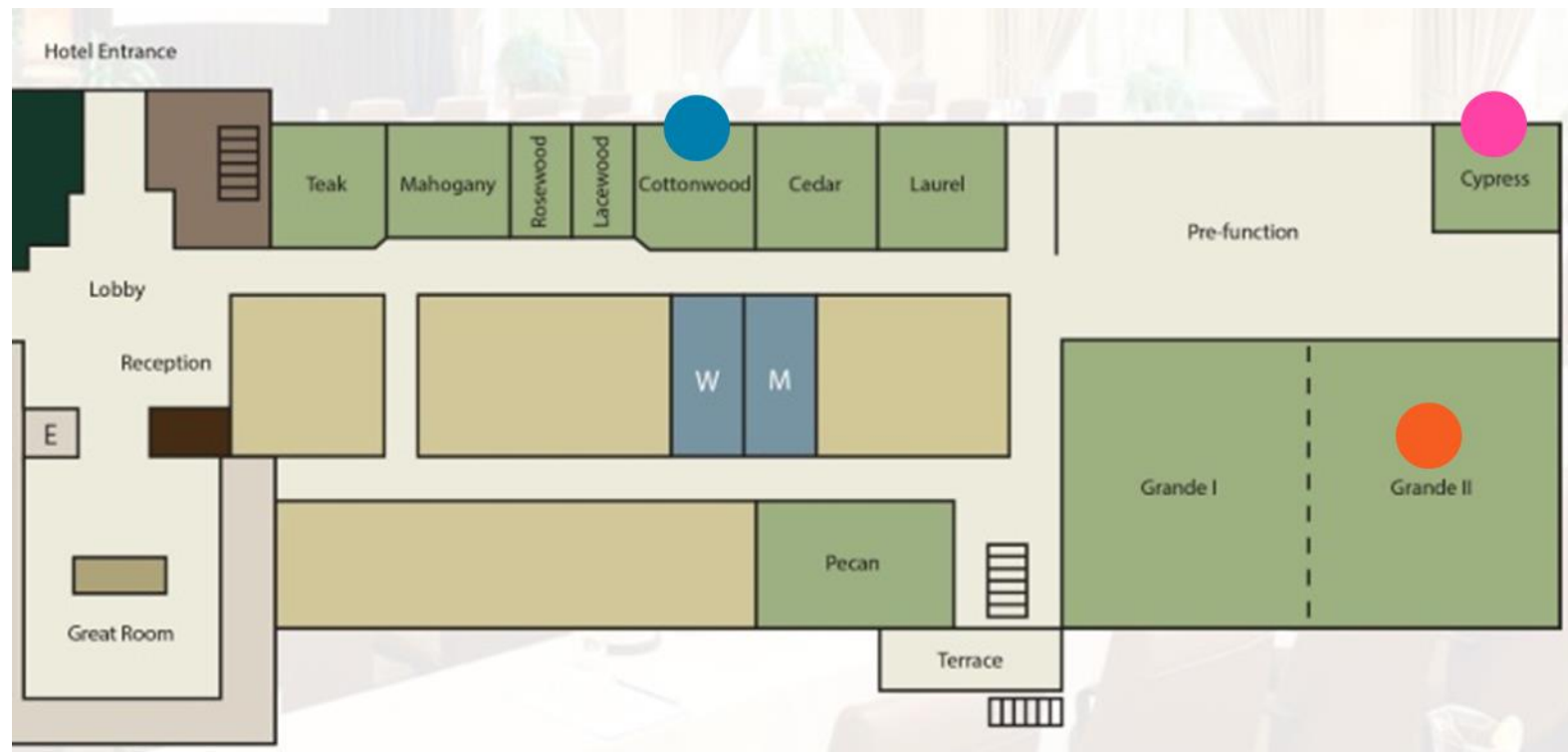
In particular, Platts prohibits any discussions/exchanges of information about any participant's individual, current or future: (1) prices (including discounts, rebates and reductions); (2) costs; (3) profits and profit margins; (4) capacity, output and sales; (5) supply and demand forecasts; (6) market shares and sales territories; (7) investments and marketing plans; or (8) unannounced capital expansion/closure plans.

Agenda

- Introduction
- FERC 552 Data Analysis and Platts Indices
- Platts – ICE Natural Gas Indices
- Price Reporting Technology
- Lunch and Natural Gas Market Update
- Breakout Sessions
 - a. Methodology 101
 - b. Methodology Evolution
 - c. Platts – ICE Natural Gas Indices

Introduction

- Platts objectives
- Goals of the event
- How you can help
- Logistics for break out sessions
 - Stay in **Grande Ballroom II**
 - Go to **Cottonwood** meeting room
 - Go to **Cypress** meeting room



FERC 552 Data Analysis

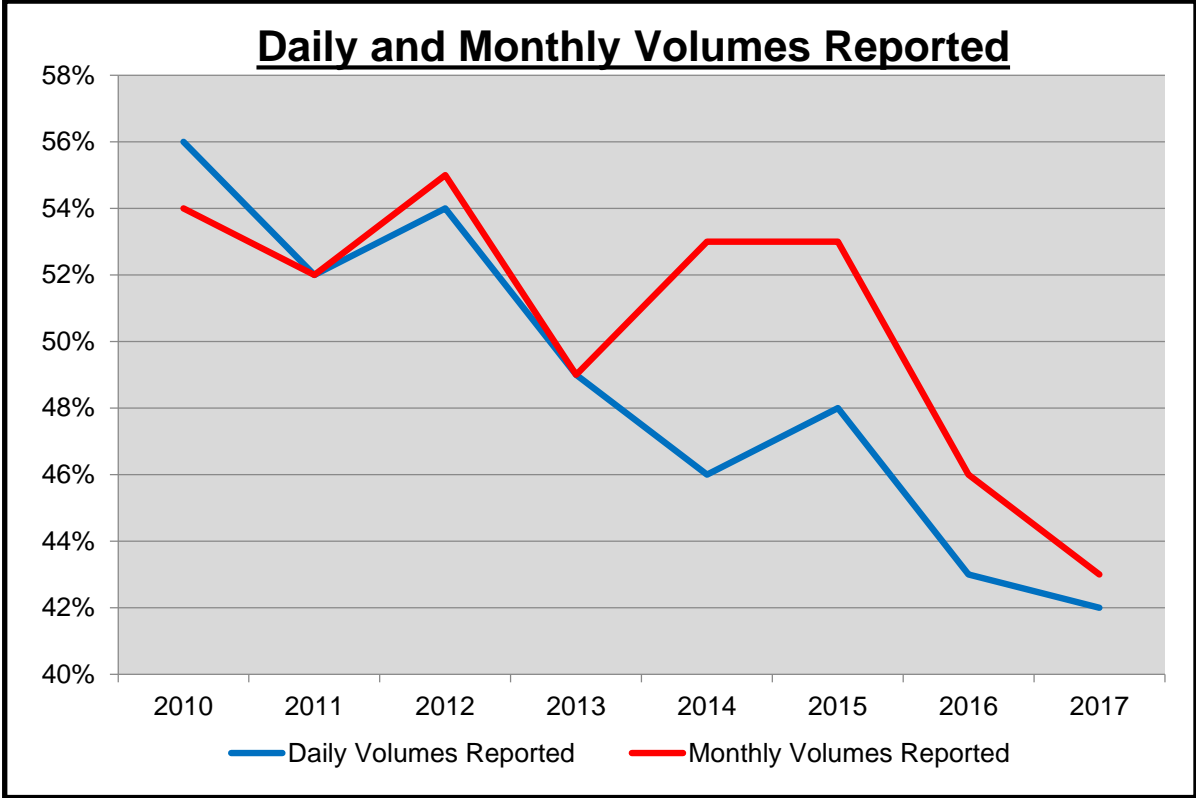
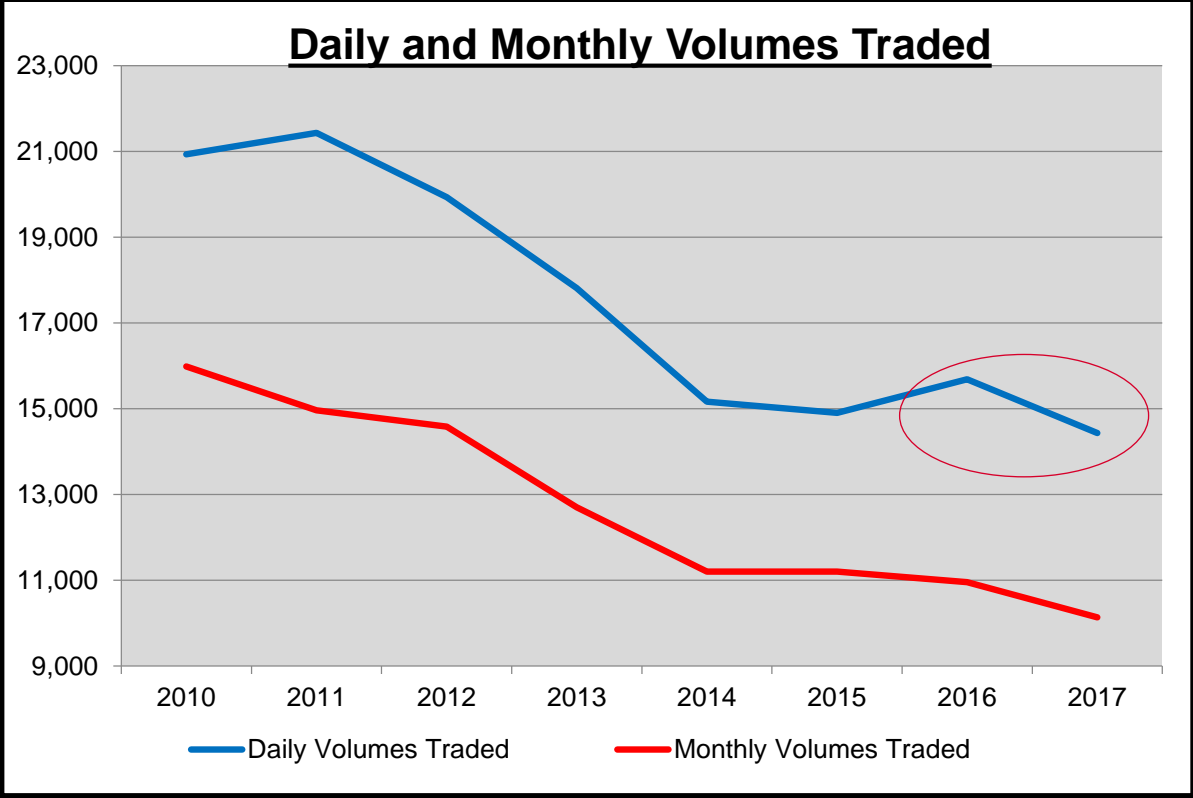
Fixed Price vs Index Trading Volumes

Year	Daily Index	Monthly Index	Daily Fixed	Monthly Fixed	Monthly Basis	Other
2010	23%	45%	17%	6%	7%	2%
2011	25%	44%	17%	6%	7%	1%
2012	27%	43%	16%	5%	7%	2%
2013	30%	43%	15%	4%	7%	1%
2014	31%	45%	13%	3%	6%	2%
2015	32%	45%	12%	3%	6%	2%
2016	33%	44%	12%	3%	6%	2%
2017	34%	44%	11%	3%	5%	3%

- Index trading continues to represent the majority of trading activity

Source: FERC 552 data

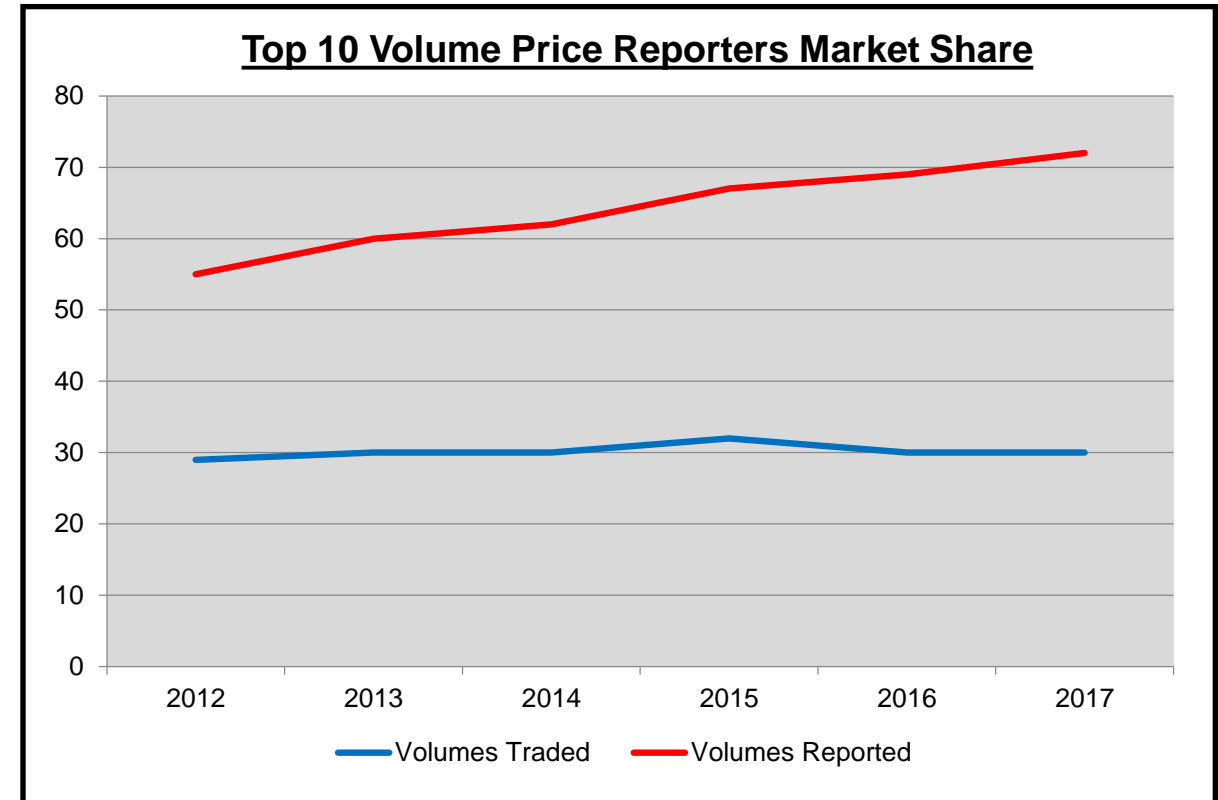
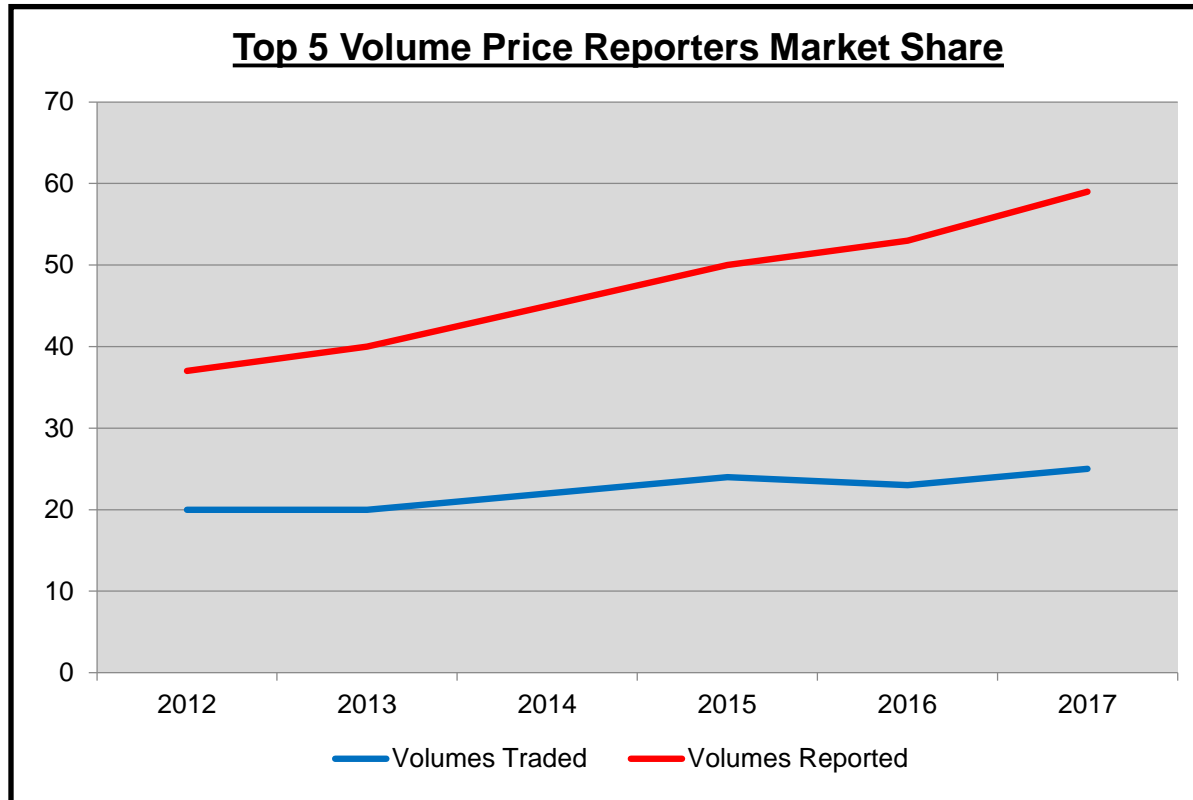
Natural Gas Volumes Traded and Reported



- Percentage of reported daily and monthly volumes at lows
- Decrease in traded volumes likely because some companies have not yet filed FERC 552 data for 2017

Source: FERC 552 data

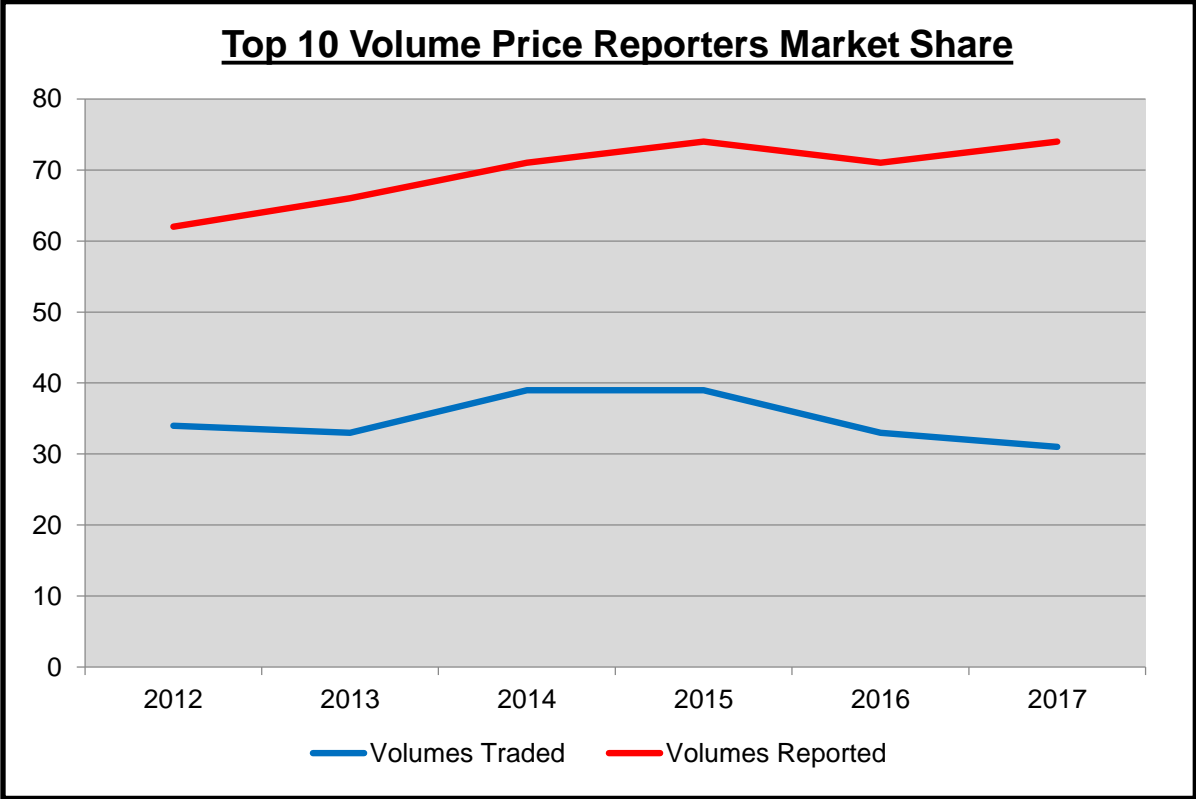
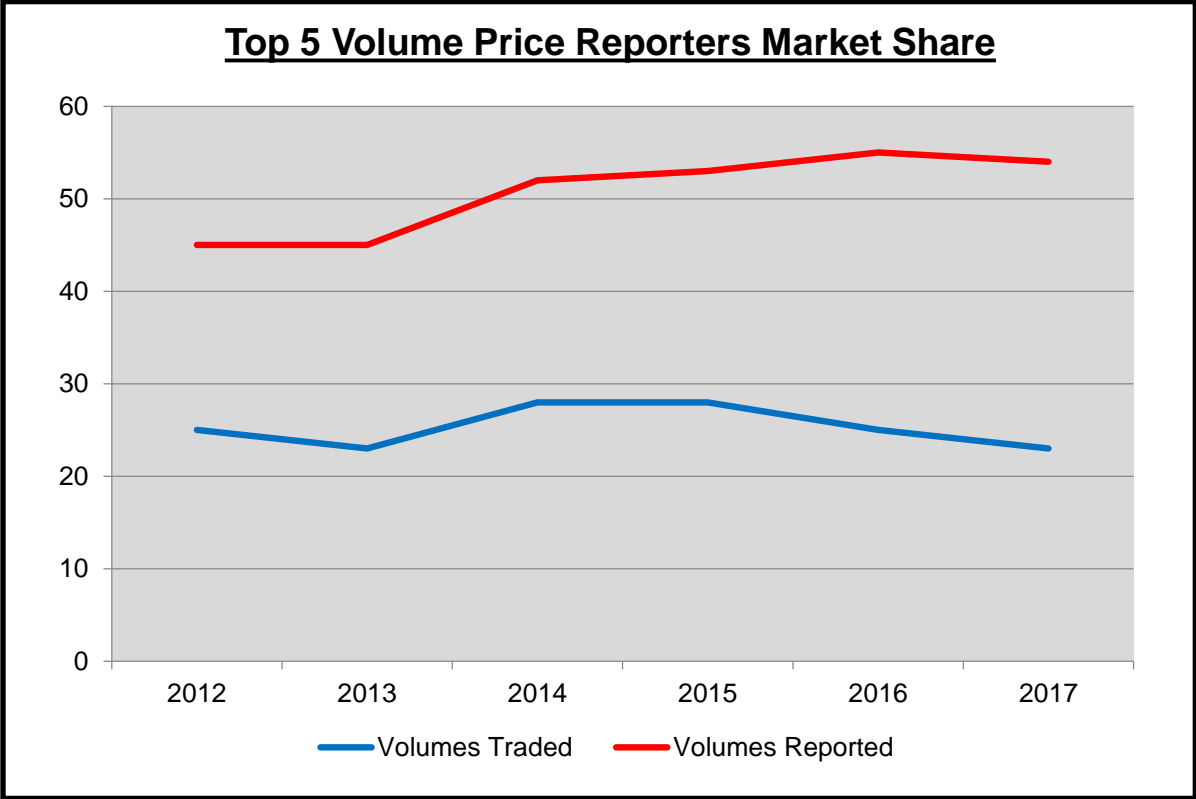
Price Reporter Market Share of Fixed Price Daily Volumes Traded and Reported



- Price reporters share of reported volumes trending higher
- Continued reliance on top players for price reporting

Source: FERC 552 data

Price Reporter Market Share of Fixed Price and Basis Monthly Volumes Traded and Reported



- Same trend as daily market

Largest Reportable Daily Volume Increase In 2017

#	Company Name	Fixed Price Next Day 2017	Fixed Price Next Day 2016	Annual Change	Price Reporter?
1	Citadel Energy Marketing LLC	179	57	122	No
2	Mieco Inc	359	256	103	No
3	Morgan Stanley Capital Group Inc	151	55	96	No
4	DTE Energy Trading Inc	287	209	78	No
5	Cheniere Energy Inc	93	47	46	Yes
6	Citigroup Energy Inc	50	7	43	Yes
7	CenterPoint Energy Inc	116	73	43	No
8	EDF Energy Services LLC	131	88	43	No
9	Tenaska Power Services Co	121	80	41	No
10	J Aron & Co	277	245	33	Yes

- Majority of companies do not report prices

Source: FERC 552 data

Largest Reportable Daily Volume Decrease In 2017

#	Company Name	Fixed Price Next Day 2017	Fixed Price Next Day 2016	Annual Change	Price Reporter?
1	Emera Energy Services Inc	67	207	(140)	Yes
2	ConocoPhillips Co	269	393	(124)	Yes
3	Freepoint Commodities LLC	43	164	(121)	No
4	BP Energy Co	1060	1155	(95)	Yes
5	Tenaska Marketing Ventures	835	919	(84)	Yes
6	Energy Transfer Partners LP	222	298	(76)	Yes
7	Cargill Inc	70	129	(59)	No
8	Kinder Morgan Texas Pipeline LLC	57	113	(57)	Yes
9	Exelon Generation Co LLC	517	561	(44)	No
10	Occidental Energy Marketing Inc	97	140	(43)	No

- Majority of companies are price reporters

Source: FERC 552 data

Largest Reportable Monthly Volume Increase In 2017

#	Company Name	Fixed Price Next Day 2017	Fixed Price Next Day 2016	Annual Change	Price Reporter?
1	Range Resources Corp	348	208	140	No
2	Cabot Oil & Gas Corp	312	196	116	No
3	Vitol Inc	233	124	109	No
4	Citadel Energy Marketing LLC	118	18	100	No
5	Direct Energy Marketing Inc	183	92	91	No
6	Mieco Inc	106	58	48	No
7	CIMA Energy LTD	236	194	42	No
8	Twin Eagle Resource Management	106	68	37	No
9	Mercuria Energy America Inc	177	140	37	No
10	UGI Energy Services LLC	111	75	36	No

- None of the companies report prices

Source: FERC 552 data

Largest Reportable Monthly Volume Decrease In 2017

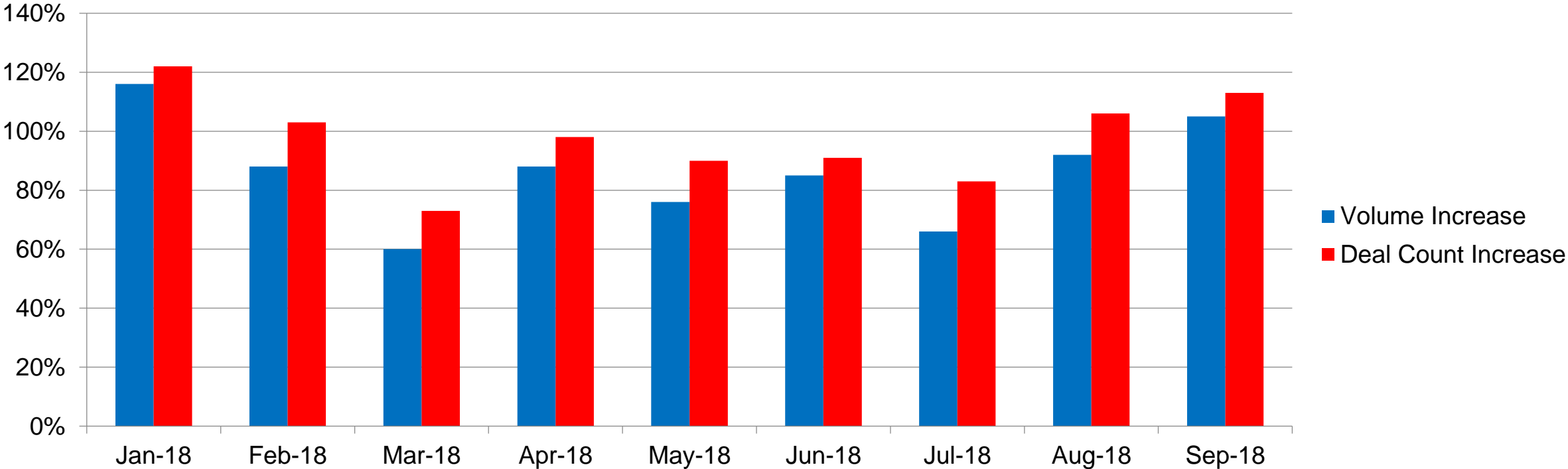
#	Company Name	Fixed Price Next Day 2017	Fixed Price Next Day 2016	Annual Change	Price Reporter?
1	J Aron & Co	315	545	(231)	Yes
2	Shell Energy North America	187	346	(158)	Yes
3	BNP Paribas Energy Trading GP	166	252	(86)	Yes
4	Macquarie Energy LLC	519	602	(83)	Yes
5	ConocoPhillips Co	202	283	(81)	Yes
6	Constellation NewEnergy Gas	1	68	(66)	No
7	BP Energy Co	736	801	(65)	Yes
8	Mitsui & Co.	79	141	(62)	No
9	Pacific Summit Energy LLC	130	189	(59)	No
10	Occidental Energy Marketing Inc	56	104	(48)	No

