



NATURAL GAS INTELLIGENCE

News | Data | Prices | Insight... since 1981

Will the Marcellus/Utica Overtake the Henry Hub? U.S. Natural Gas Price Volatility in 2015 & Beyond

Presented by Natural Gas Intelligence & Observ Commodities | April 7, 2015

Presented by



Patrick C. Rau, CFA

Director of Strategy & Research, NGI
Natural Gas Intelligence



Wei Chien

Founder, Observ Commodities,
Gas Price Forecasts

Thank you for joining us.
We'll get started momentarily.



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