- Price reporters have largest decrease in reported monthly volumes

Source: FERC 552 data

Platts Indices Update

Platts Gas Daily Indices vs 2017



- Inclusion of non-price reporter ICE trades has increased deal counts by 98%
- 2017 average daily deal count = 2,461
- 2018 average daily deal count = 4,867

Platts 2018 daily data through September 30

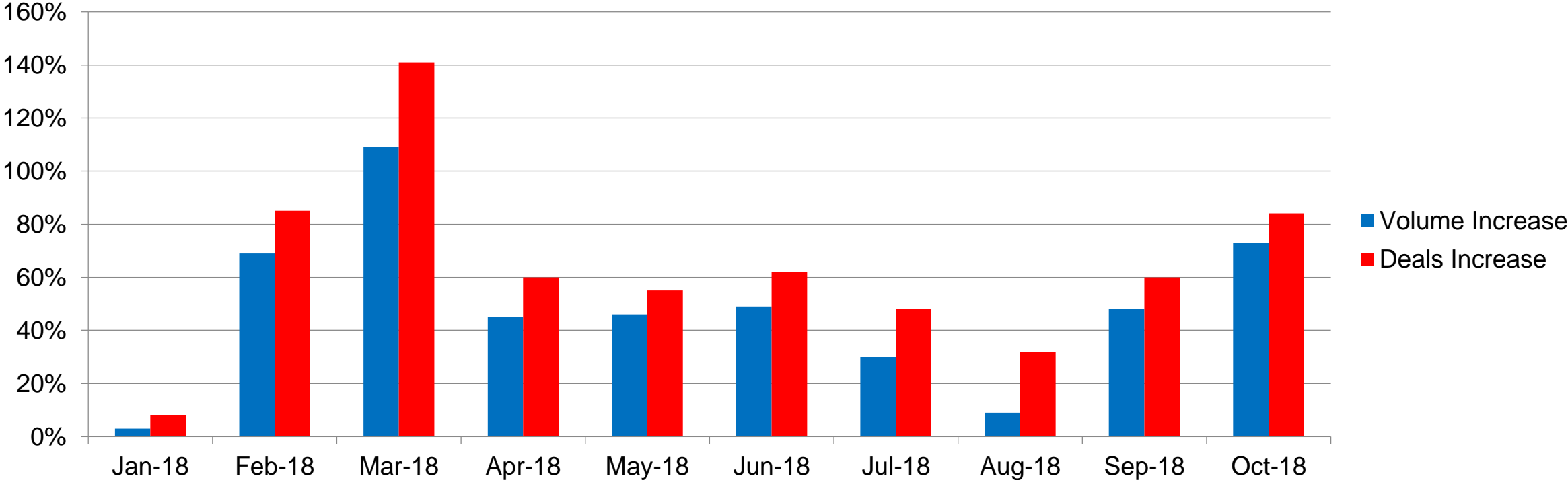
Composition of Platts Gas Daily Indices - 2018

Average Daily Deal Count	# of Locations	% ICE PR	% ICE non-PR	% PR non-ICE
Greater than 100	12	38%	60%	2%
50 - 99	25	40%	56%	4%
25 - 49	23	38%	56%	6%
11 - 24	22	41%	51%	8%
1 - 10	22	25%	30%	45%

- Almost 95% of all daily trades done on ICE
- Most liquid locations trade more on ICE

Platts 2018 daily data through September 30

Platts Monthly Indices vs 2017



- Inclusion of non-price reporter ICE trades has increased deal counts by 63%
- 2017 average monthly deal count = 1,566
- 2018 average monthly deal count = 2,549

Composition of Platts Monthly Indices - 2018

Average Daily Deal Count	# of Locations	% ICE PR	% ICE non-PR	% PR non-ICE
Greater than 100	2	28%	47%	24%
50 - 99	14	42%	40%	18%
25 - 49	23	45%	34%	21%
11 - 24	19	42%	28%	30%
1 - 10	23	25%	26%	49%

- 22% of all trades not done on ICE
- Price reporting matters!

Composition of Platts Indices - 2018

Daily Indices:

Month	ICE PR	ICE non-PR	PR non-ICE
Jan	38%	55%	7%
Feb	39%	55%	6%
Mar	40%	54%	6%
Apr	40%	53%	7%
May	42%	53%	6%
Jun	40%	54%	6%
Jul	40%	53%	7%
Aug	40%	54%	6%
Sep	39%	55%	6%

Monthly Indices:

Month	ICE PR	ICE non-PR	PR non-ICE
Jan	44%	34%	22%
Feb	39%	36%	25%
Mar	66%	21%	13%
Apr	44%	37%	19%
May	37%	37%	26%
Jun	35%	34%	31%
Jul	63%	22%	15%
Aug	36%	35%	29%
Sep	34%	39%	27%
Oct	37%	41%	22%

Platts Approach to Increase Price Reporting

Partnerships

- Platts-ICE gas agreement allows for use of all ICE trades in Platts indices

Technology

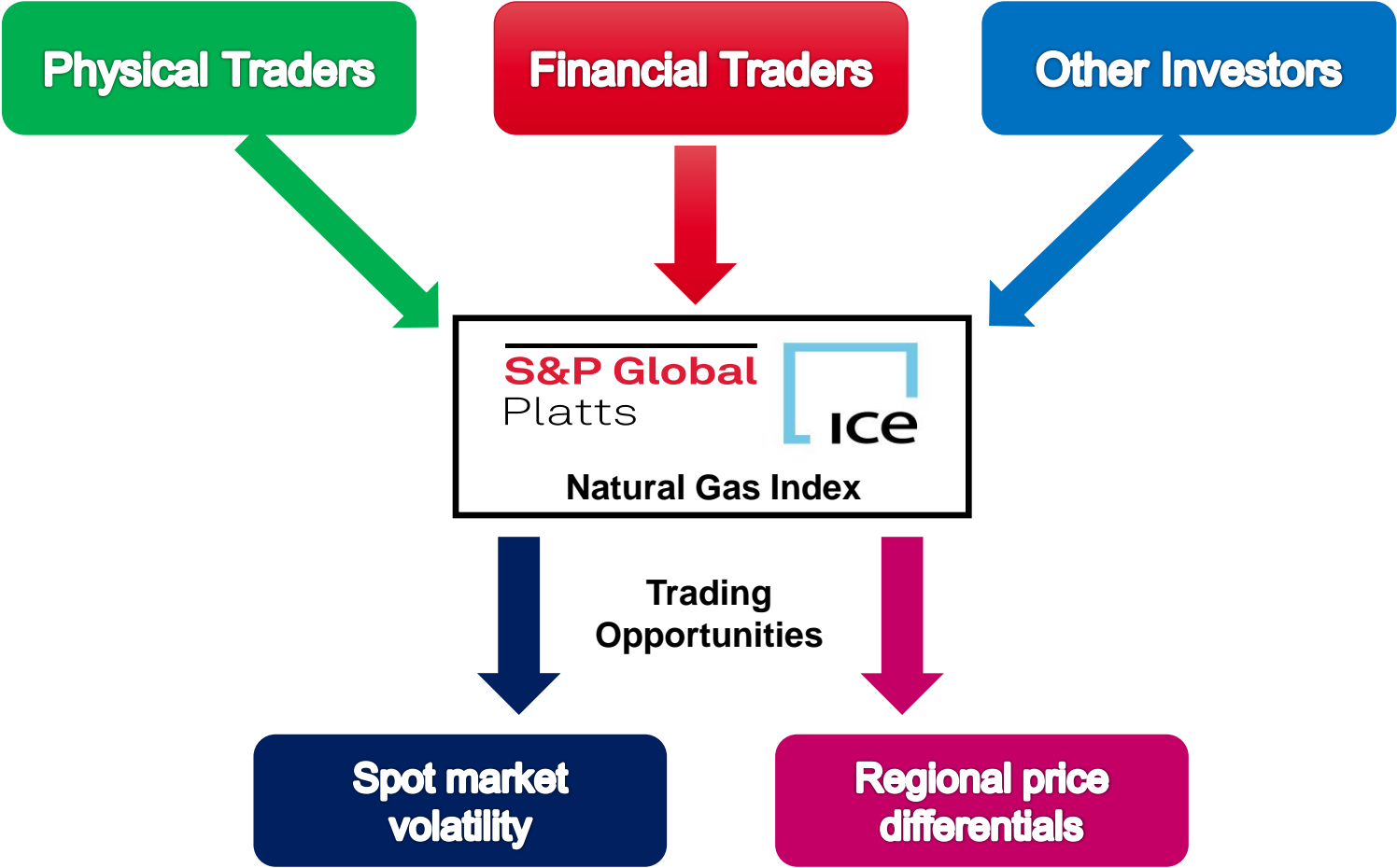
- Platts is determining interest in Blockchain technology for trade verification and price, compliance, and regulatory reporting
- Platts is considering the creation of a website for submitting price data
- ICE eConfirm platform for price reporting based on customer interest

Regulatory

- Platts has issued public comments on suggested changes to the FERC Policy Statement:
- Separation of daily and monthly reporting
- Expansion of safe harbor provision
- Standardization of annual auditor review
- Reviews to be provided to FERC upon request
- Limit FERC audits to non-data providers

Platts – ICE Natural Gas Indices

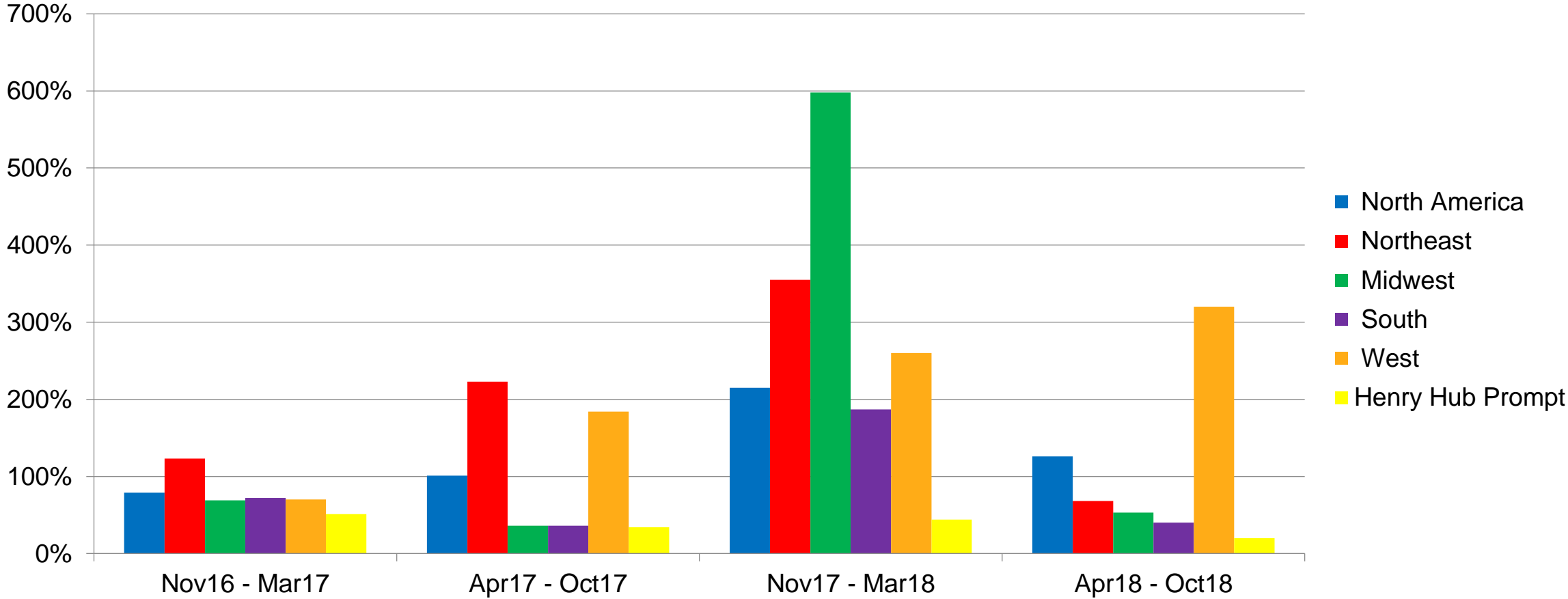
What is the idea?



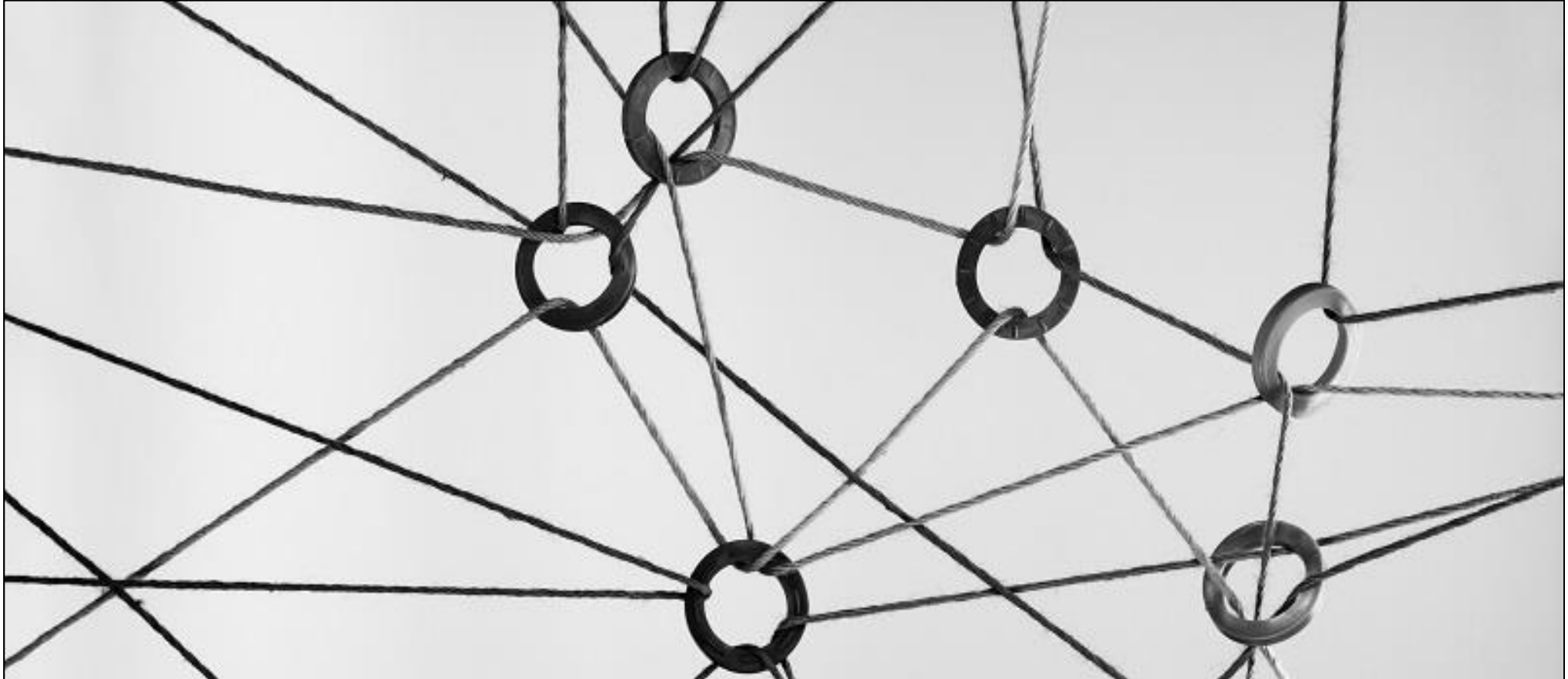
What is the idea?

- Indices represent a basket of selected daily gas locations in North America
- Prices are published at end of day and represent Platts final daily indices
- Platts Analytics pipeline flow data is used to determine locations, location weightings and regional weightings
- Platts to publish a North America index as well as a separate set of regional indices in the Northeast, South, Midwest, and West regions based on 20 locations in the US and Canada

Volatility By Season Since November 1, 2016



Platts North American Natural Gas Blockchain: An Evolution in Price Reporting



Platts TradeVision: An Evolution in Price Reporting

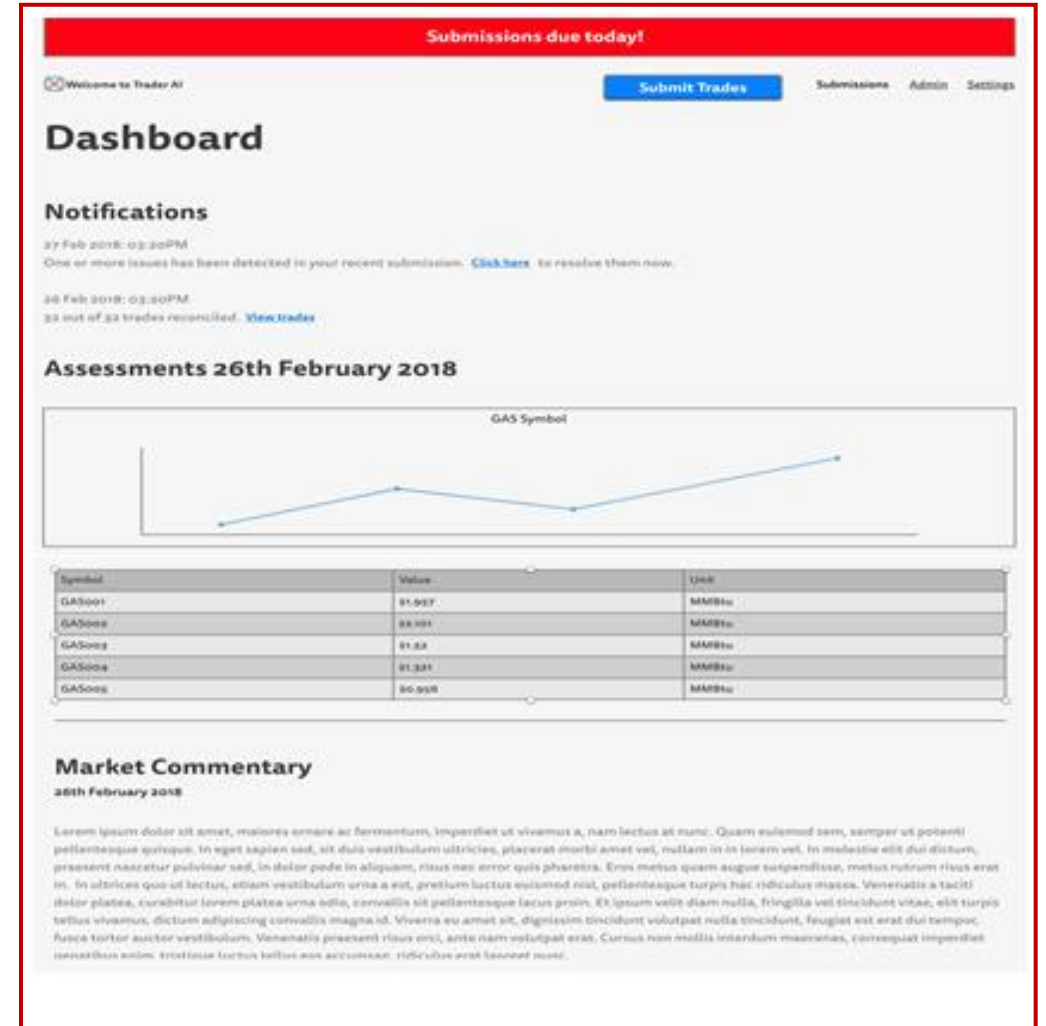
Concept:

A simple medium for price reporting and trade verification that provides analytical value and maintains opportunity for expansion into settlement and scheduling longer-term through the integration of blockchain technology.

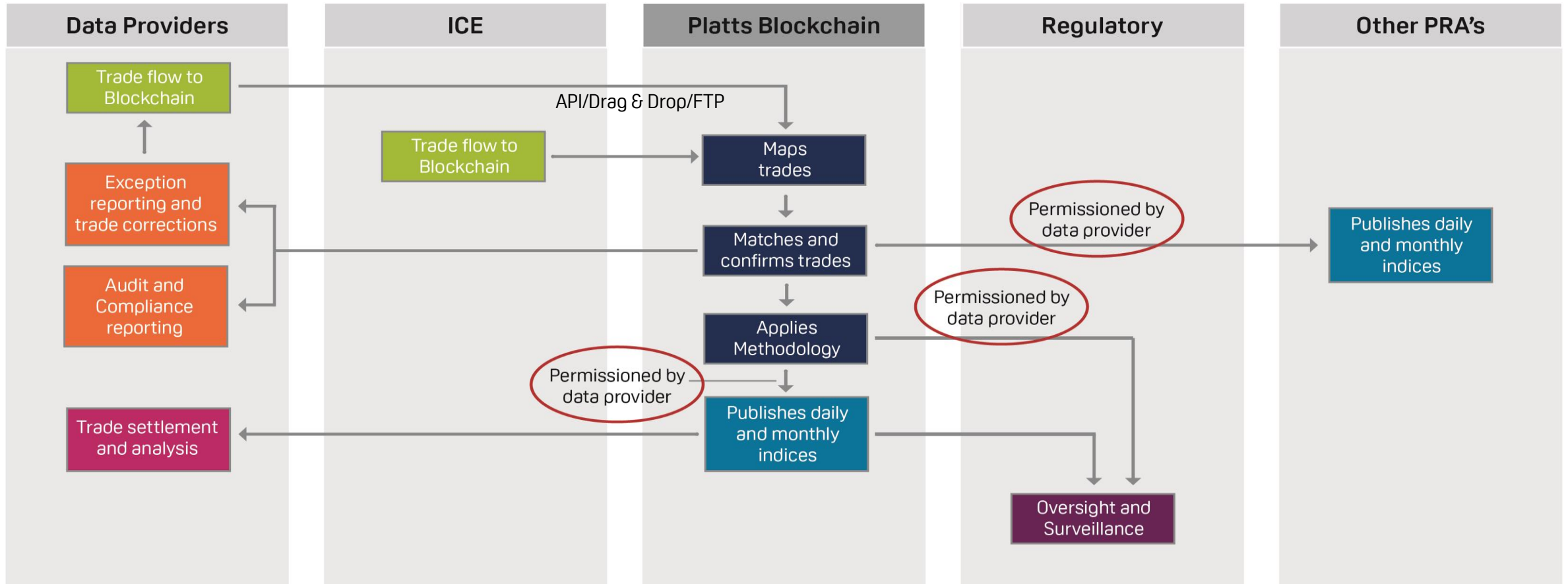
Timeline:

Beta Launch Q1 2019

Public Launch Q2 2019



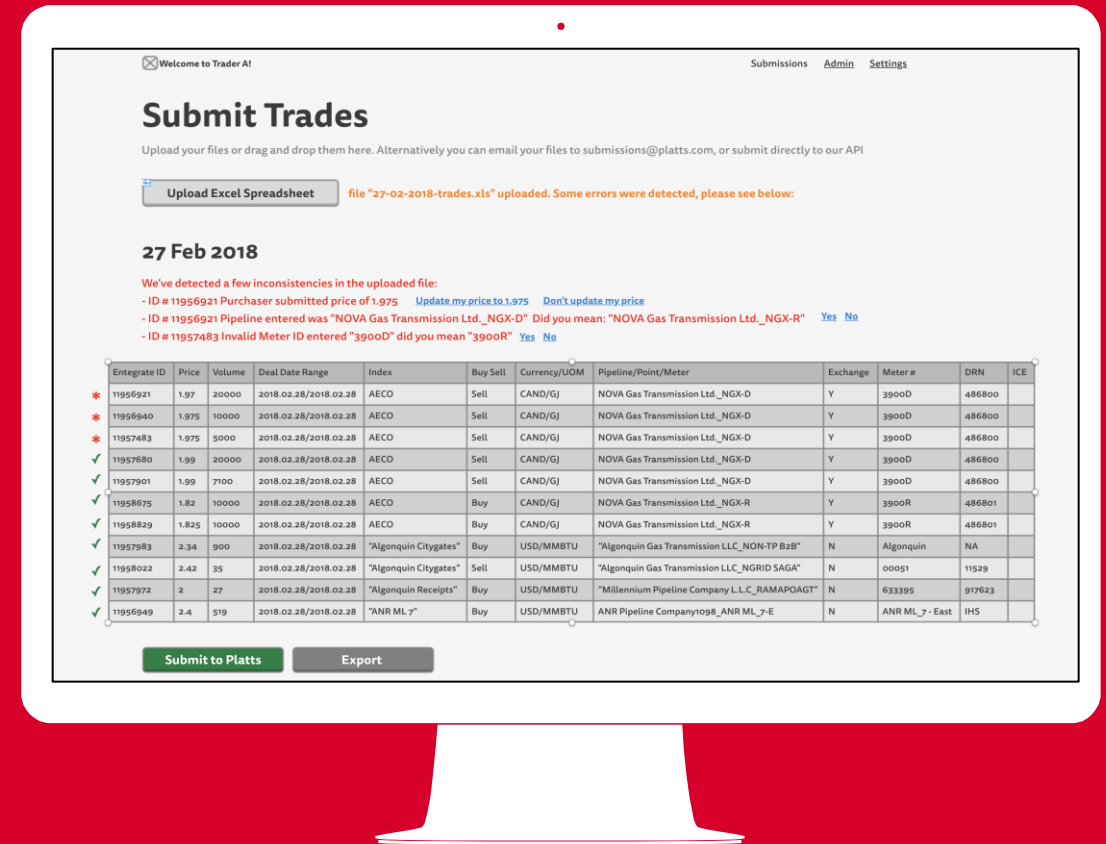
Platts TradeVision: Removes Price Reporting Bottlenecks



- While all trade components are reported to the TradeVision blockchain, participants decide what fields regulators, PRAs and other parties can actually see
- This permissioning allows Platts TradeVision to reconcile, map and report unmatched transactions all while maintaining participants' privacy and confidentiality agreements

Benefits for Users

- Simplified price reporting, regulatory and compliance processes
- Trade Confirmation
- Reduction in middle- and back-office overhead
- Opportunity to participate in ground floor of paradigm shift across energy accounting and back office operations



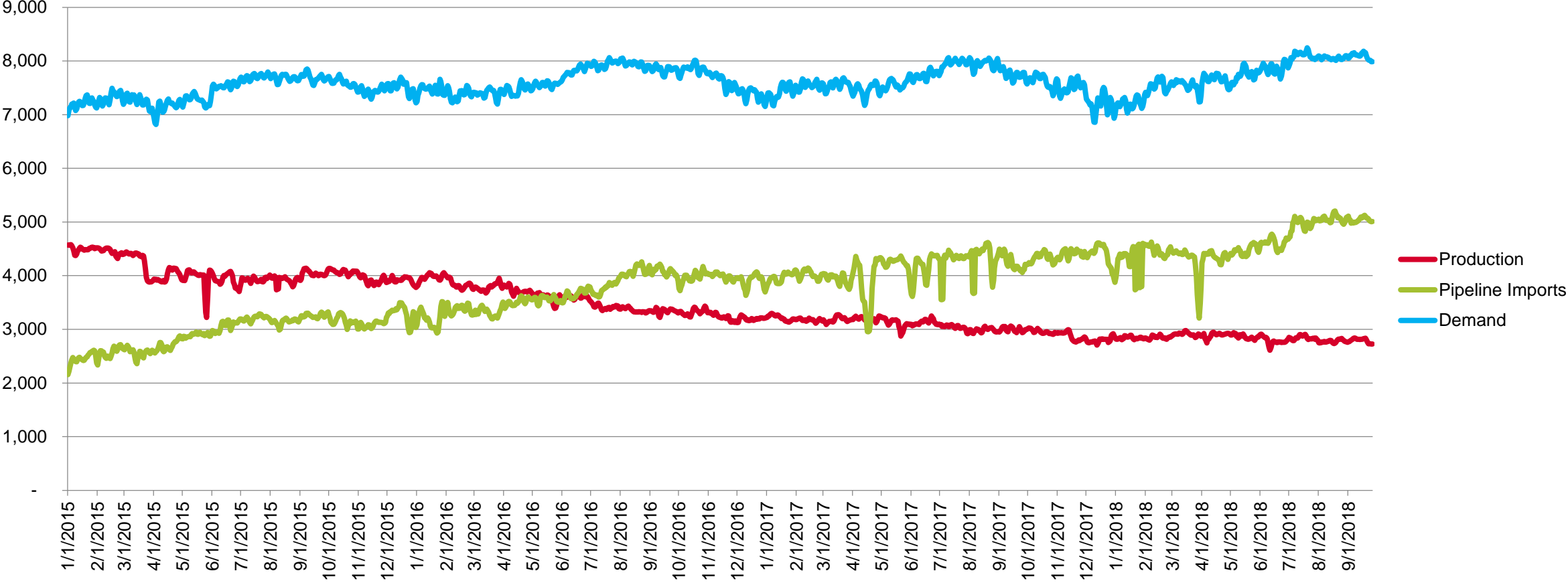
A Post-VPM World: Mexico Pricing Dynamics

Houston Natural Gas Methodology Workshop

Ryan Ouwerkerk
Manager, Americas Natural Gas Pricing
10/11/2018

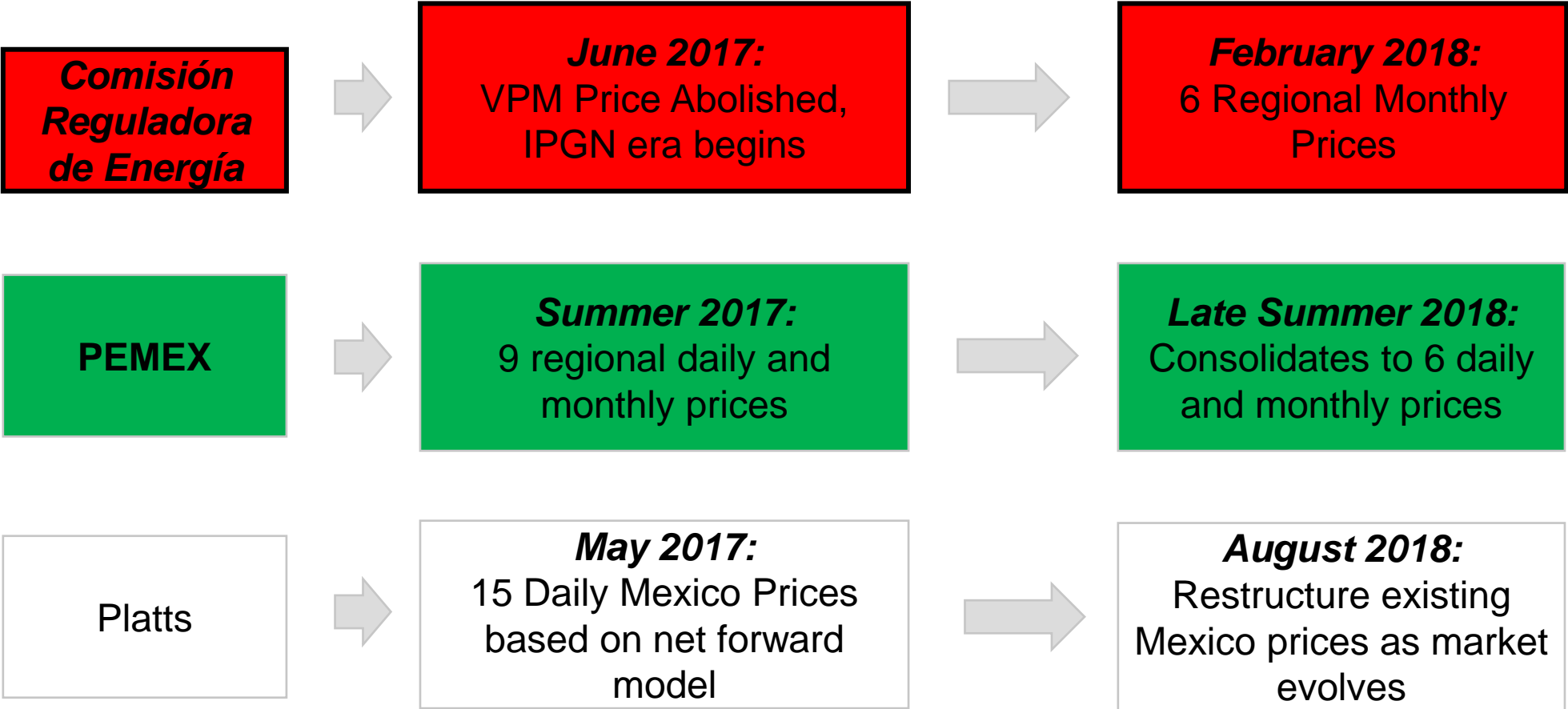
S&P Global
Platts

A Crash Course: Mexico Energy Reform



Source: S&P Global Platts Analytics

Mexico Pricing Developments: A Post VPM Environment



Platts Mexico: The development of the net forward model



- Multiple evolutions in Mexican gas pricing have occurred in last year
- Platts began publishing net forward prices in May 2017 at 15 locations
- Platts Mexico daily are net forward prices from Platts South and WTX benchmarks
- Modeled prices are first step in a pricing evolution
- Goal is to have support of market participants in index development through submissions

Mexico Daily Prices Evolve as the Market Does



North American Natural Gas Market Update

S&P Global Platts Natural Gas Technical Workshop
Houston Energy Forum October 2018

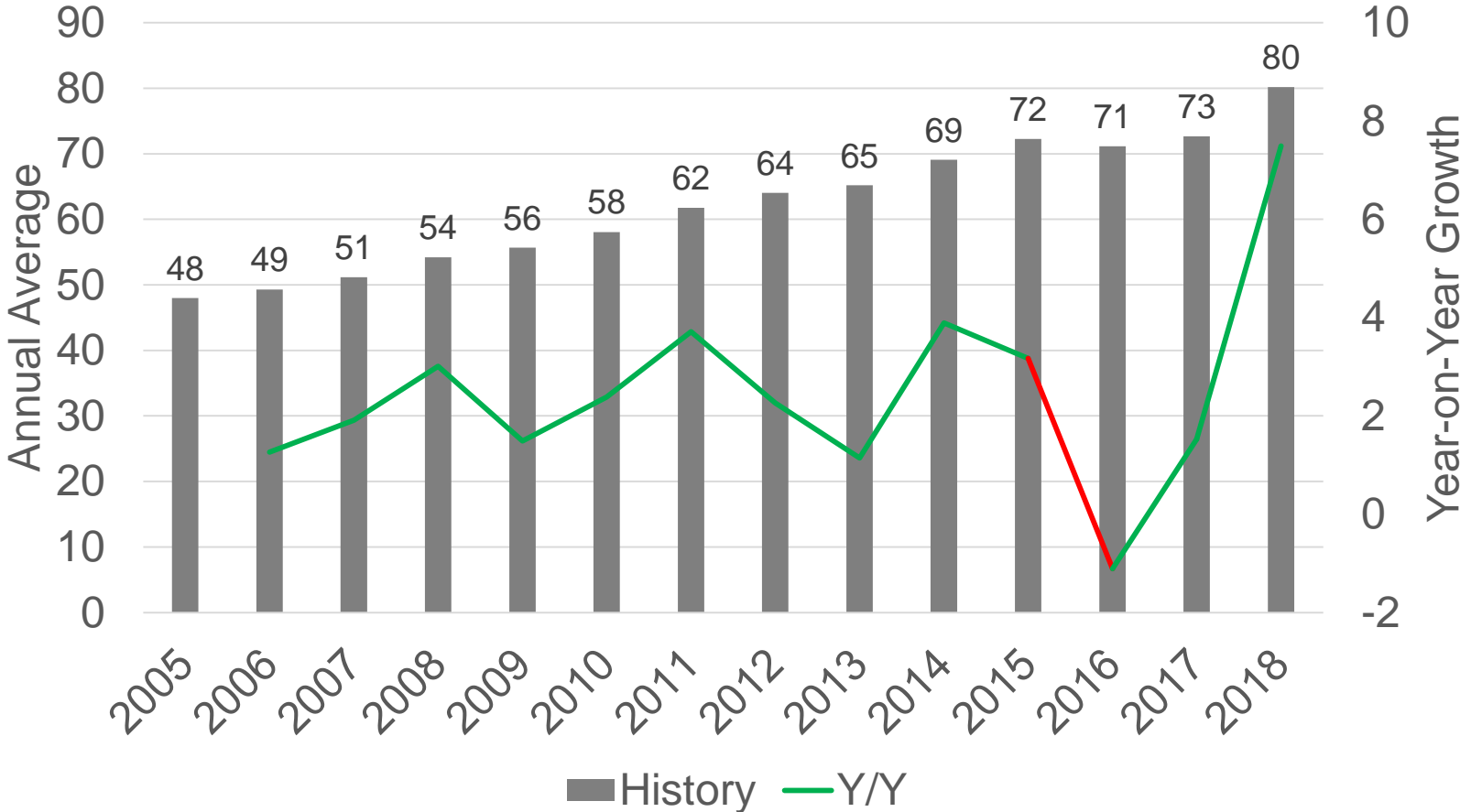
John Hilfiker
North American Gas & Power Energy Analyst
Platts Analytics

October 11, 2018

S&P Global
Platts

Platts Analytics is forecasting the largest Y/Y production gain to date

US Dry Natural Gas Production (Bcf/d)



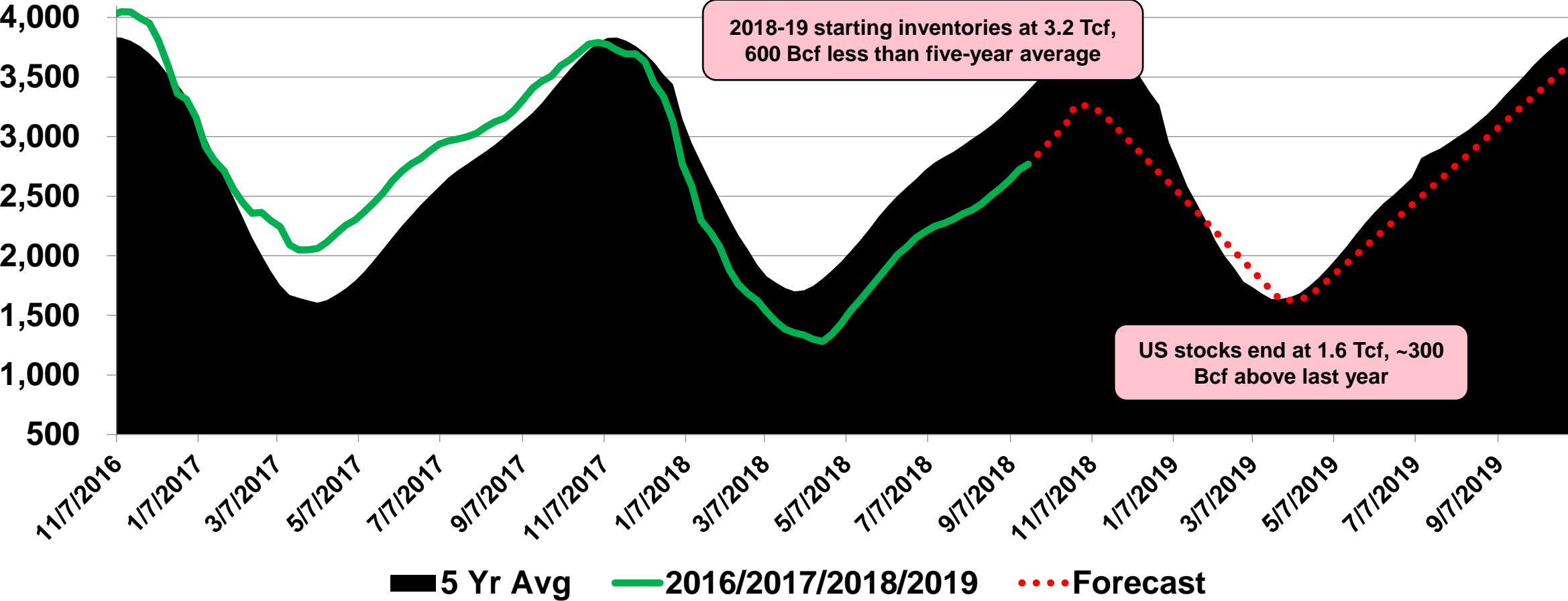
+7 Bcf/d y-o-y!!
 Largest y-o-y increase
 previously: 3.8 Bcf/d in 2013-14

Northeast, Permian, Haynesville growth expectations tempering bulls, easing storage concerns exiting coming winter

“Last mile” problem is key infrastructure story to watch; will lead to tighter market around Henry Hub in coming years

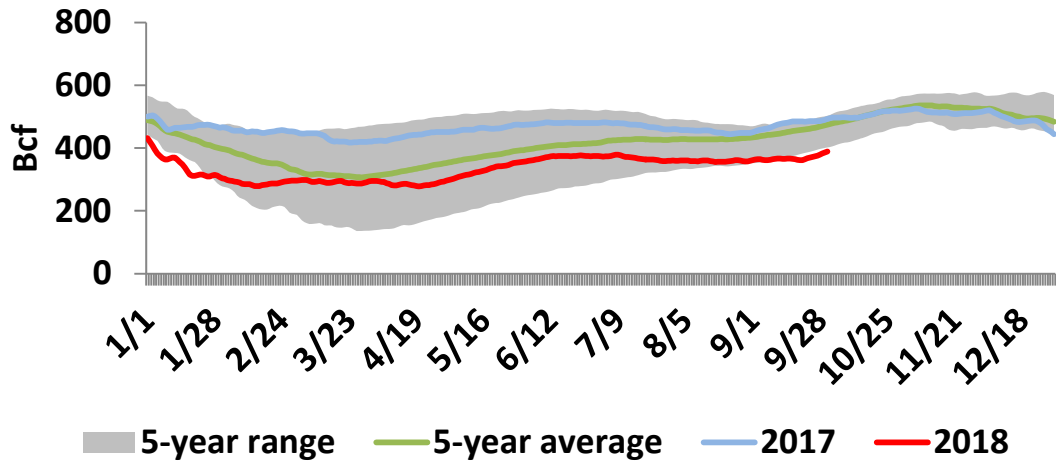
October forecast at 3.26 Tcf, but end of winter drawdown small due to production

US Storage Inventories (Bcf)

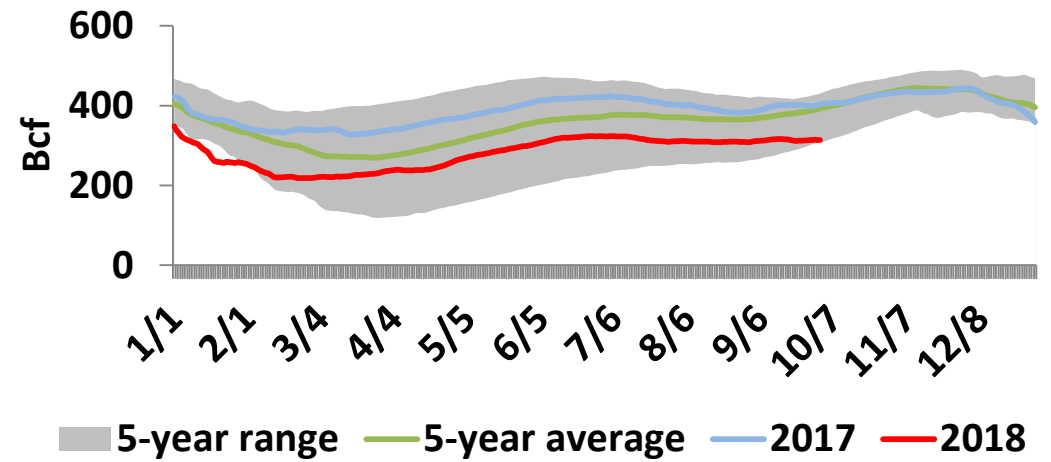


Storage deficit housed in Southeast/Texas; Midwest also unlikely to hit 5-year average

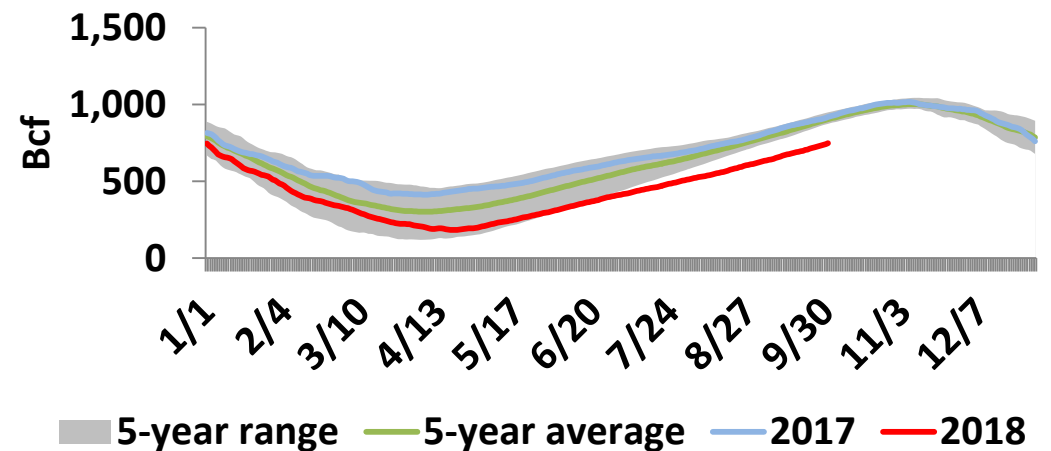
Southeast Inventory



Texas Inventory



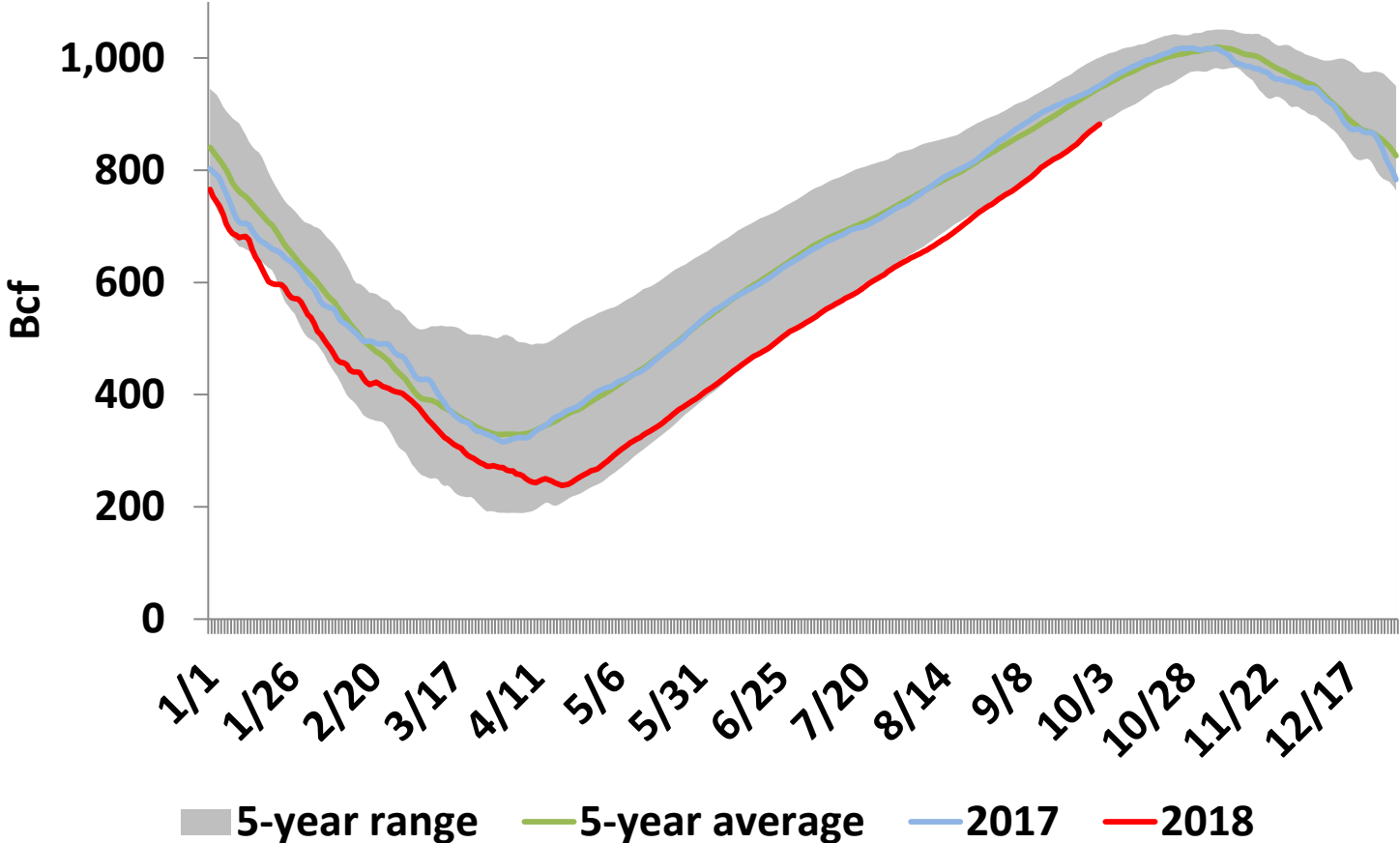
Midwest Inventory



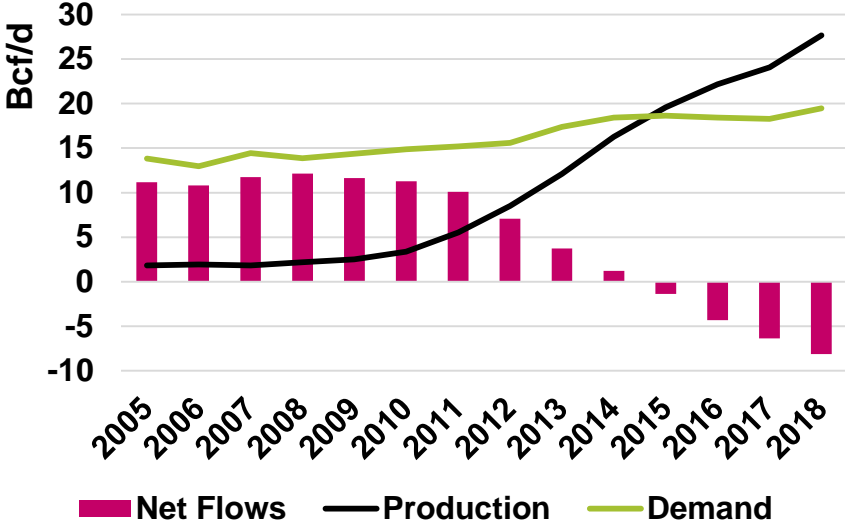
Flexible salt storage in Southeast/Texas poised to drop below 5-year lows entering winter, bullish for winter price volatility at Henry Hub. Midwest also set to fall short of 5-year low.

Northeast, however, set to hit 5-year average... again

NE Inventory



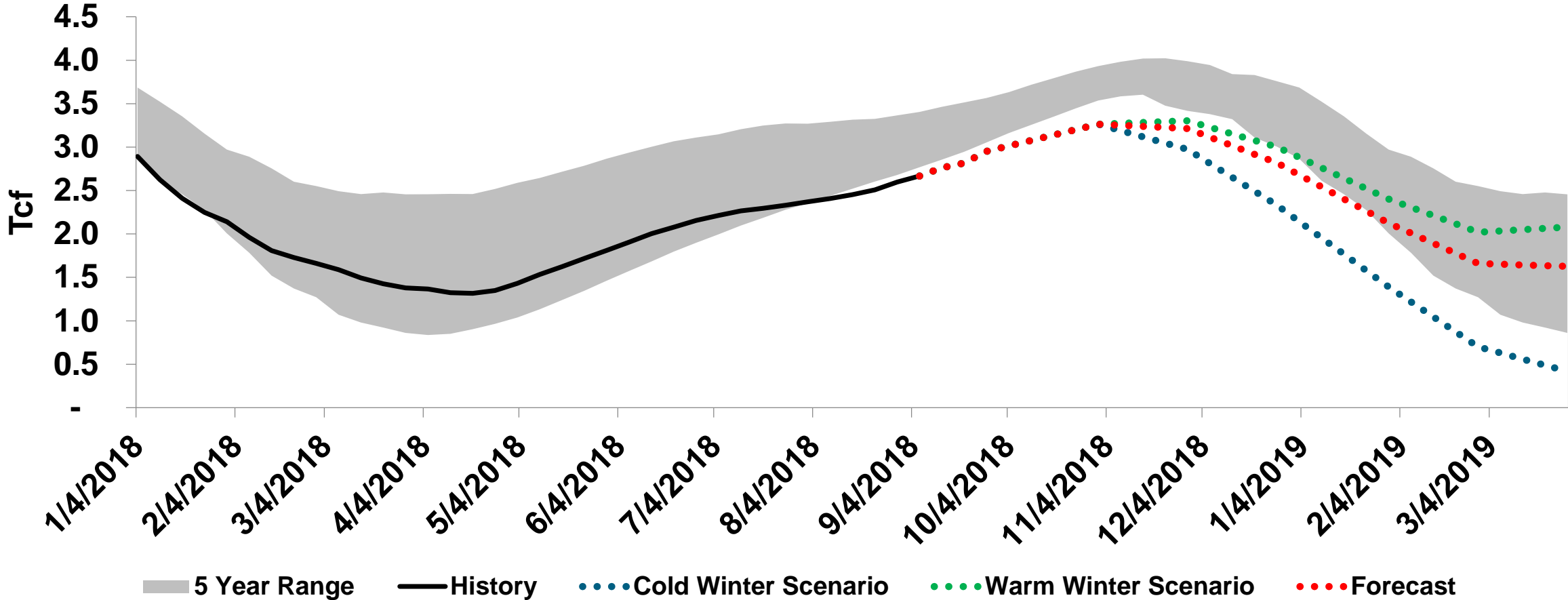
NE Production vs Demand



Despite NE production outpacing regional demand, storage continues to maintain value in NE because new production volumes are contracted out of Northeast to downstream markets in SE/MW

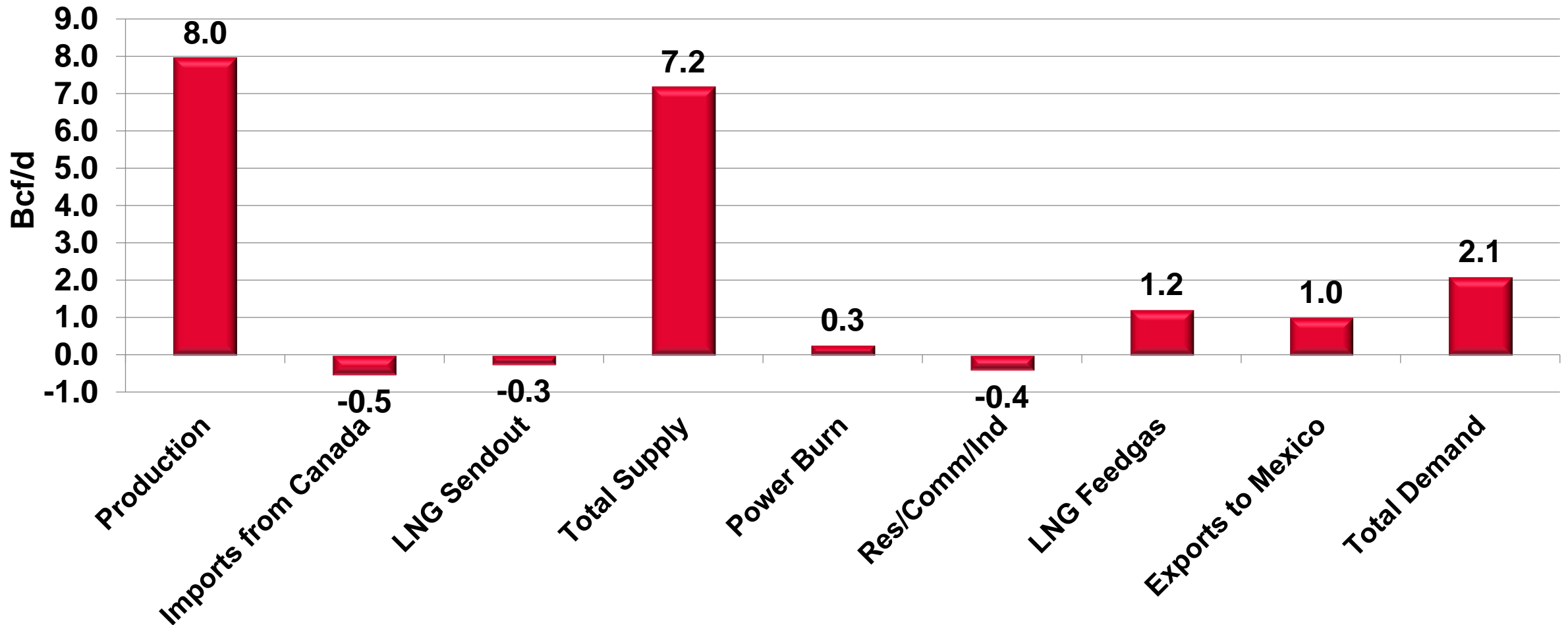
Cold winter similar to winter 13-14 would leave just 400 Bcf in storage

US Natural Gas Inventories

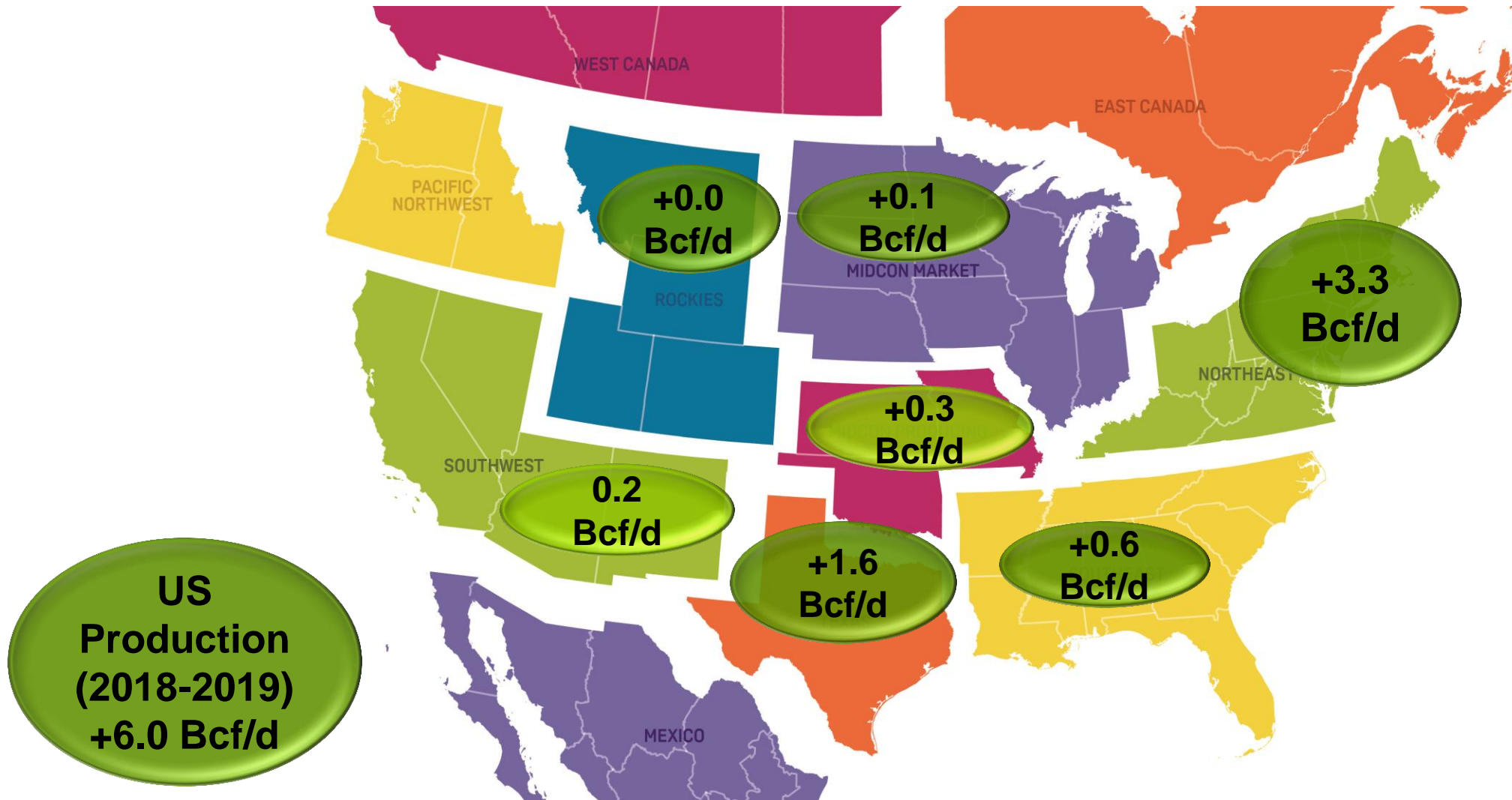


Winter 18-19 to be dominated by production; US inventories exit at 1.6 Tcf

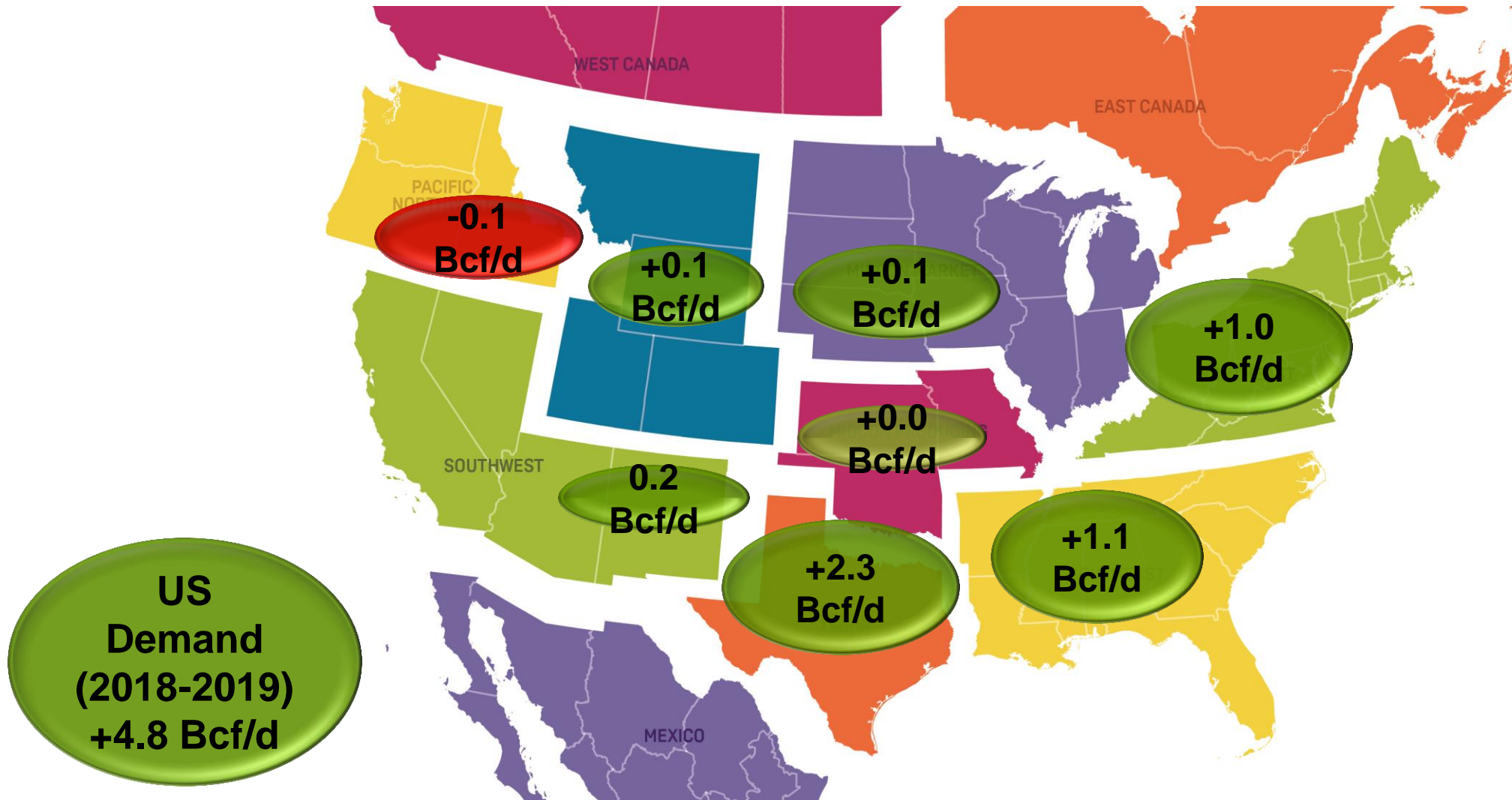
Winter 2018-2019 vs Winter 17-18



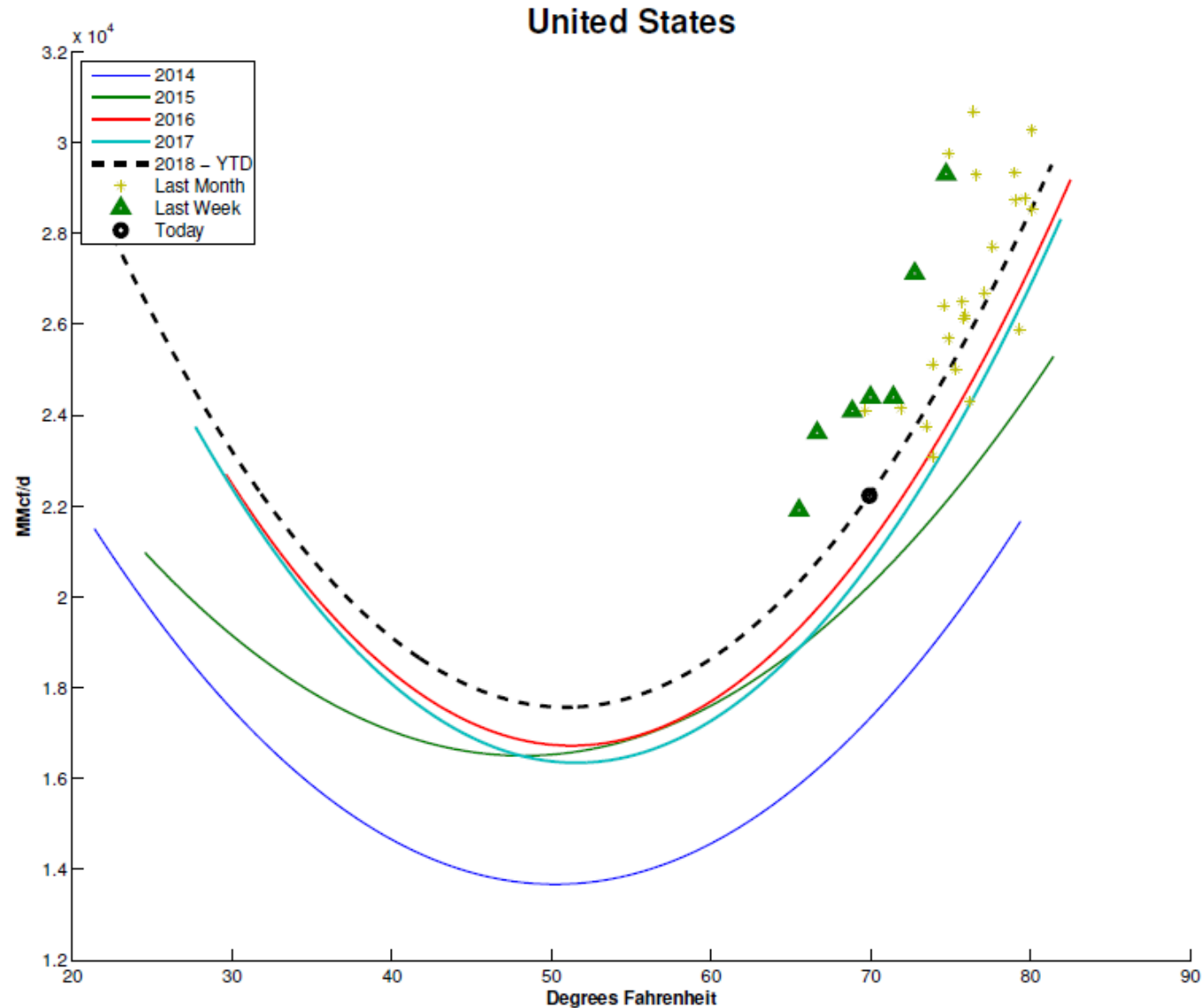
Northeast, Texas drive production growth in 2019



Southeast, Texas drive demand growth in 2019

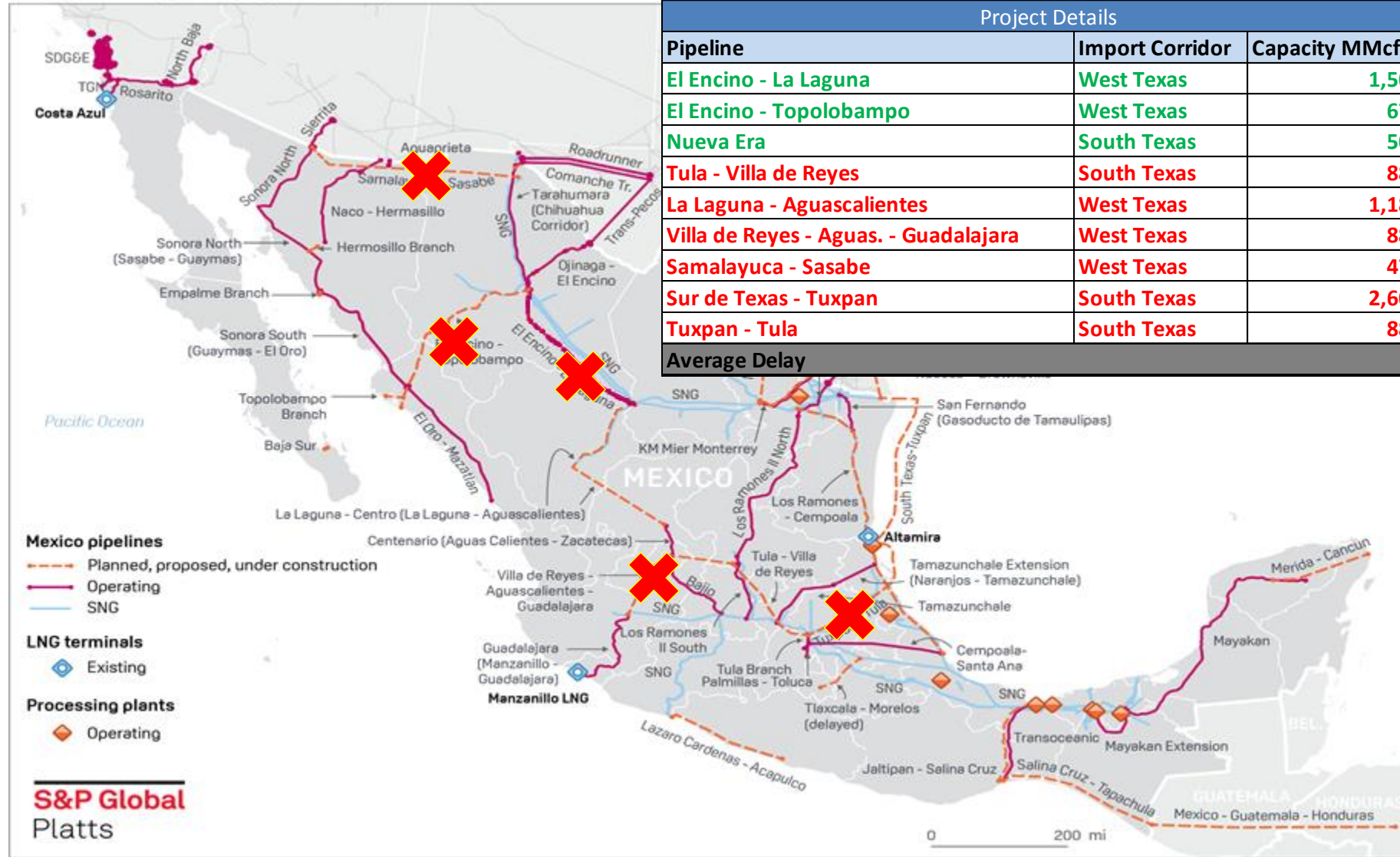


Wave of coal retirements lifting US gas burns well above 2017's level



Infrastructure delays in Mexico remain constraint to US exports in near term

MEXICAN NATURAL GAS PIPELINES

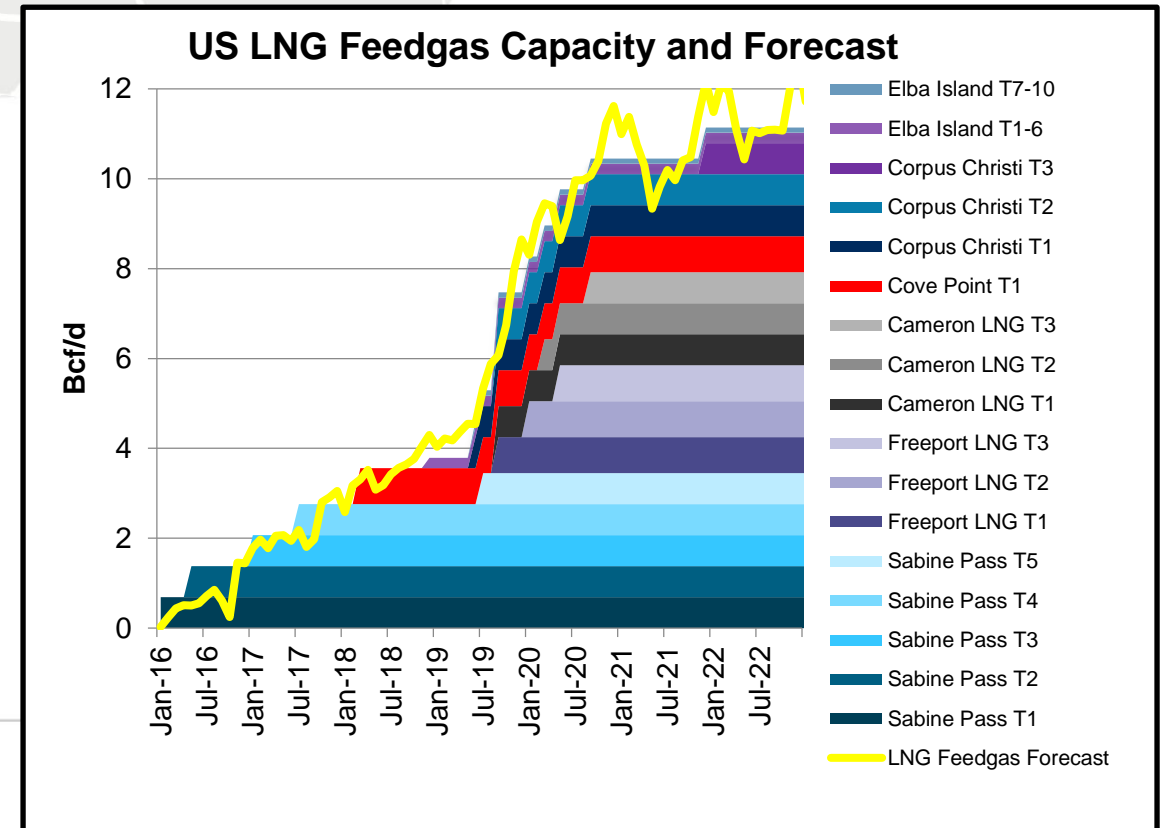
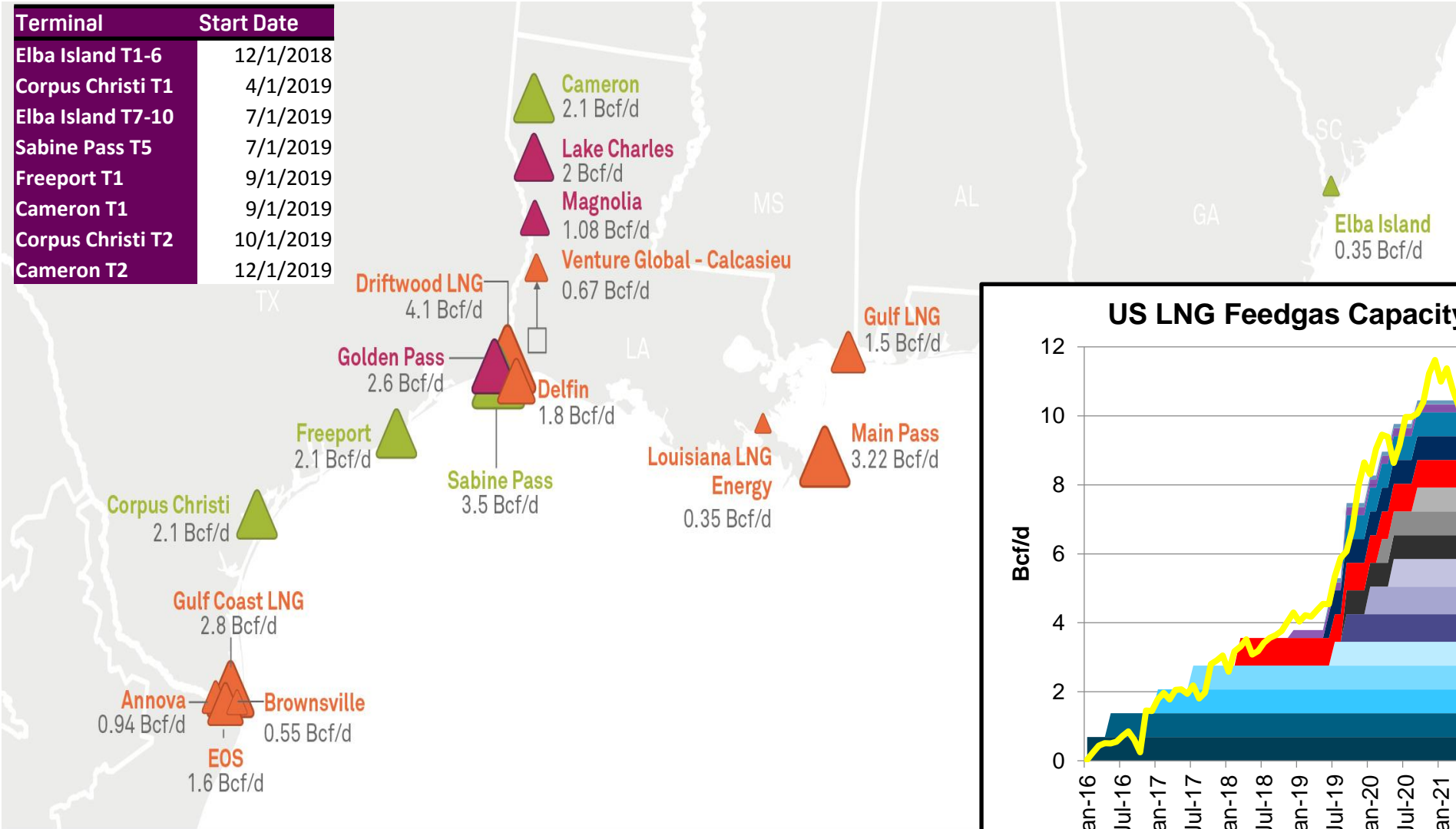


Mexican Pipeline Construction Tracker

Project Details			Start Date Tracker		
Pipeline	Import Corridor	Capacity MMcf/d	Original ISD	Estimated Start	Delay
El Encino - La Laguna	West Texas	1,500	Apr-17	Mar-18	334
El Encino - Topolobampo	West Texas	670	Oct-16	Jun-18	608
Nueva Era	South Texas	504	Jun-17	Jul-18	395
Tula - Villa de Reyes	South Texas	886	Dec-17	Jul-19	577
La Laguna - Aguascalientes	West Texas	1,189	Dec-17	Nov-18	335
Villa de Reyes - Aguas. - Guadalajara	West Texas	886	Dec-17	Nov-18	335
Samalayuca - Sasabe	West Texas	472	Jun-17	Nov-18	518
Sur de Texas - Tuxpan	South Texas	2,600	Jun-18	Mar-19	273
Tuxpan - Tula	South Texas	886	Mar-17	Dec-20	1,371
Average Delay					552

- Average delay over **500 days**
- Critical systems now expected to be in-service post-2018
- US imports will remain capacity constrained until mid-2019

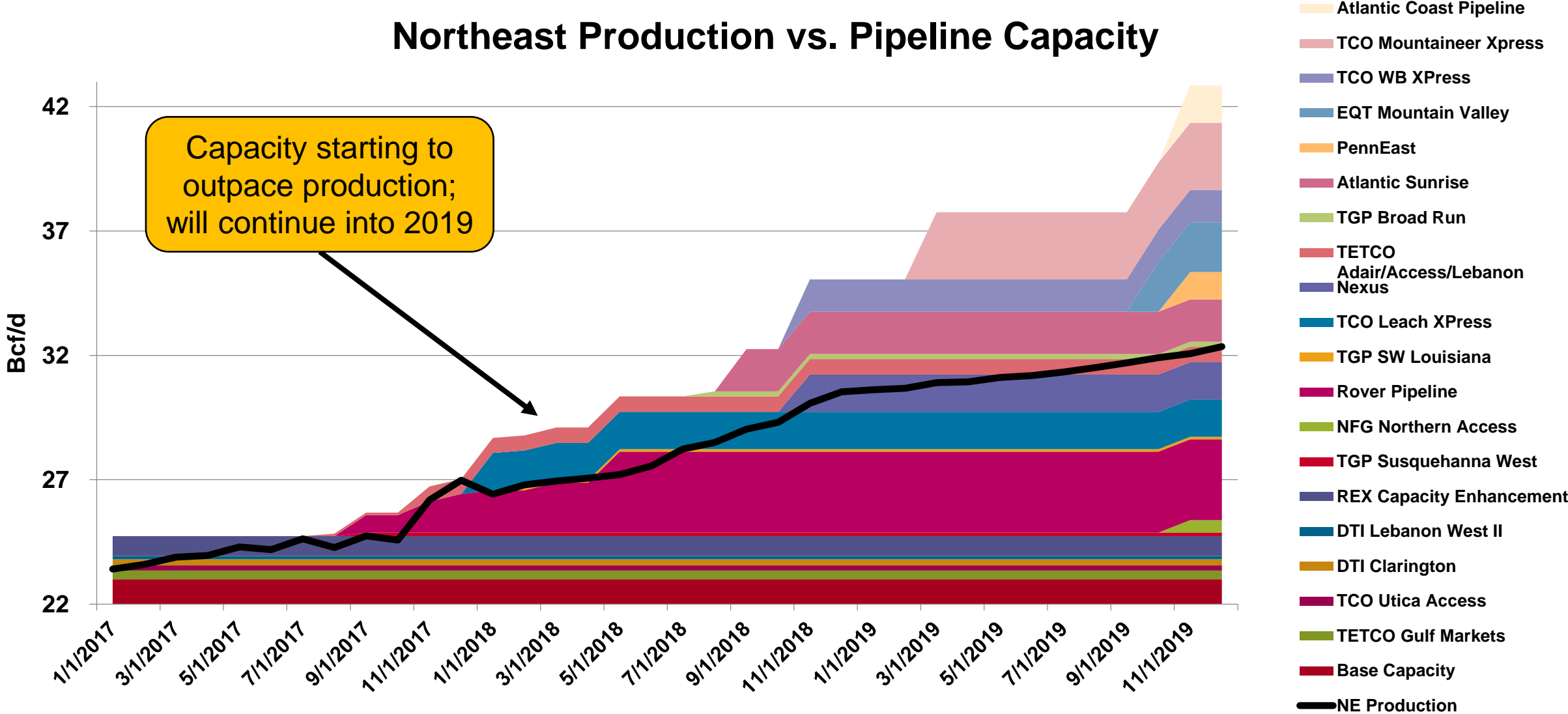
3.9 Bcf/d of new capacity in 2019; 1.8 Bcf/d of more feedgas Y/Y



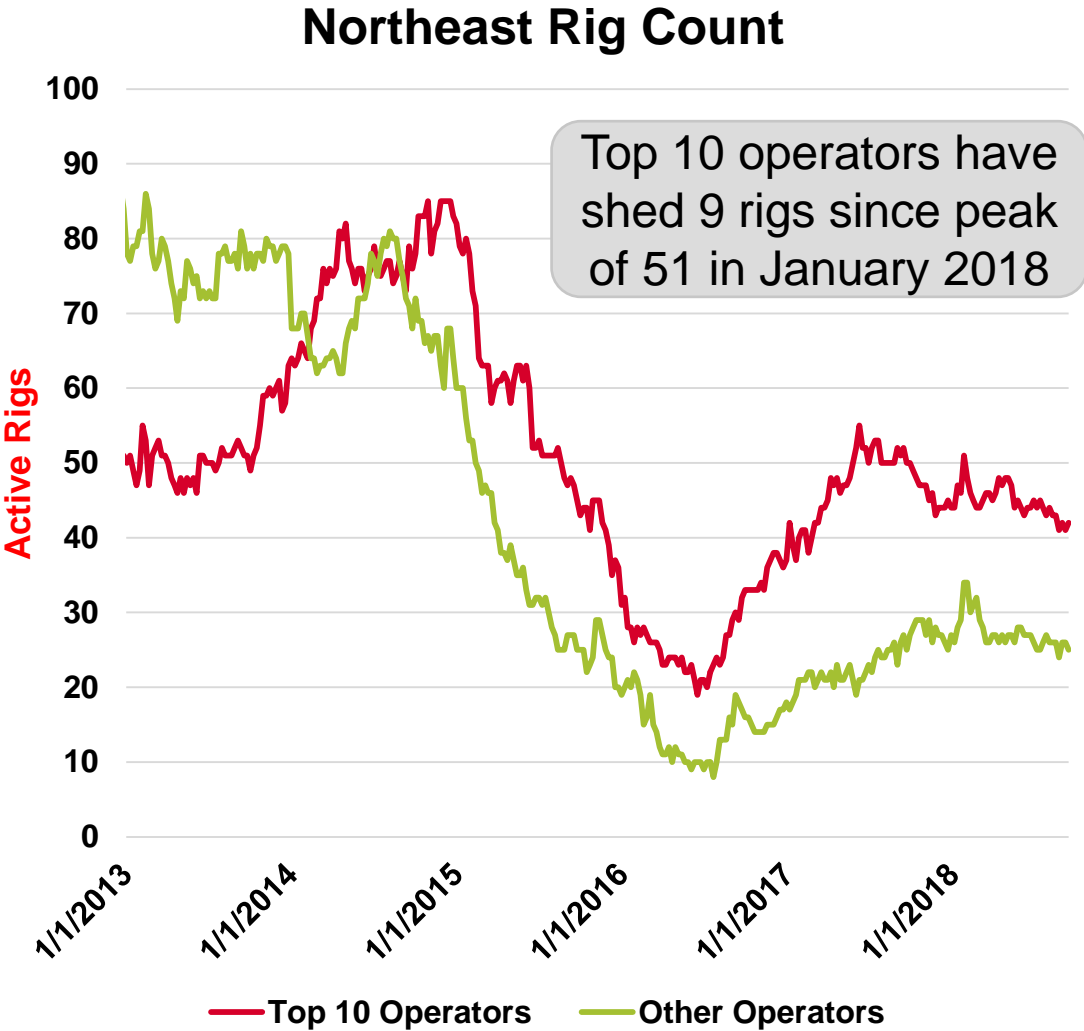
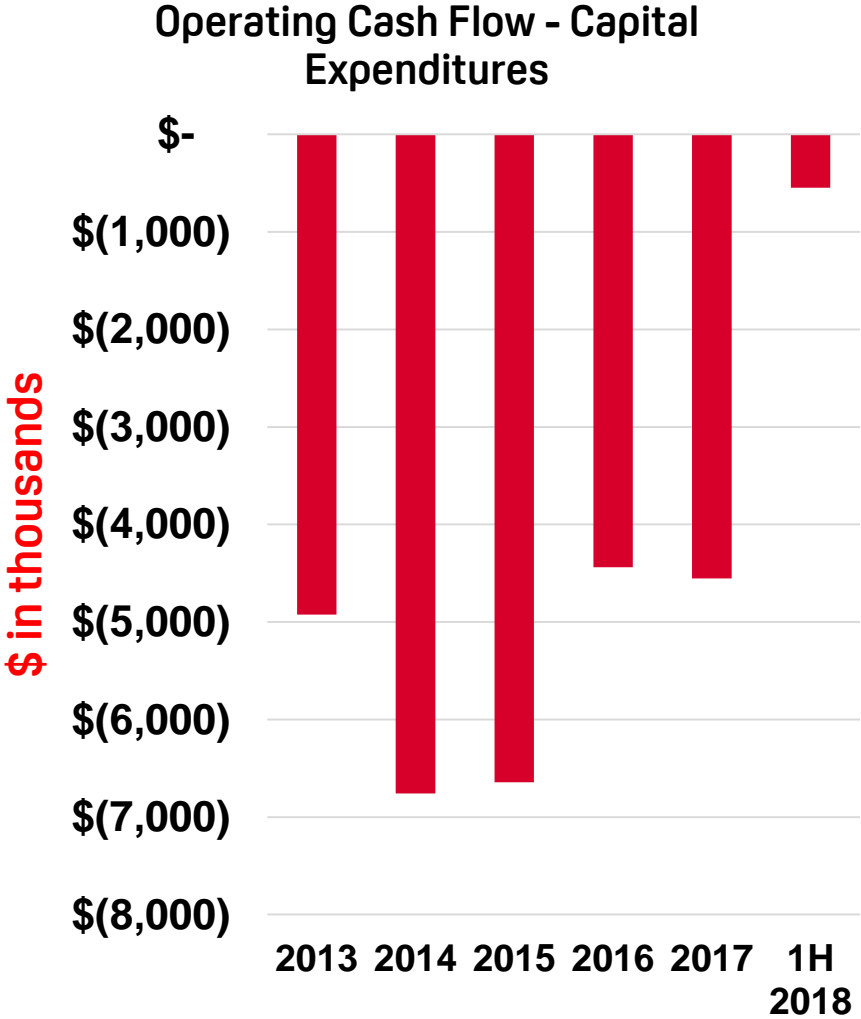
Source: Platts

Northeast producing area debottlenecking

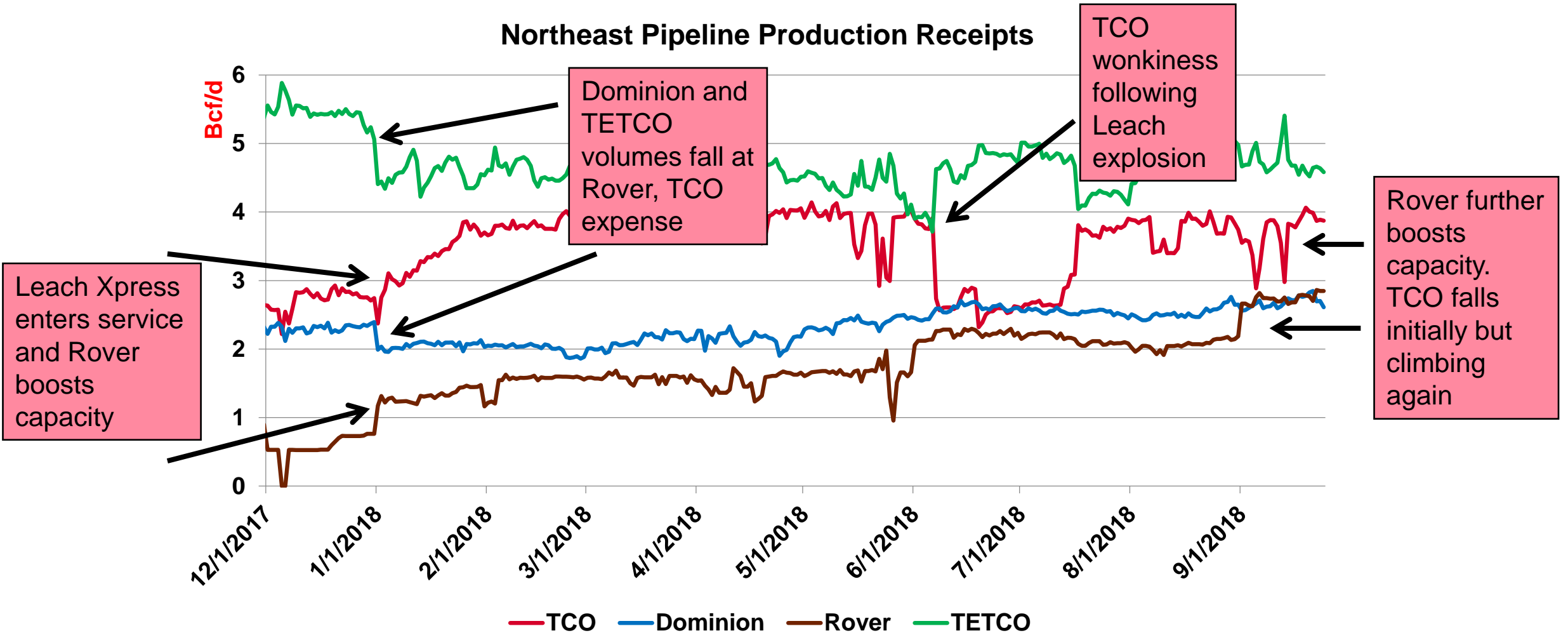
Northeast Production vs. Pipeline Capacity



Producers easing off of the gas pedal

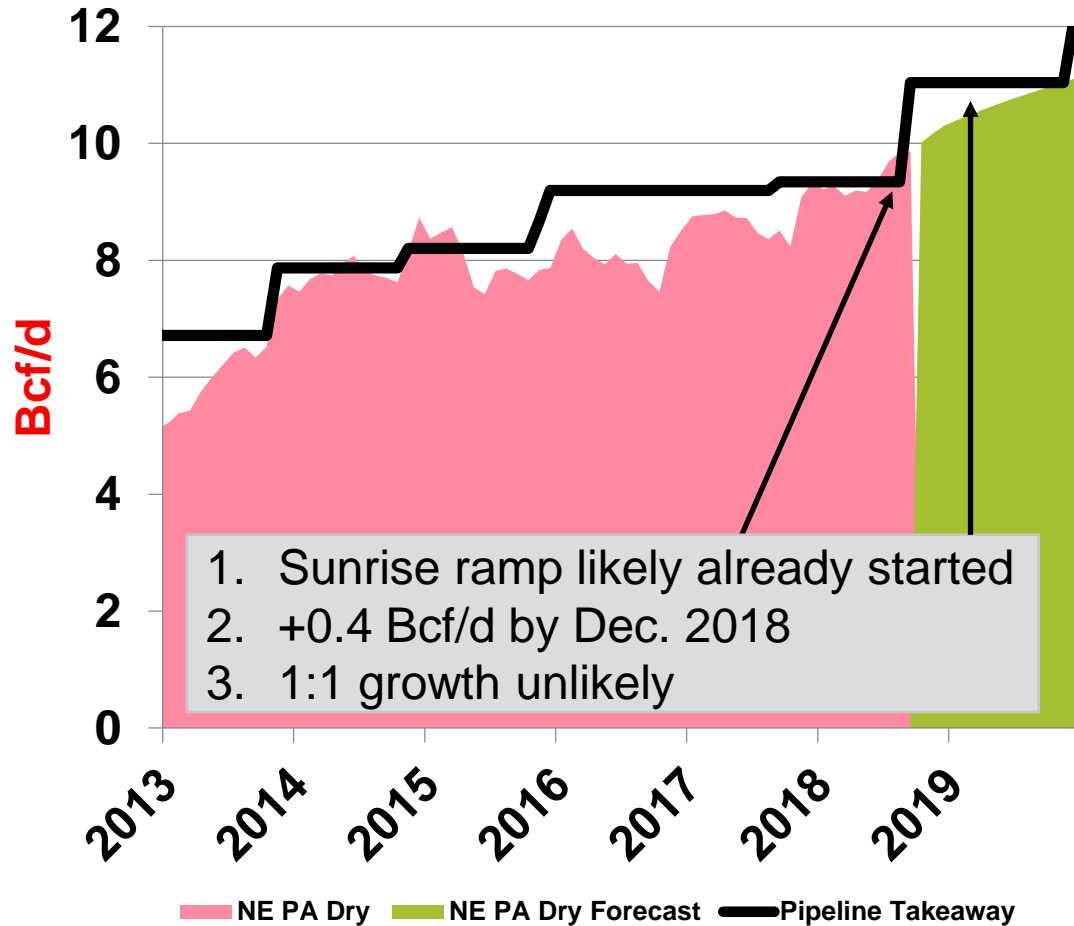


Producers electing to “reroute” volumes to fill new pipelines

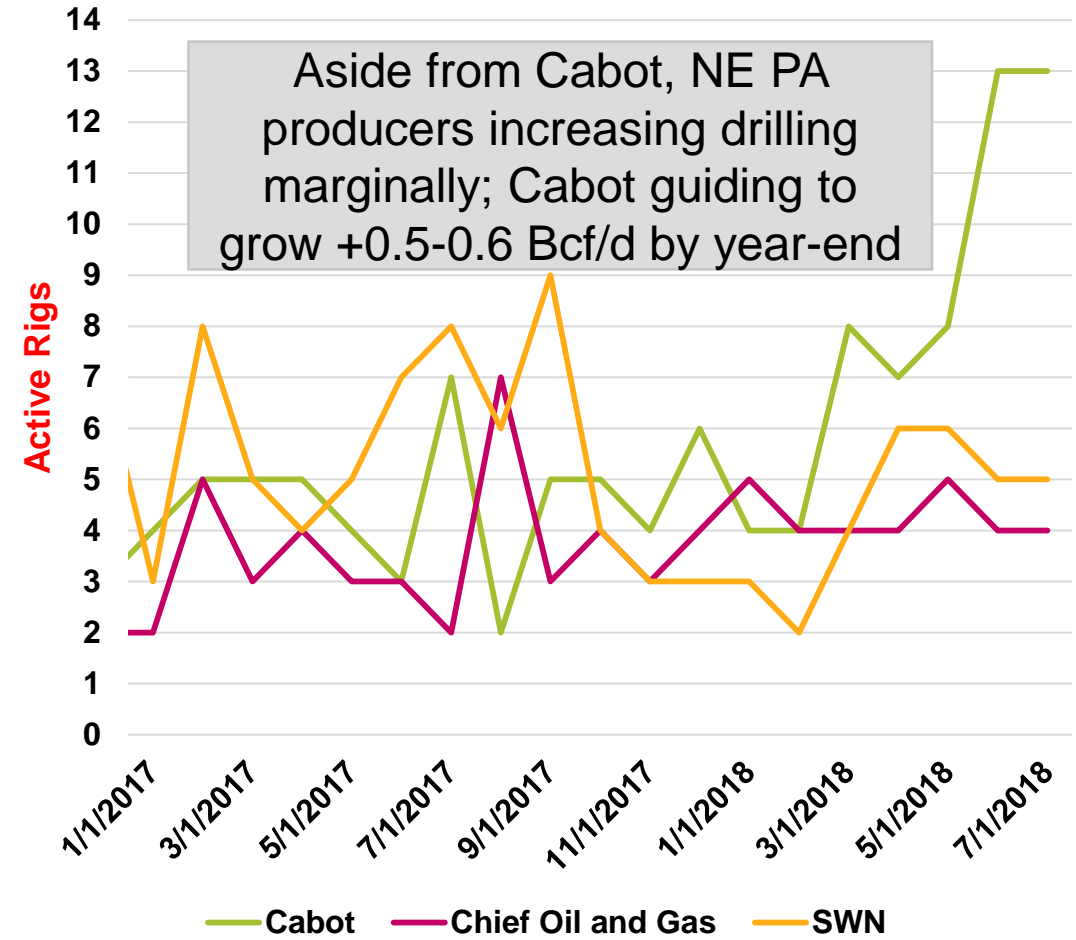


Will same trend hold with Atlantic Sunrise?

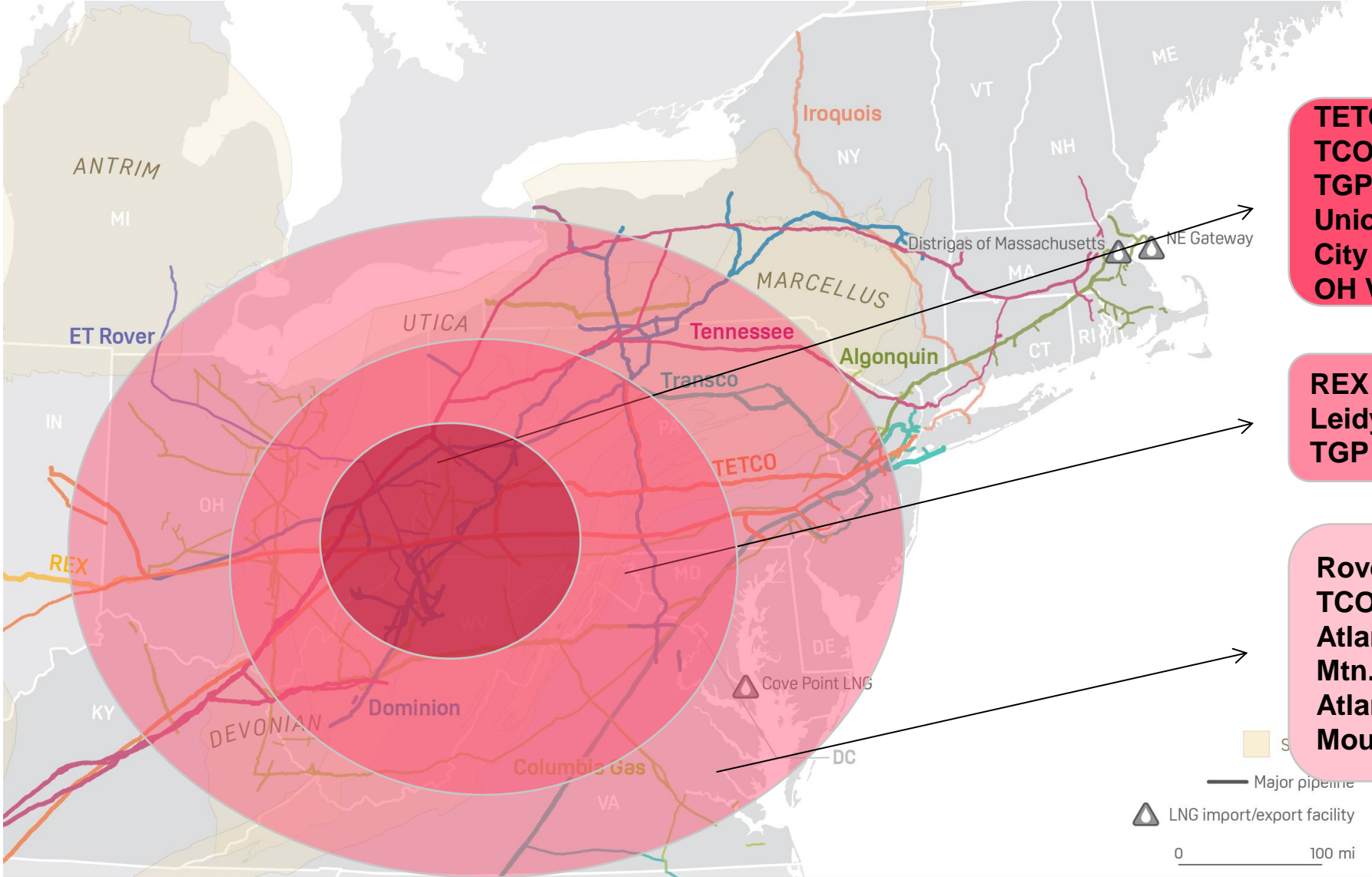
NE PA Production vs Capacity



Wells Drilled by NE PA producers



Northeast buildout expanding beyond Dom South, M2; constraints loom at Z5, TCO pool

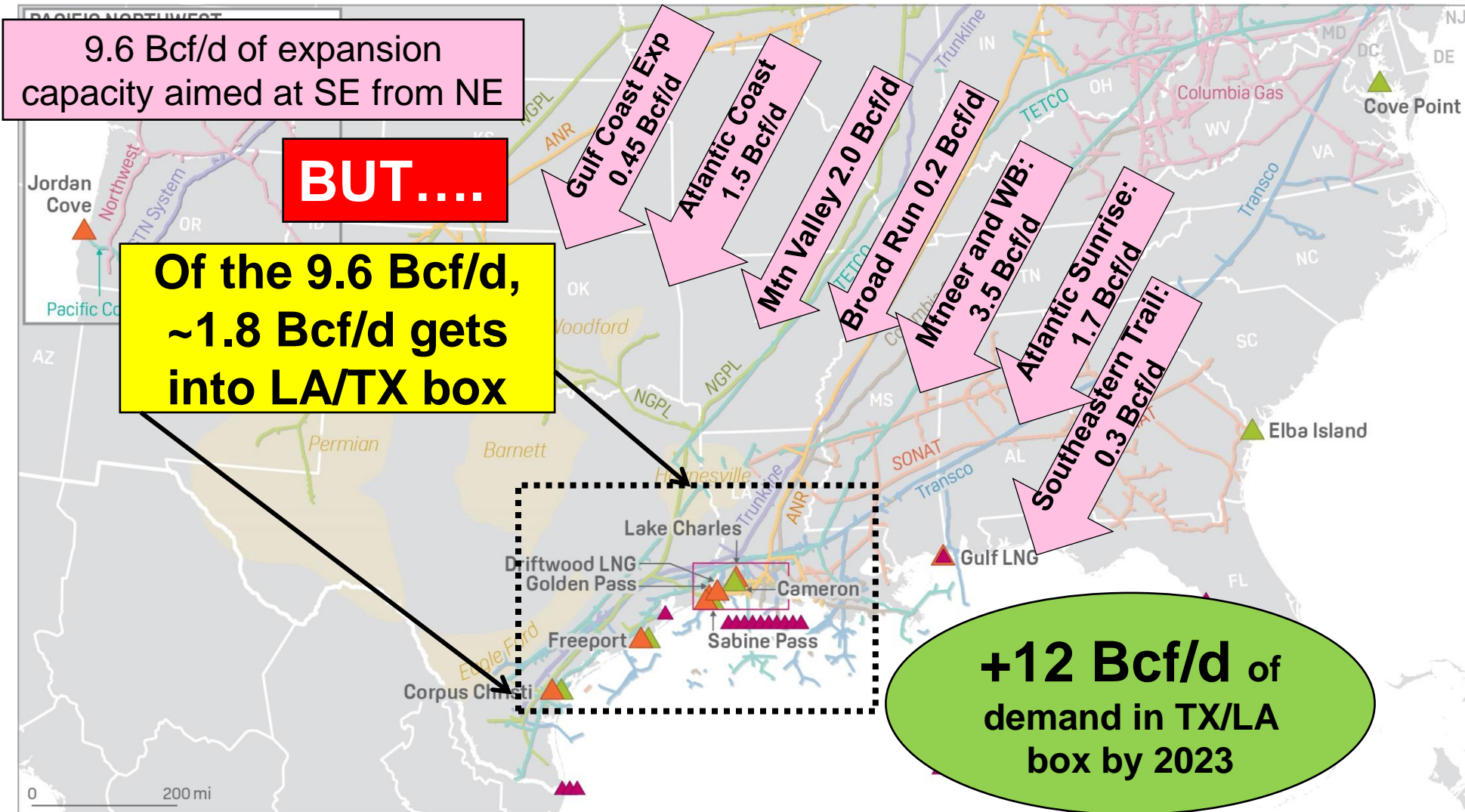


TETCO Team 2014
TCO East Side
TGP Niagara
Uniontown to Gas
City
OH Valley Connector

REX Zone 3 Exp.
Leidy SE
TGP Broad Run

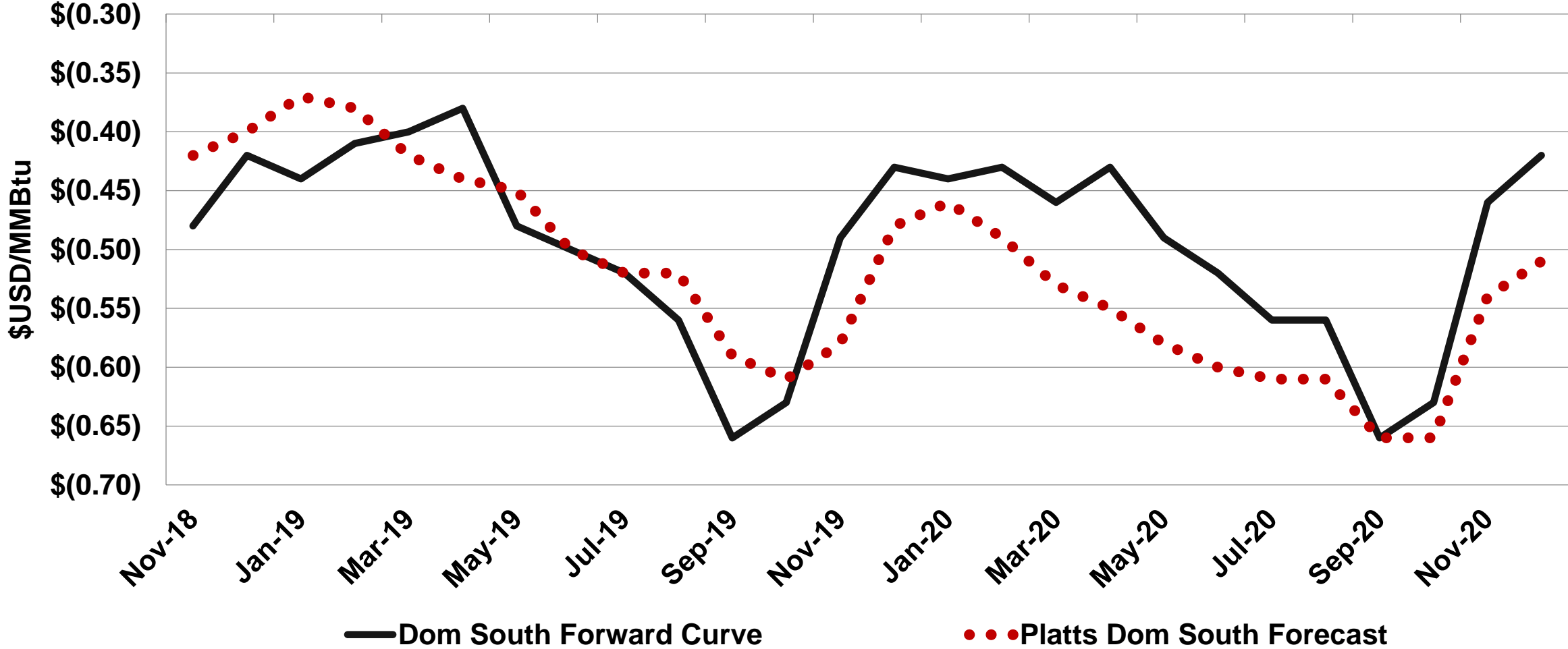
Rover
TCO Leach Xpress
Atlantic Sunrise
Mtn. Valley
Atlantic Coast
Mountaineer Xpress

Despite buildout, few expansions linking supply & demand create “Last Mile Problem”



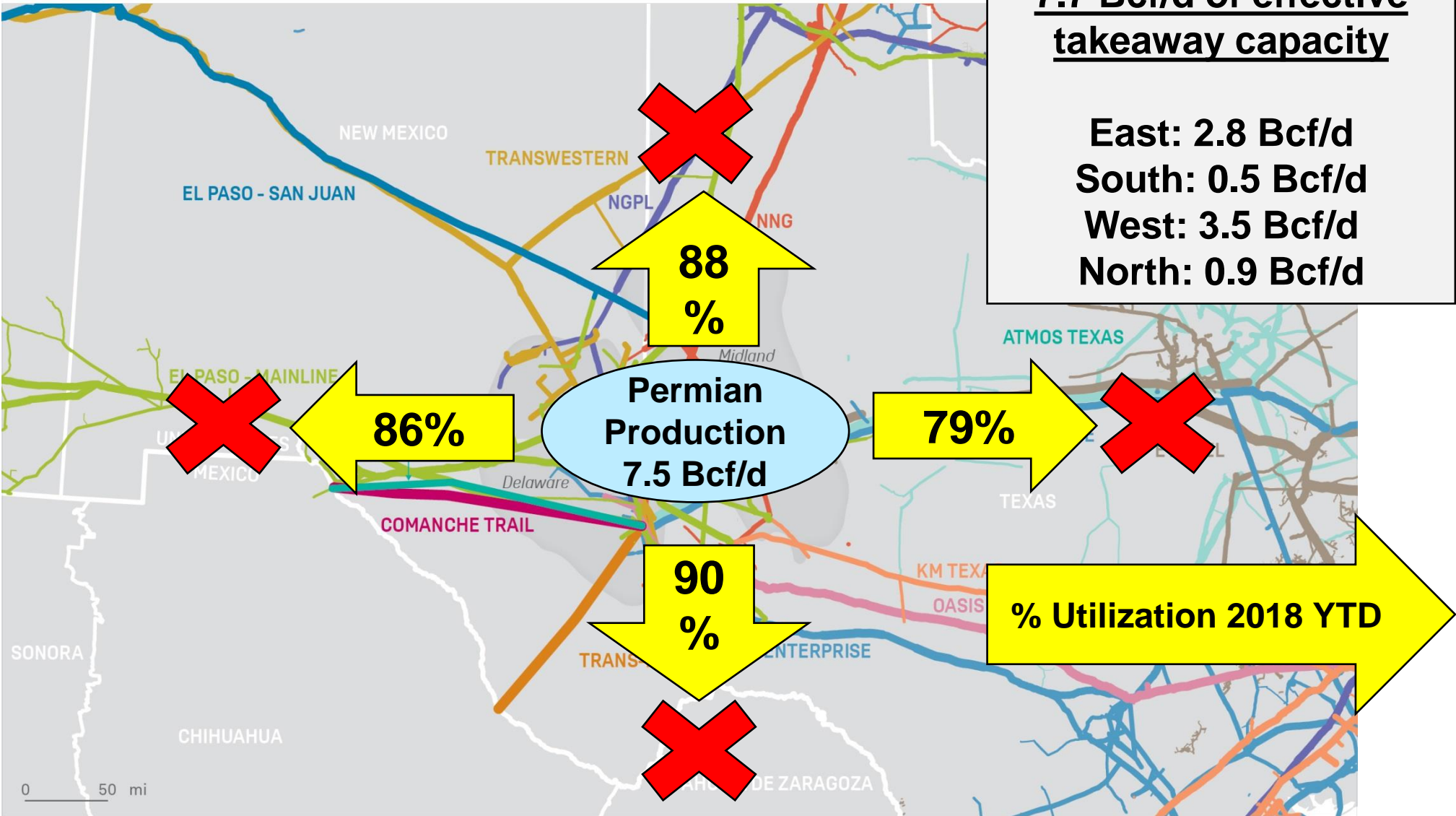
Dominion South Price Forecast

Market vs Platts Forecast

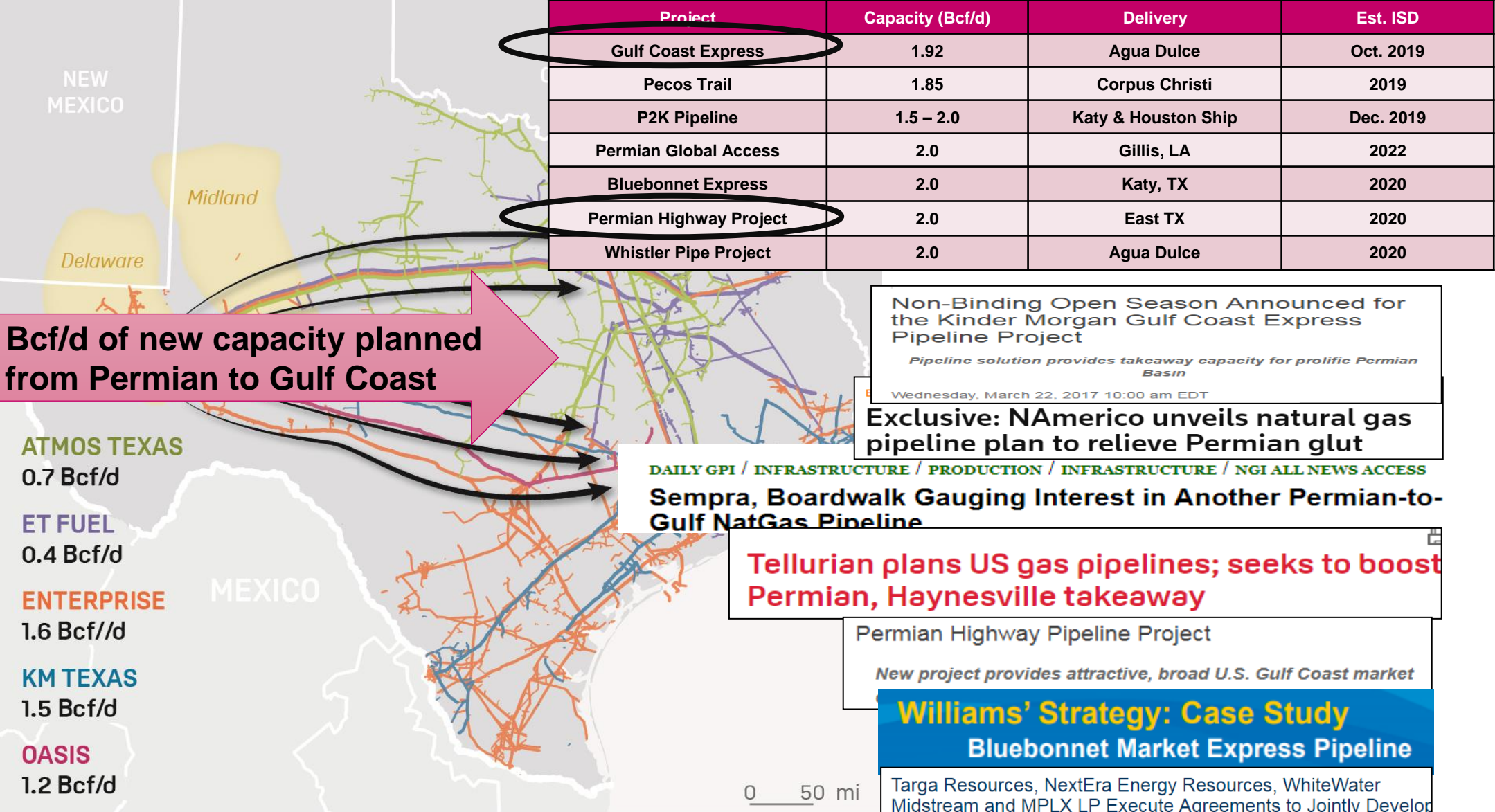


Permian nearing pipeline constraints

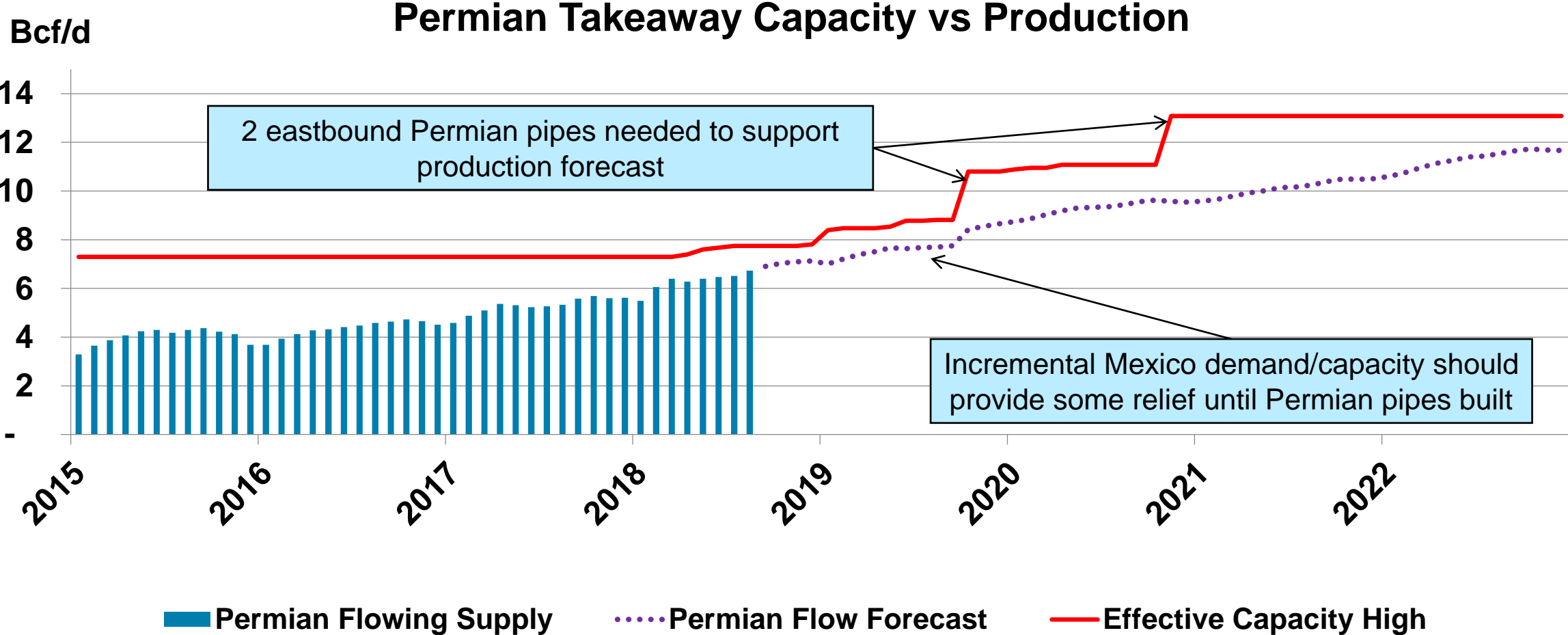
PERMIAN NATURAL GAS PIPELINES



Numerous Permian pipes in the cue

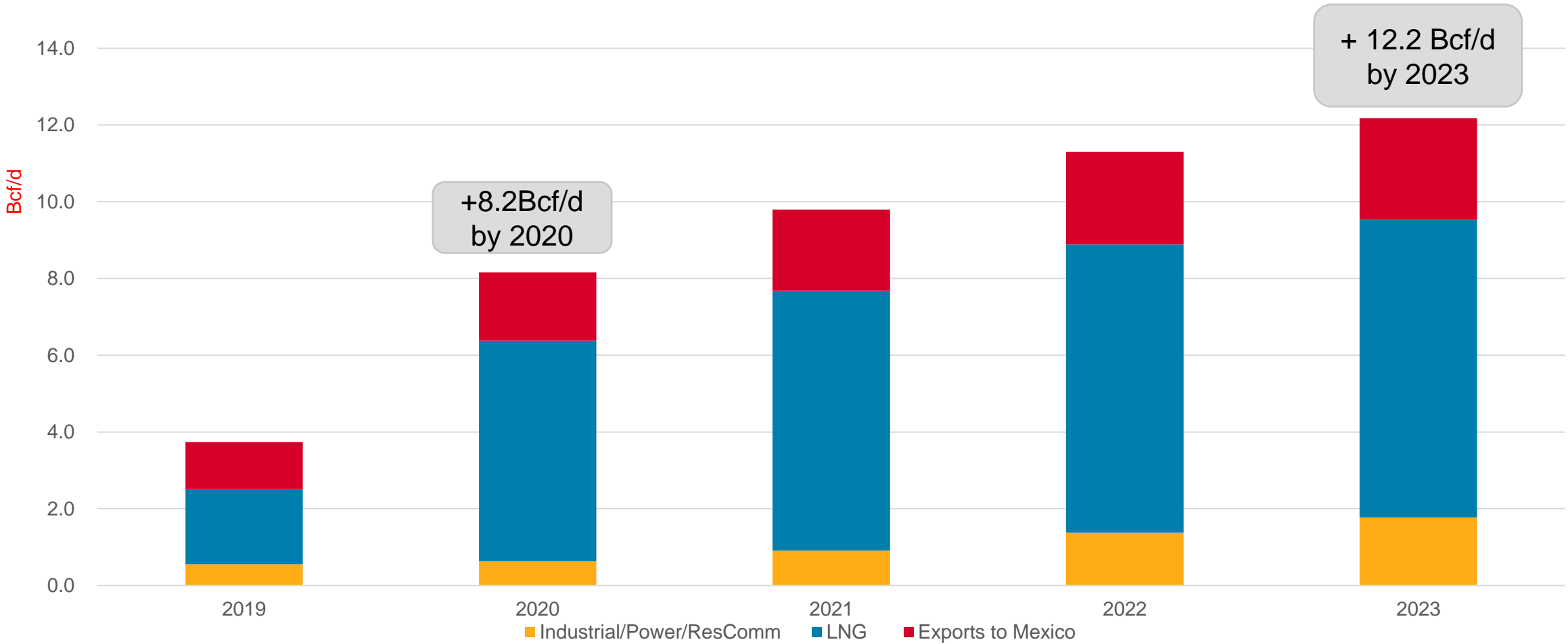


Incremental outlets to Mexico still provide the greatest risk for how low Waha will go



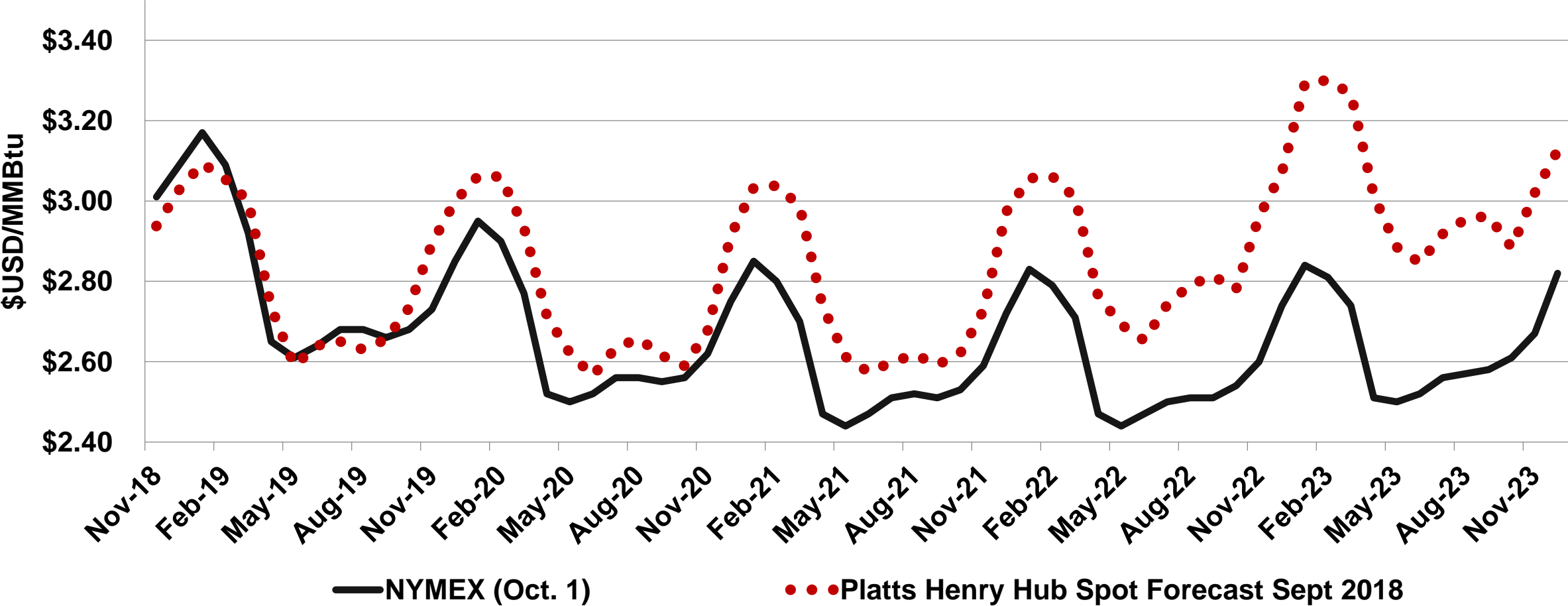
Southeast/Texas demand growth coming from more than just LNG

Southeast/Texas incremental demand growth compared to 2018



Market finally starting to price in tight storage situation this winter

Market vs Platts Forecast



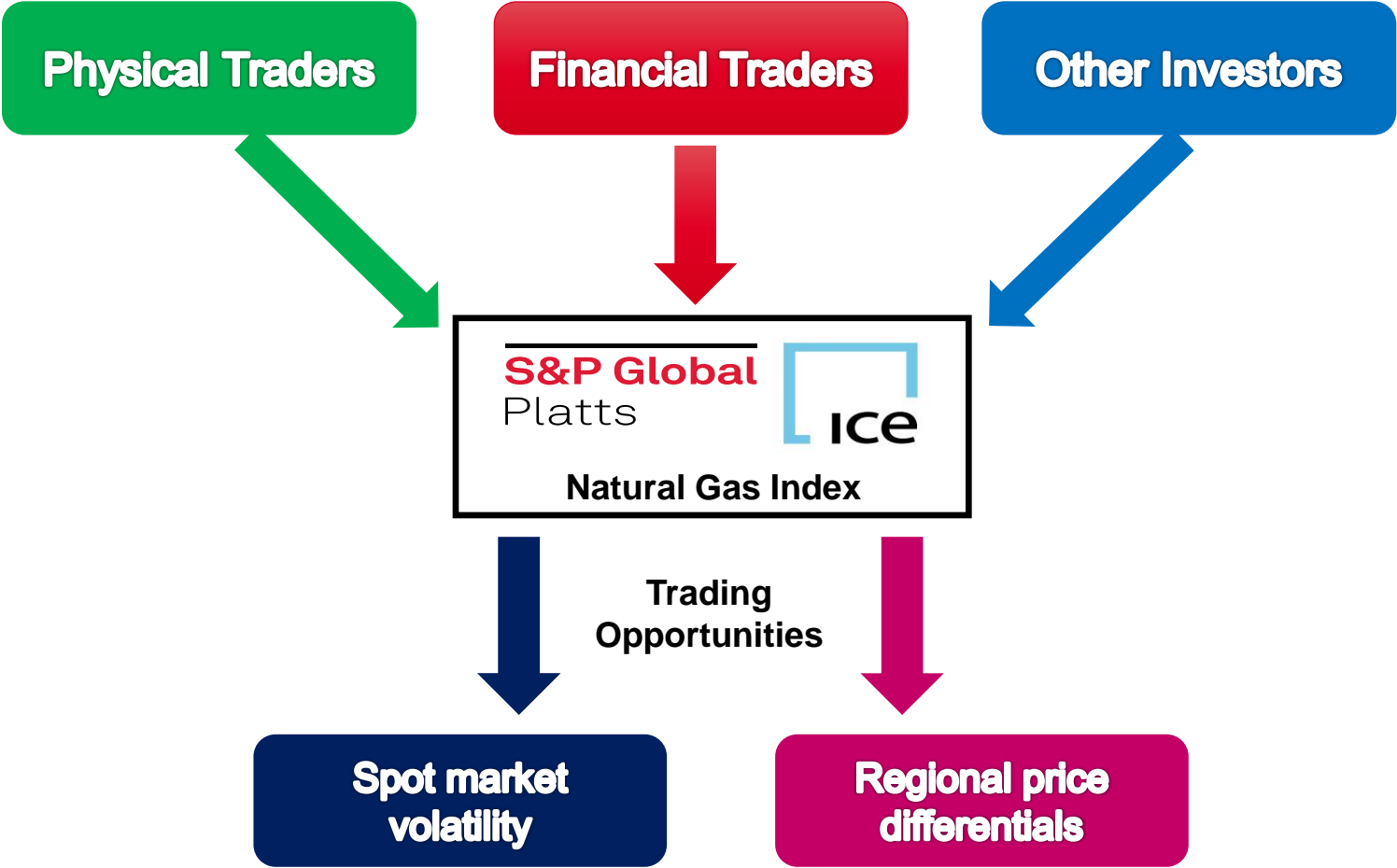
Innovative market **insights**

Driven by analytics, powered by fundamentals

Breakout Sessions

Platts – ICE Natural Gas Indices

What is the idea?

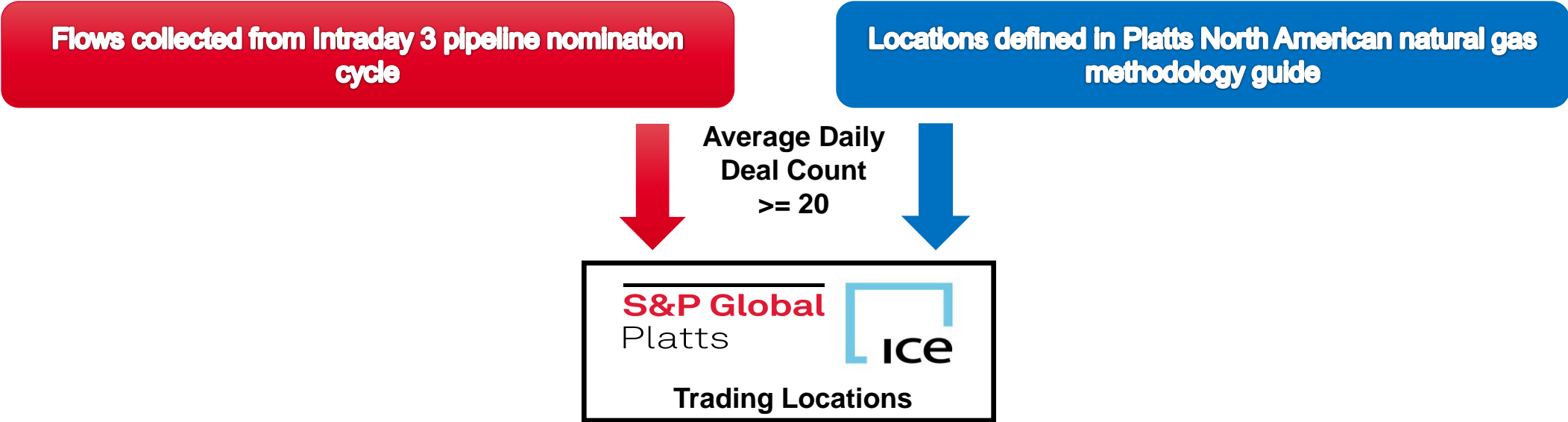


What is the idea?

- A new suite of financially settled Platts – ICE natural gas indices that increase market transparency and better reflect the value of daily physical natural gas prices than the current Henry Hub benchmark
- Platts to publish a North America index as well as a separate set of regional indices in the Northeast, South, Midwest, and West regions based on 20 locations in the US and Canada
- Locations, location weightings, and region weightings are based on interstate pipeline nominations from the previous winter or summer season that represent natural gas flows in the US and Canada and are announced in April at the end of winter and in November at the end of summer
- Prices are published at end of day and represent Platts final daily indices

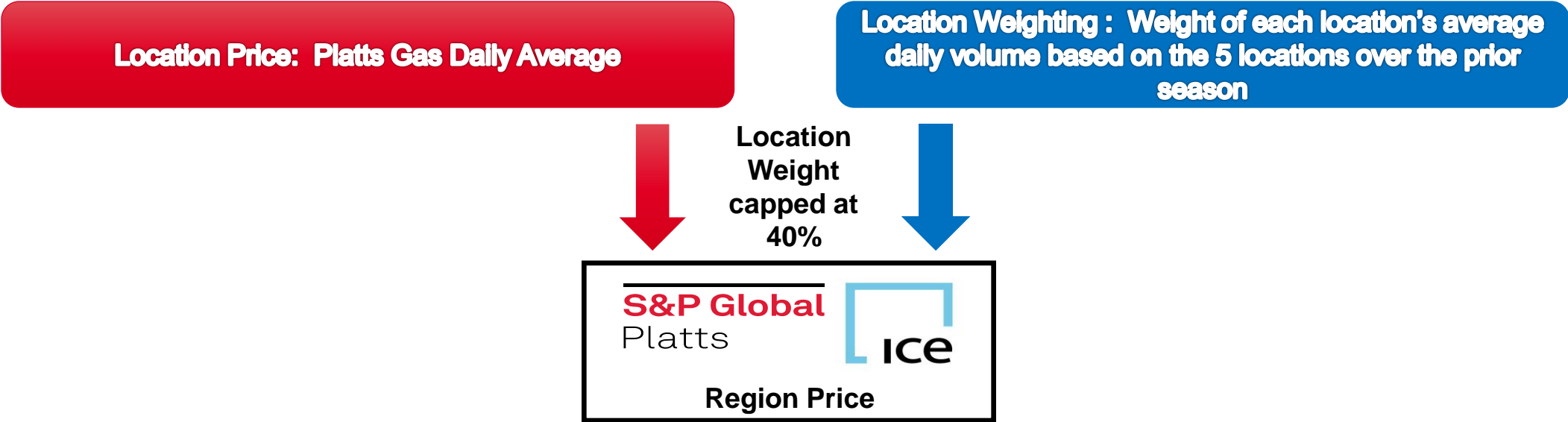
Methodology: Trading Locations

- Locations are determined by selecting the five locations in each of the four regions with the highest average daily flows that also meet a fixed price next day deal count threshold for the previous winter or summer season



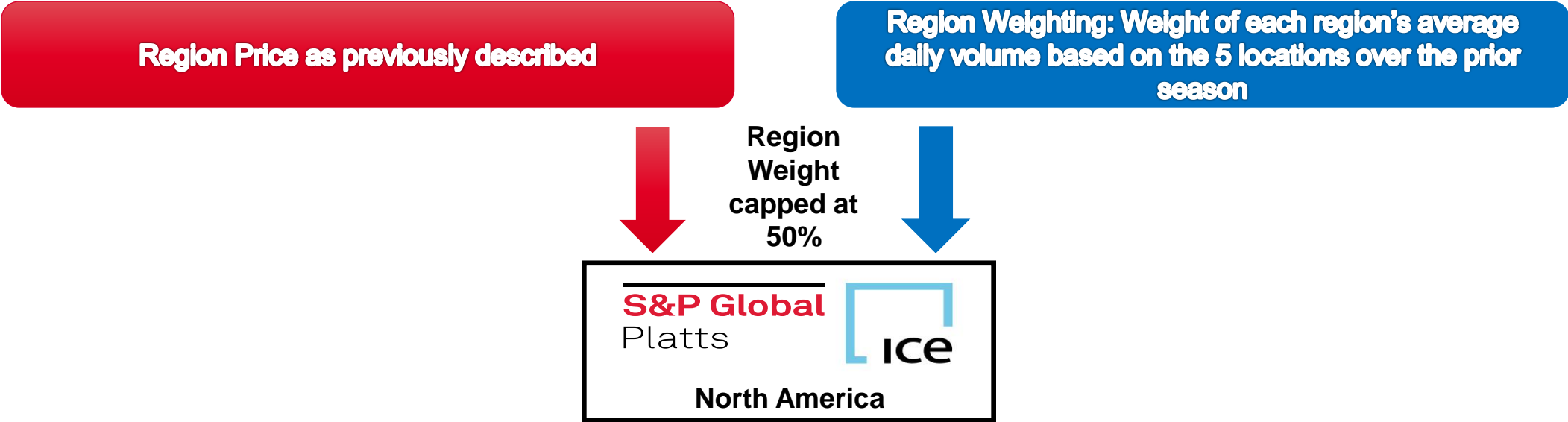
Methodology: Region Prices

- Region prices represent weighting of 5 locations in each of the 4 regions based on prior winter or summer season nominations
- Region price = Sum of the (Location Price x Location Weighting) for each of the 5 locations in each region, where:



Methodology: North America Price

- North America price represents weighting of 4 regions based on prior winter or summer season nominations
- North America price = Sum of the (Region Price x Region Weighting) for each of the 4 regions, where:



Historical Locations and Weightings

Winter 2017: Nov 16 - Mar 17

Location	Region	Location Weighting
Texas Eastern, M-2, receipts	Northeast	29.48%
Columbia Gas, Appalachia	Northeast	22.54%
Texas Eastern, M-3	Northeast	19.16%
Tennessee, zone 4-300 leg	Northeast	16.01%
Transco, Leidy Line receipts	Northeast	12.81%
Transco, zone 4	South	26.20%
El Paso, Permian Basin	South	19.88%
Southern Natural, La.	South	19.33%
Waha	South	18.88%
Texas Gas, zone 1	South	15.71%
REX, Zone 3 delivered	Midwest	25.45%
Alliance, into interstates	Midwest	19.51%
Dawn, Ontario	Midwest	18.84%
Northern, Ventura	Midwest	18.51%
Chicago city-gates	Midwest	17.69%
TCPL Alberta, AECO-C	West	40.00%
Socal, citygate	West	20.25%
PG&E, city-gate	West	14.81%
SoCal Gas	West	14.53%
PG&E, Malin	West	10.40%

Region	Location Weighting
Northeast	39.58%
South	18.31%
Midwest	12.91%
West	29.21%

Summer 2017: Apr 17 - Oct 17

Location	Region	Location Weighting
Texas Eastern, M-2, receipts	Northeast	29.80%
Columbia Gas, Appalachia	Northeast	21.98%
Tennessee, zone 4-300 leg	Northeast	17.27%
Texas Eastern, M-3	Northeast	16.14%
Transco, Leidy Line receipts	Northeast	14.81%
Transco, zone 4	South	25.07%
El Paso, Permian Basin	South	20.74%
Waha	South	19.71%
Texas Gas, zone 1	South	17.61%
Southern Natural, La.	South	16.87%
Dawn, Ontario	Midwest	30.67%
REX, Zone 3 delivered	Midwest	28.29%
Alliance, into interstates	Midwest	13.87%
Northern, Ventura	Midwest	13.81%
Chicago city-gates	Midwest	13.35%
TCPL Alberta, AECO-C	West	40.00%
Socal, citygate	West	17.56%
SoCal Gas	West	16.98%
PG&E, Malin	West	12.96%
PG&E, city-gate	West	12.50%

Region	Location Weighting
Northeast	37.60%
South	17.62%
Midwest	17.51%
West	27.27%

Historical Locations and Weightings

Winter 2018: Nov 17 - Mar 18

Location	Region	Location Weighting
Texas Eastern, M-2, receipts	Northeast	29.50%
Columbia Gas, Appalachia	Northeast	20.52%
Texas Eastern, M-3	Northeast	19.91%
Tennessee, zone 4-300 leg	Northeast	16.31%
Transco, Leidy Line receipts	Northeast	13.75%
Transco, zone 4	South	28.13%
El Paso, Permian Basin	South	21.92%
Waha	South	20.15%
Texas Gas, zone 1	South	16.26%
Southern Natural, La.	South	13.55%
REX, Zone 3 delivered	Midwest	29.77%
Dawn, Ontario	Midwest	21.16%
Alliance, into interstates	Midwest	16.74%
Northern, Ventura	Midwest	16.63%
Chicago city-gates	Midwest	15.71%
TCPL Alberta, AECO-C	West	40.00%
Socal, citygate	West	19.19%
SoCal Gas	West	17.06%
PG&E, city-gate	West	14.23%
PG&E, Malin	West	9.52%

Region	Location Weighting
Northeast	39.48%
South	17.74%
Midwest	14.83%
West	27.95%

Summer 2018: Apr 18 - Oct 18

Location	Region	Location Weighting
Texas Eastern, M-2, receipts	Northeast	31.09%
Columbia Gas, Appalachia	Northeast	20.87%
Tennessee, zone 4-300 leg	Northeast	17.22%
Texas Eastern, M-3	Northeast	15.64%
Transco, Leidy Line receipts	Northeast	15.18%
Transco, zone 4	South	25.49%
Waha	South	22.78%
El Paso, Permian Basin	South	20.98%
Texas Gas, zone 1	South	15.65%
Transco, zone 3	South	15.09%
REX, Zone 3 delivered	Midwest	34.27%
Dawn, Ontario	Midwest	24.81%
NGPL, Midcontinent	Midwest	13.96%
Alliance, into interstates	Midwest	13.91%
MichCon city-gate	Midwest	13.05%
TCPL Alberta, AECO-C	West	40.00%
Socal, citygate	West	17.94%
SoCal Gas	West	17.46%
PG&E, Malin	West	12.82%
PG&E, city-gate	West	11.78%

Region	Location Weighting
Northeast	37.33%
South	19.10%
Midwest	17.35%
West	26.22%

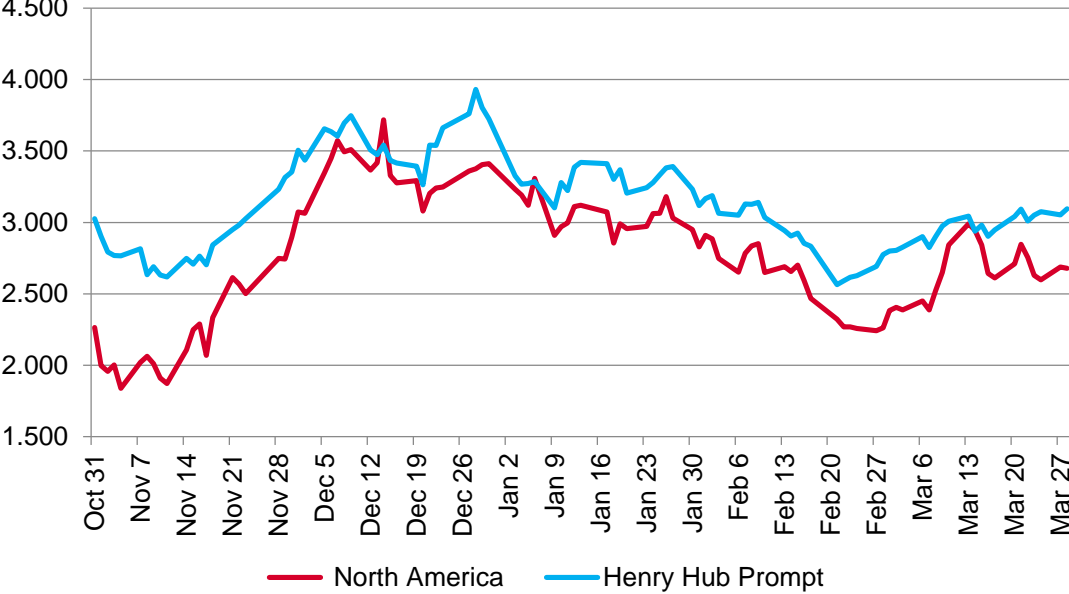
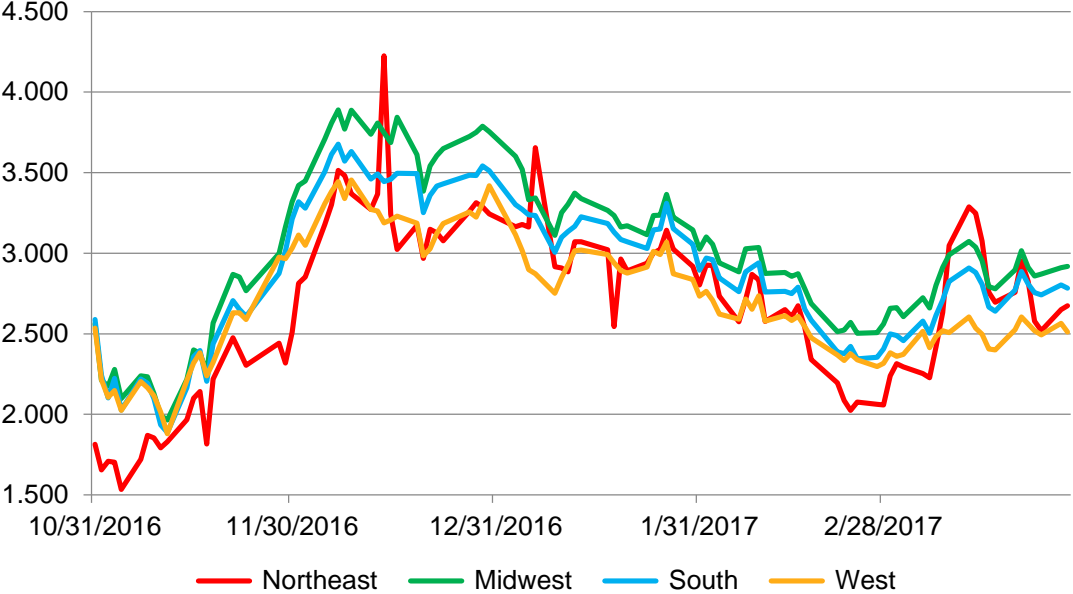
Winter 2019 Locations and Weightings

Winter 2019: Nov 18 - Mar 19

Location	Region	Location Weighting
Texas Eastern, M-2, receipts	Northeast	30.76%
Columbia Gas, Appalachia	Northeast	23.09%
Texas Eastern, M-3	Northeast	19.01%
Tennessee, zone 4-300 leg	Northeast	15.11%
Transco, Leidy Line receipts	Northeast	12.02%
Transco, zone 4	South	25.38%
Waha	South	20.32%
El Paso, Permian Basin	South	20.30%
Transco, zone 3	South	18.33%
Texas Gas, zone 1	South	15.68%
REX, Zone 3 delivered	Midwest	32.57%
Chicago city-gates	Midwest	19.05%
Dawn, Ontario	Midwest	16.71%
Northern, Ventura	Midwest	16.56%
Alliance, into interstates	Midwest	15.11%
TCPL Alberta, AECO-C	West	40.00%
Socal, citygate	West	18.30%
SoCal Gas	West	15.63%
PG&E, city-gate	West	15.40%
Cheyenne Hub	West	10.66%

Region	Location Weighting
Northeast	41.06%
South	20.38%
Midwest	14.10%
West	24.47%

Indices History for Nov 16 – Mar 17



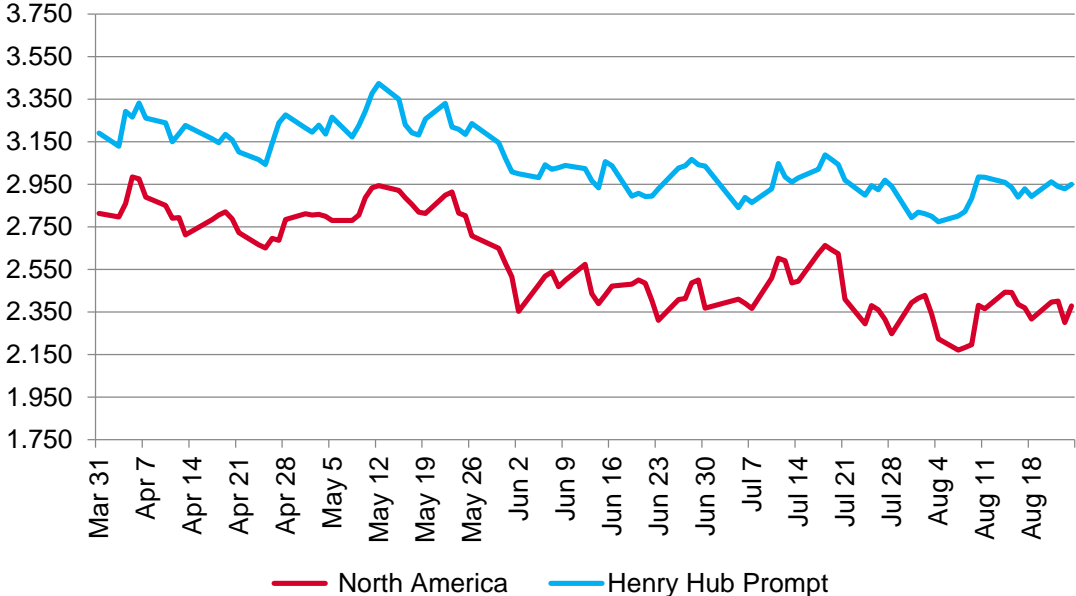
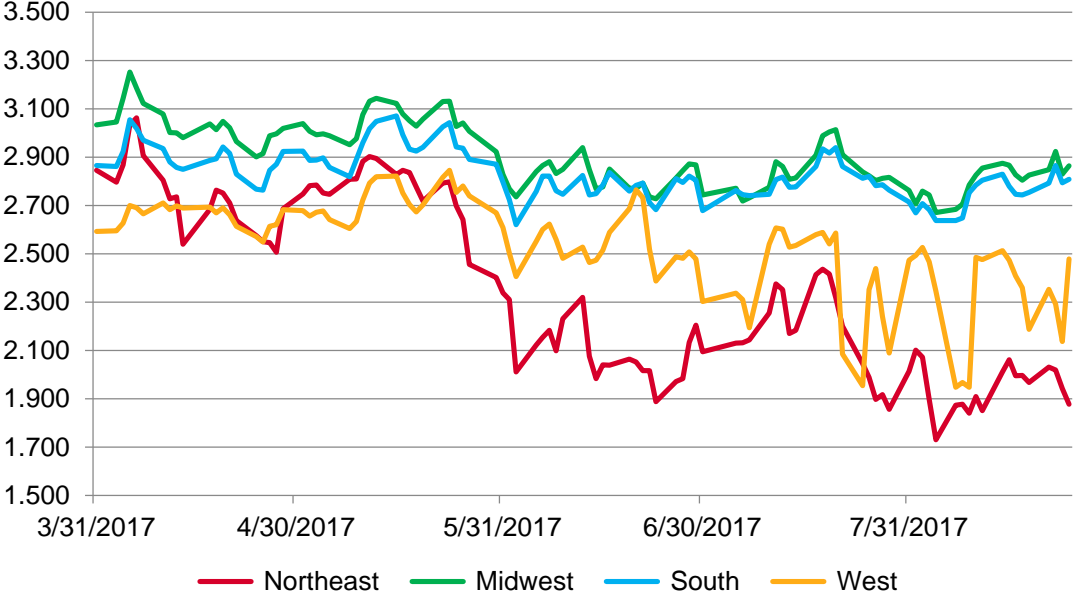
Monthly Prices:

Month	North America	Northeast	South	Midwest	West	Henry Hub Prompt
Nov 16	2.208	1.983	2.347	2.418	2.334	2.846
Dec 16	3.315	3.211	3.454	3.667	3.214	3.554
Jan 17	3.091	3.048	3.193	3.327	2.980	3.344
Feb 17	2.611	2.537	2.703	2.825	2.560	2.925
Mar 17	2.635	2.638	2.707	2.851	2.490	2.974

Annualized Volatility:

North America	Northeast	South	Midwest	West	Henry Hub Prompt
79%	123%	72%	69%	70%	51%

Indices History for Apr 17 – Oct 17



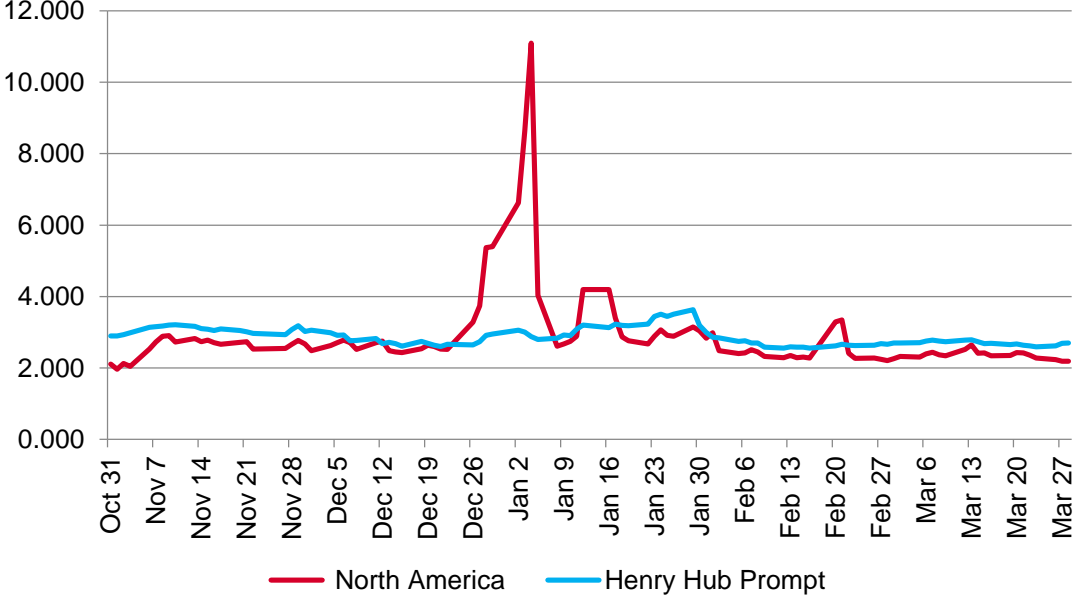
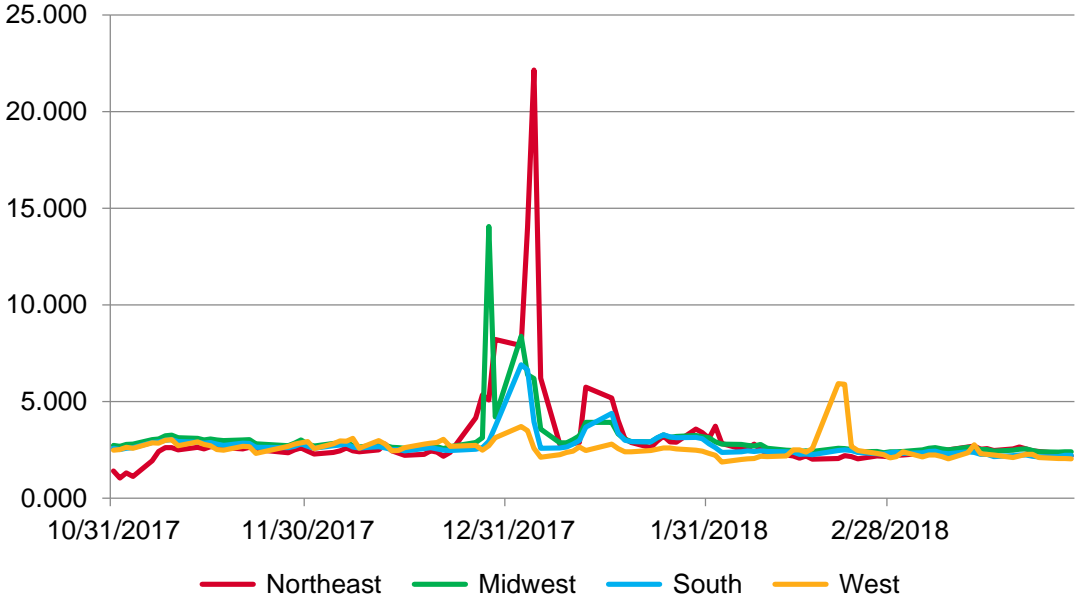
Monthly Prices:

Month	North America	Northeast	South	Midwest	West	Henry Hub Prompt
Apr 17	2.794	2.739	2.891	3.038	2.649	3.185
May 17	2.828	2.754	2.940	3.042	2.720	3.245
Jun 17	2.465	2.102	2.770	2.817	2.543	2.995
Jul 17	2.462	2.175	2.807	2.843	2.390	2.968
Aug 17	2.351	1.921	2.751	2.800	2.398	2.894
Sep 17	2.174	1.591	2.792	2.882	2.125	3.008
Oct 17	2.044	1.304	2.669	2.765	2.195	2.918

Annualized Volatility:

North America	Northeast	South	Midwest	West	Henry Hub Prompt
101%	223%	36%	36%	184%	34%

Indices History for Nov 17 – Mar 18



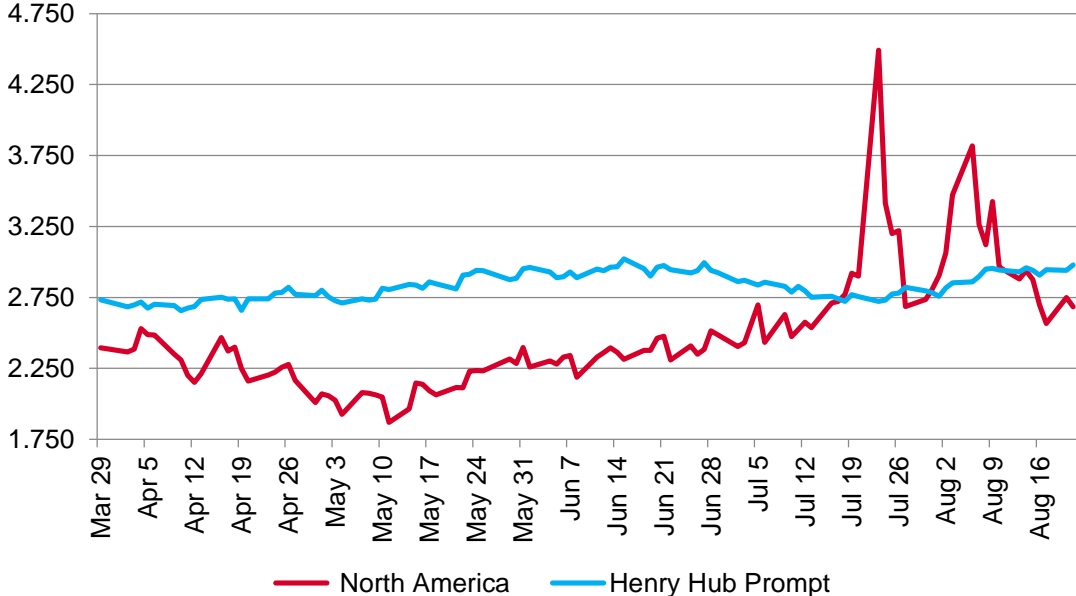
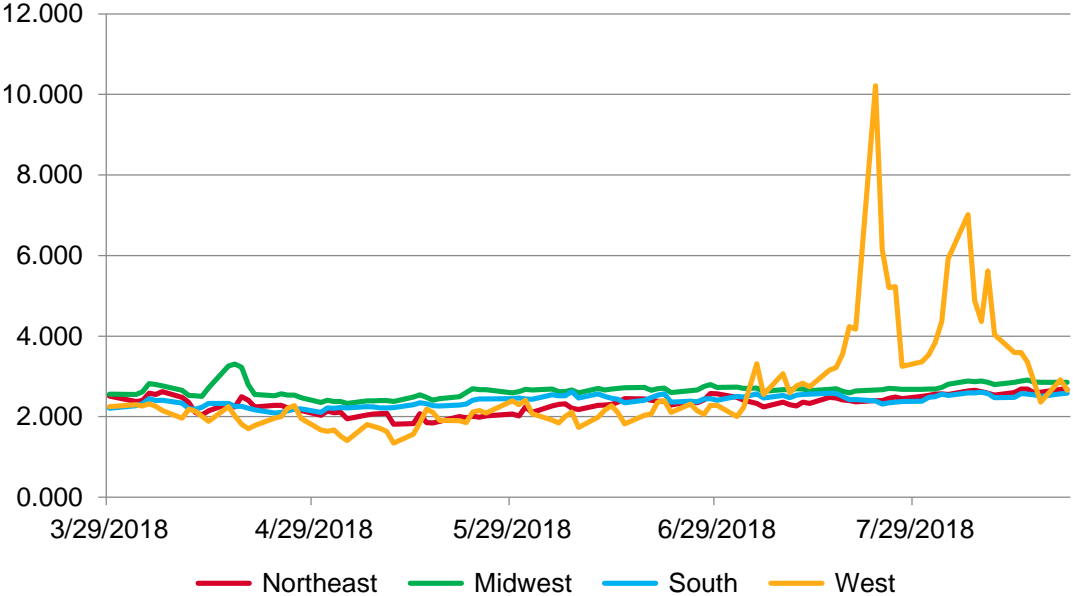
Monthly Prices:

Month	North America	Northeast	South	Midwest	West	Henry Hub Prompt
Nov 17	2.585	2.265	2.785	2.969	2.705	3.065
Dec 17	2.826	2.776	2.617	3.309	2.773	2.780
Jan 18	4.035	5.347	3.528	3.807	2.623	3.159
Feb 18	2.514	2.416	2.420	2.609	2.660	2.733
Mar 18	2.355	2.433	2.286	2.495	2.213	2.692

Annualized Volatility:

North America	Northeast	South	Midwest	West	Henry Hub Prompt
215%	355%	187%	598%	260%	44%

Indices History for Apr 18 – Oct 18



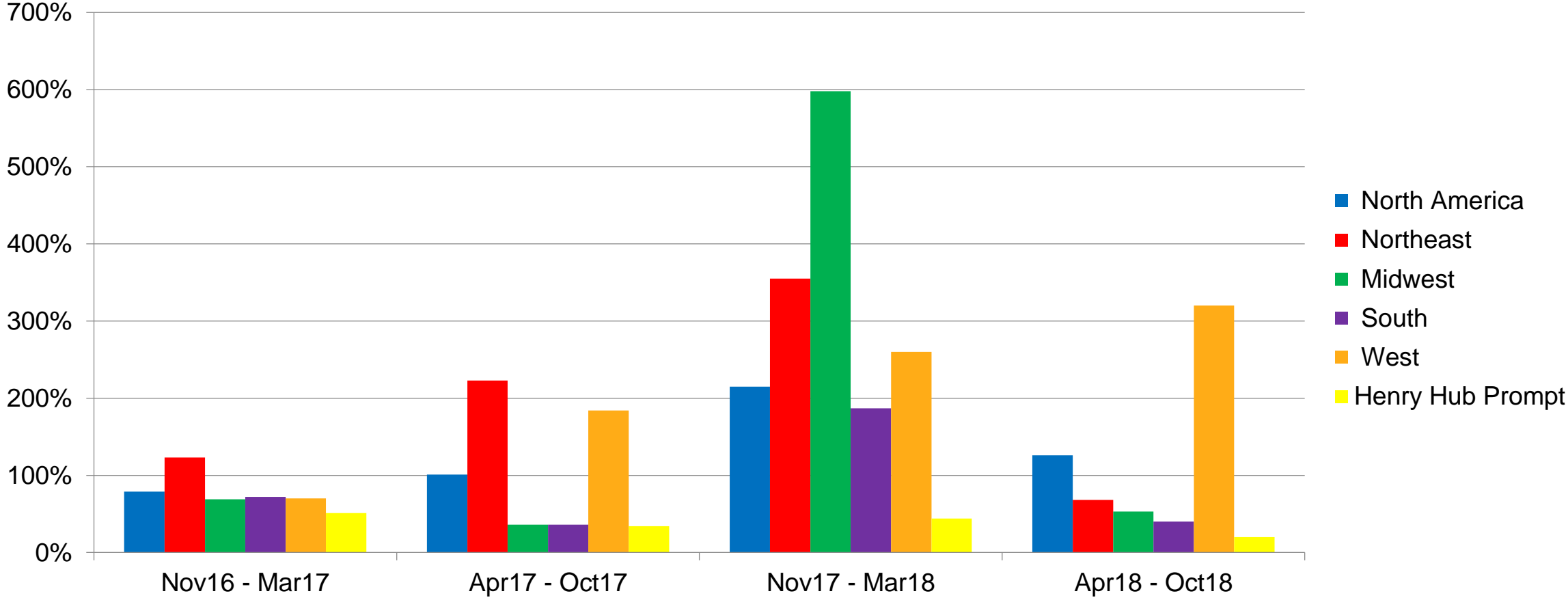
Monthly Prices:

Month	North America	Northeast	South	Midwest	West	Henry Hub Prompt
Apr 18	2.317	2.334	2.253	2.705	2.081	2.723
May 18	2.098	1.999	2.293	2.479	1.844	2.821
Jun 18	2.358	2.330	2.469	2.678	2.106	2.944
Jul 18	2.808	2.404	2.465	2.676	3.721	2.796
Aug 18	2.860	2.620	2.476	2.816	3.511	2.902
Sep 18	2.442	2.483	2.390	2.708	2.245	2.829

Annualized Volatility:

North America	Northeast	South	Midwest	West	Henry Hub Prompt
126%	68%	40%	53%	320%	20%

Volatility By Season Since November 1, 2016



Platts Methodology 101

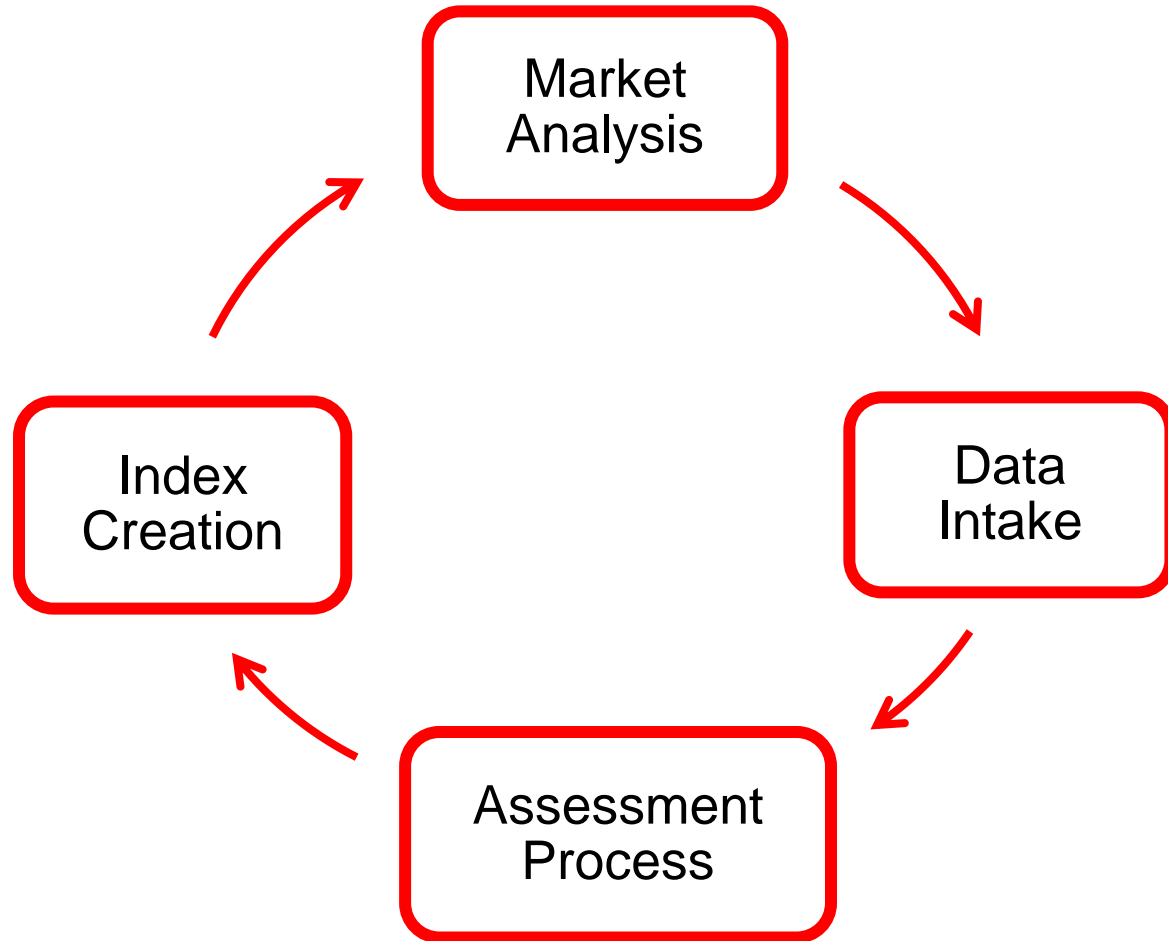
The Development of Platts Natural Gas Indices

- Guiding principle is independence from commercial and external market elements
- Between 4,500 and 6,500 trades feed into 110 daily and 90 monthly indices
- Indices are comprised of Platts price reporter trades and supplemented by non-price reporter ICE exchange trades
- Methodology as a living document, constantly updated as market evolves



S&P Global
Platts

The Development of Platts Natural Gas Indices



- Regional market commentaries are written daily, analyzing flows, maintenances, and price movements.
- Price reporter trades and ICE transactional data is received, with a backend process removing any “double counted” deals. Mappings are done for trades not in system.
- Assessment process is not an algorithm.
- Each Platts point is looked at manually, verifying price and locational data by contacting price reporters and referencing activity on ICE.
- After assessment process, Platts indices are generated.

Mapping Example

- Location reported as Tennessee Gas Pipeline, Greenbrier
- Meter number given is 420289
- Point Catalog for Tennessee Gas Pipeline Company lists the point as a Delivery off of the pipe in Robertson County, TN at segment 860 in Zone 1
- Platts Methodology states: **Tennessee, Zone 1 (daily market only)** Deliveries into Tennessee Gas Pipeline 100 Leg between Natchitoches, Louisiana and Portland, Tennessee.

The Verdict

Location in Zone 1

100 Leg

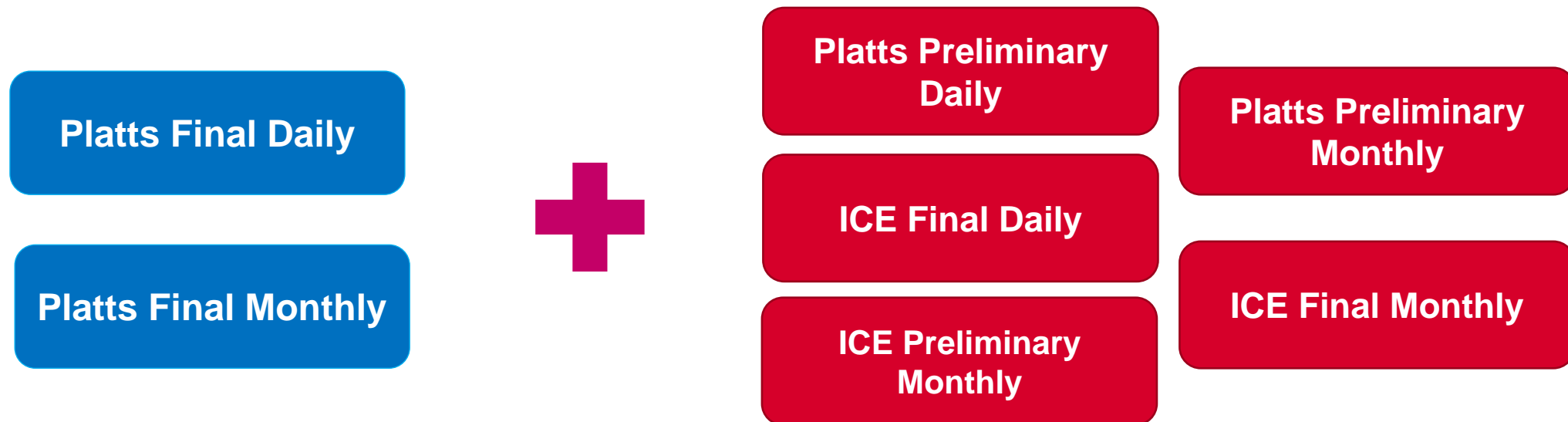
Delivered into Tennessee Pipeline



- Placed into a Tennessee Zone 1 Delivered tracking point

Platts – ICE Agreement: More Robust Indices

- Announced in November 2016 with full implementation November 1, 2017
- Averted steady trend downward in reported volumes to PRAs
- Aim is to bolster Platts daily and monthly indices with additional trade data
- Platts indices more robust, and increases Platts coverage of daily and monthly market



Natural Gas Products: What data is used?

Uses Price Reporter and ICE transactional data

- Platts Final Daily
- Platts Preliminary Monthly
- Platts Final Monthly

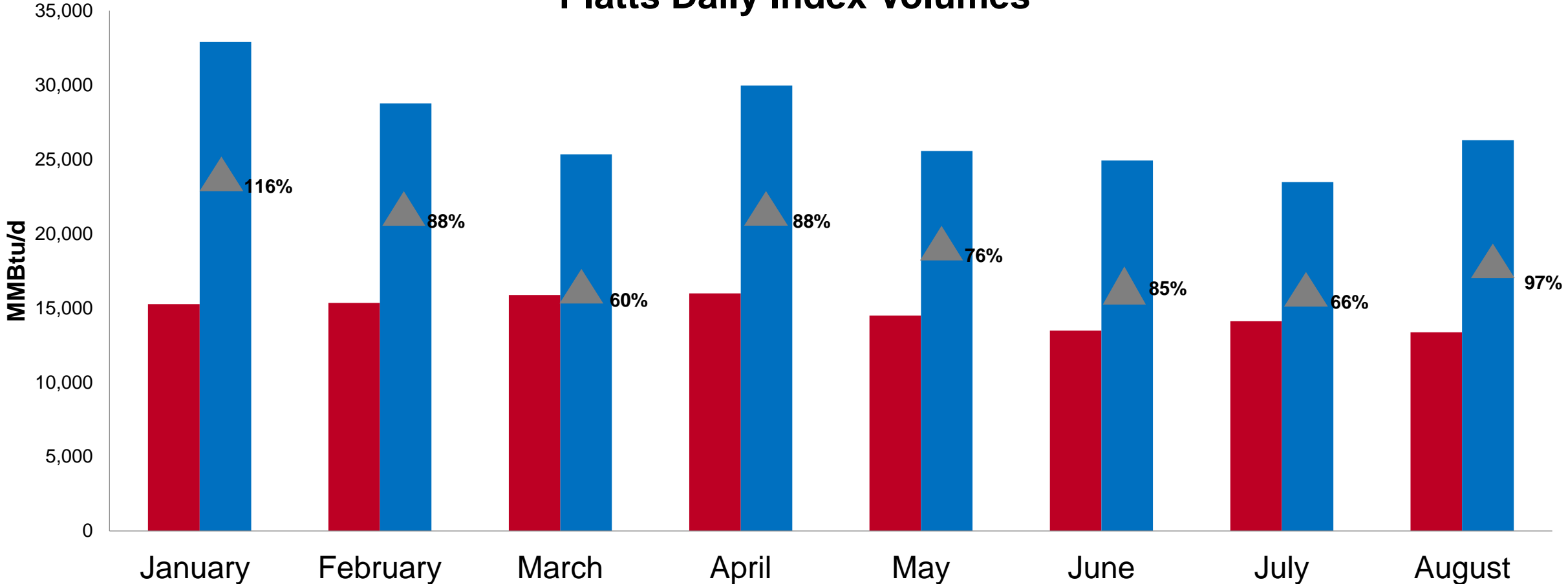
Only uses ICE transactional data

- Platts Preliminary Daily- ICE trades that fit into a Platts index
- ICE Final Daily
- ICE Preliminary Monthly
- ICE Final Monthly

The ICE Deal Ten Months In...

How has the inclusion of ICE data bolstered volume?

Platts Daily Index Volumes

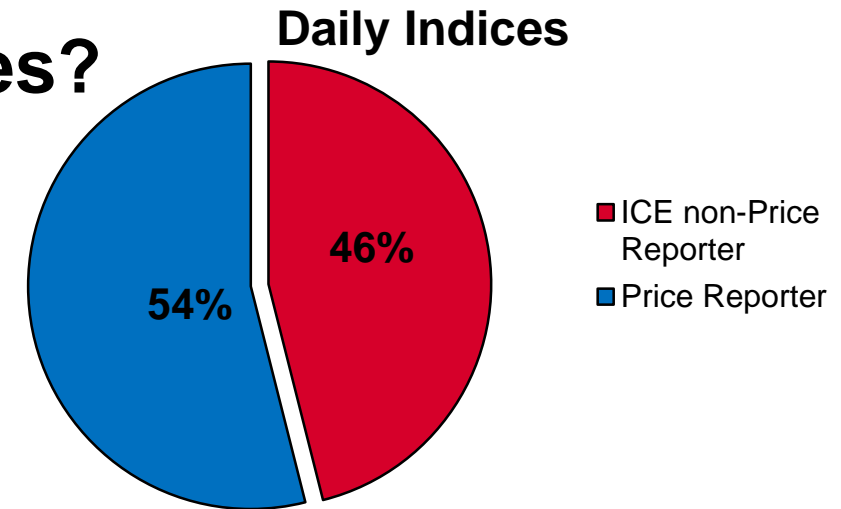


The Breakdown:

What comprises Platts daily and monthly indices?

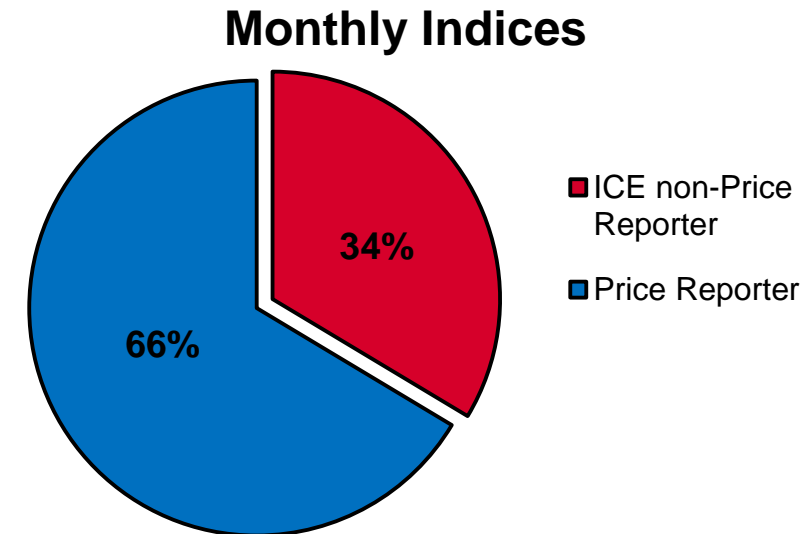
Daily Market:

- Next day, fixed price indices include all transactions done on ICE and bilateral price reporter deals
- No basis transactions exist in daily index



Monthly Market:

- Inclusive of all fixed price **and** basis transactions done on ICE and bilateral price reporter deals
- Bidweek is always last five business days of month



Platts Methodology Evolution: Recent and Upcoming Changes

How Does Platts Conduct Methodology Changes?



- Methodology changes are spurred by consistent shifts in pricing activity and are not preemptive
- Market feedback is key in determining a market reflective approach to index development
- No definitive timetable for all types of methodology changes
- Not all shifts in market require a revision or new locational listing as market evolves

Methodology Update From March 2018 Workshop

Houston Ship Channel and Katy

- Following an extended period of feedback from participants in US and Mexican market, Platts decided against various proposals surrounding illiquidity at Houston Ship Channel
- 2018 deal counts have averaged nearly 50% above year ago levels when stripping out winter volatility

Tennessee Zone 6, delivered

- Existing Zone 6 area is being divided into a North and South region for Winter 2018-2019
- Both standalone North and South contracts will roll into existing Platts Tennessee Zone 6, delivered

Tennessee Zone 1

- Platts specific location listed since June 1, averaging 43 deals in the daily market

ICE to Platts Location Transition

- Iroquois, Zone 1
- Tennessee, Zone 5 200 Leg

Current Methodology Change Proposals

Florida city-gates

- Following a period of market consultation, Platts proposes to include basis trades in the preliminary and final daily indices for Florida city-gates.
- The only basis trades that would be included would be trades priced as a differential to Florida Gas, zone 3.
- The basis trades would be converted to fixed price trades by adding the price differential to the Florida Gas, zone 3 index price.

Northwest, S. of Green River

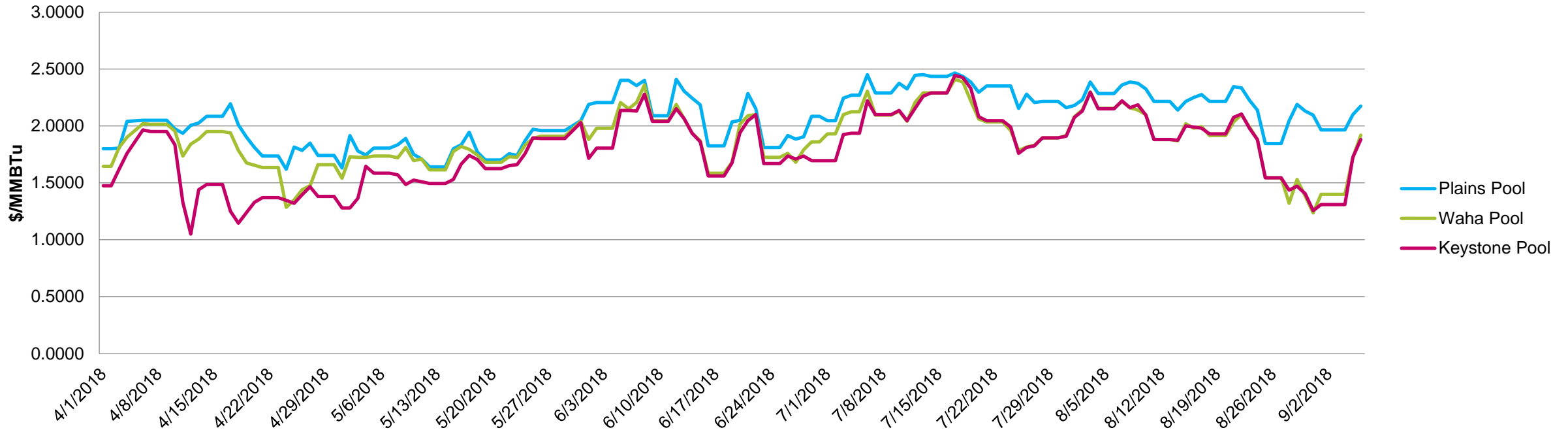
- Beginning in March, observed that Ignacio Plant, which is included in the existing index, is trading at a steady discount to other transactions done at other locations in the index, notably Northwest, Rocky Mountain Pool.

El Paso, Permian

- Due to constraints in the region, Platts has observed price divergence in the pooling areas that make up the El Paso, Permian index. El Paso, Plains pool has traded at a notable premium to the El Paso, Waha and El Paso, Keystone pools.

El Paso, Permian: Constrained or Fundamental Shift?

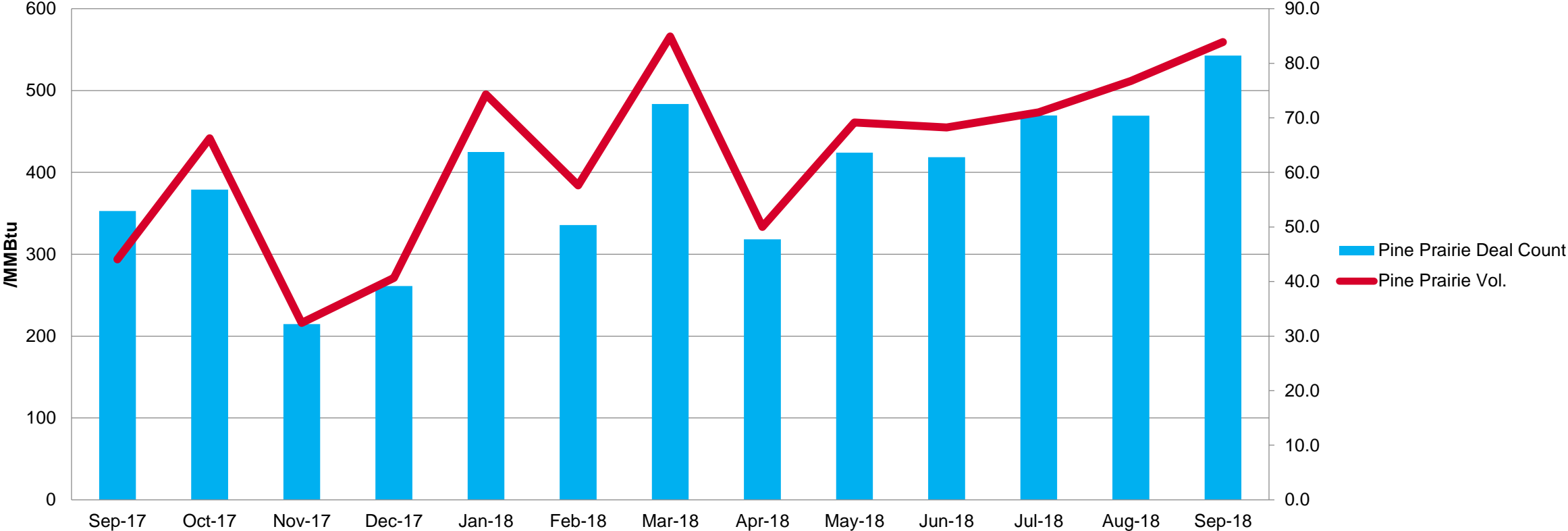
Plains Pool Diverges April-September, 2018



- As Permian gas production grows, so does the differential between pools
- With downstream export and infrastructure growth, will this persist?

Pine Prairie Hub

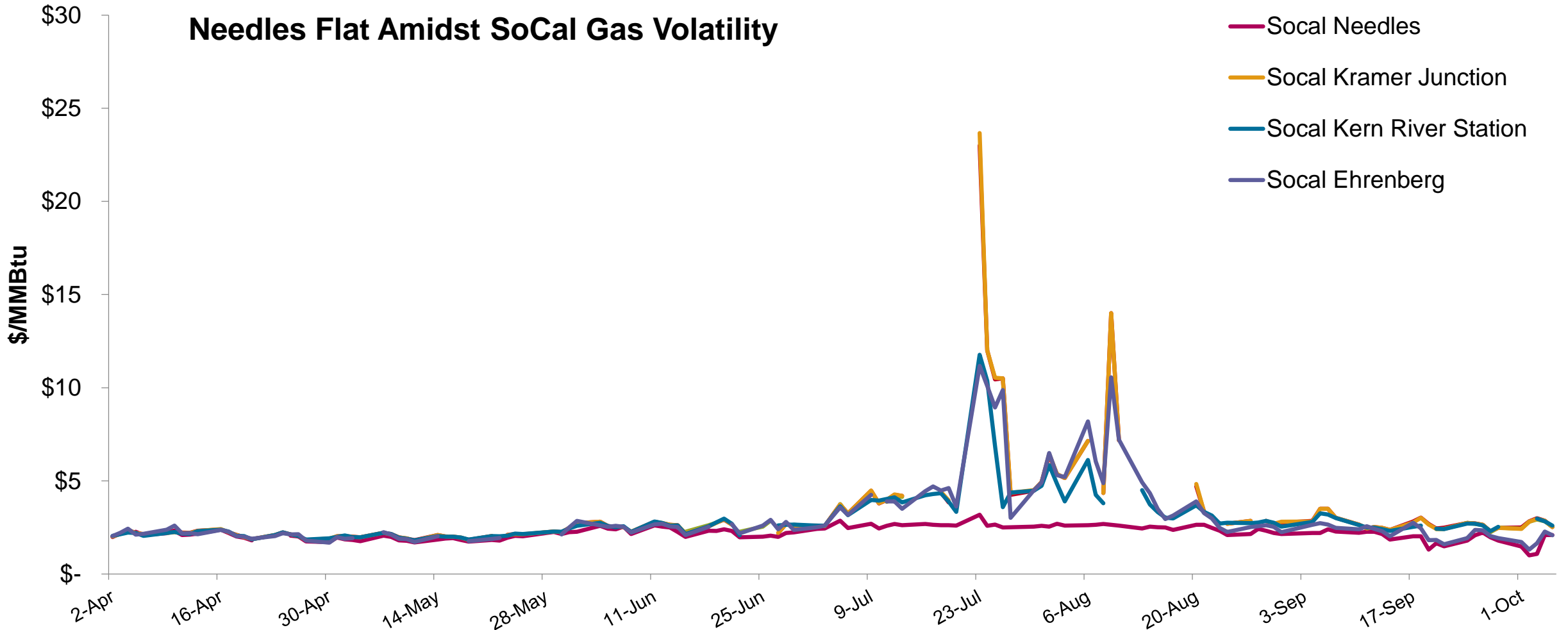
Pine Prairie deals up 63% in 2018



- How to develop methodology around storage, driven by seasonality shifts?

Downstream of Permian: SoCal Border

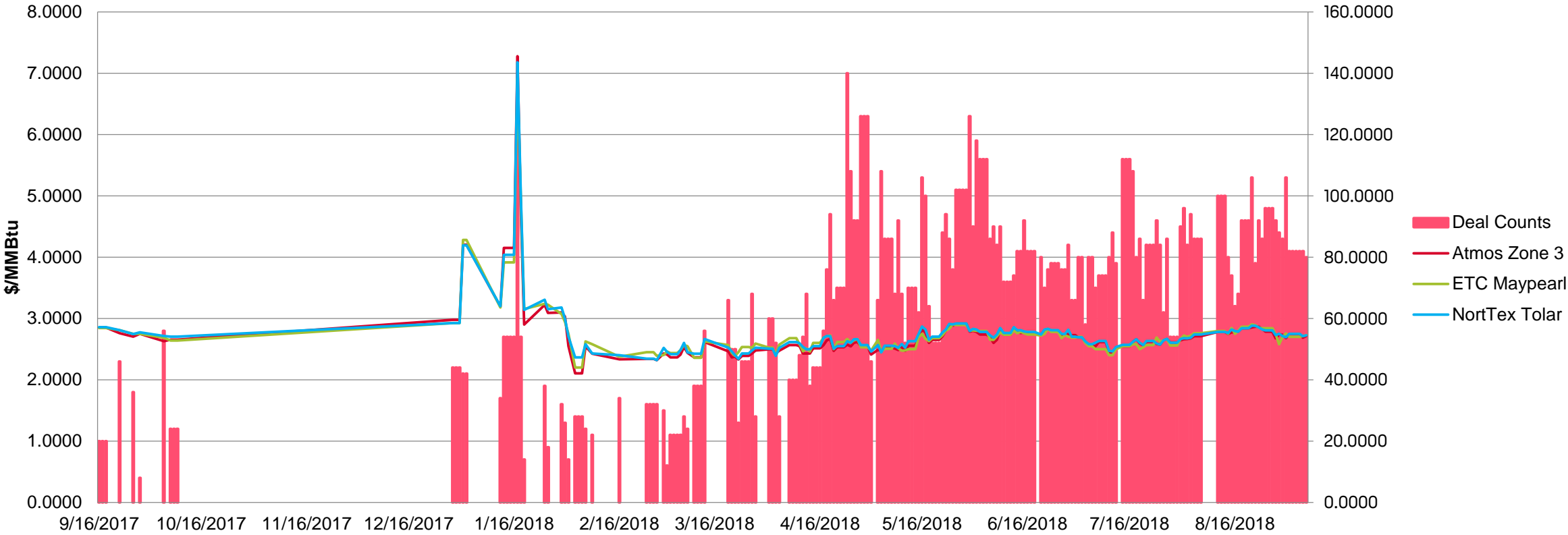
Needles Flat Amidst SoCal Gas Volatility



- During peak volatility, Needles averaged \$8/MMBtu below Ehrenberg and Kramer Junction

North Texas Hub

North Texas Deal Counts Surge, 2017-2018



- Deal counts surge 80% from January to September

Thank You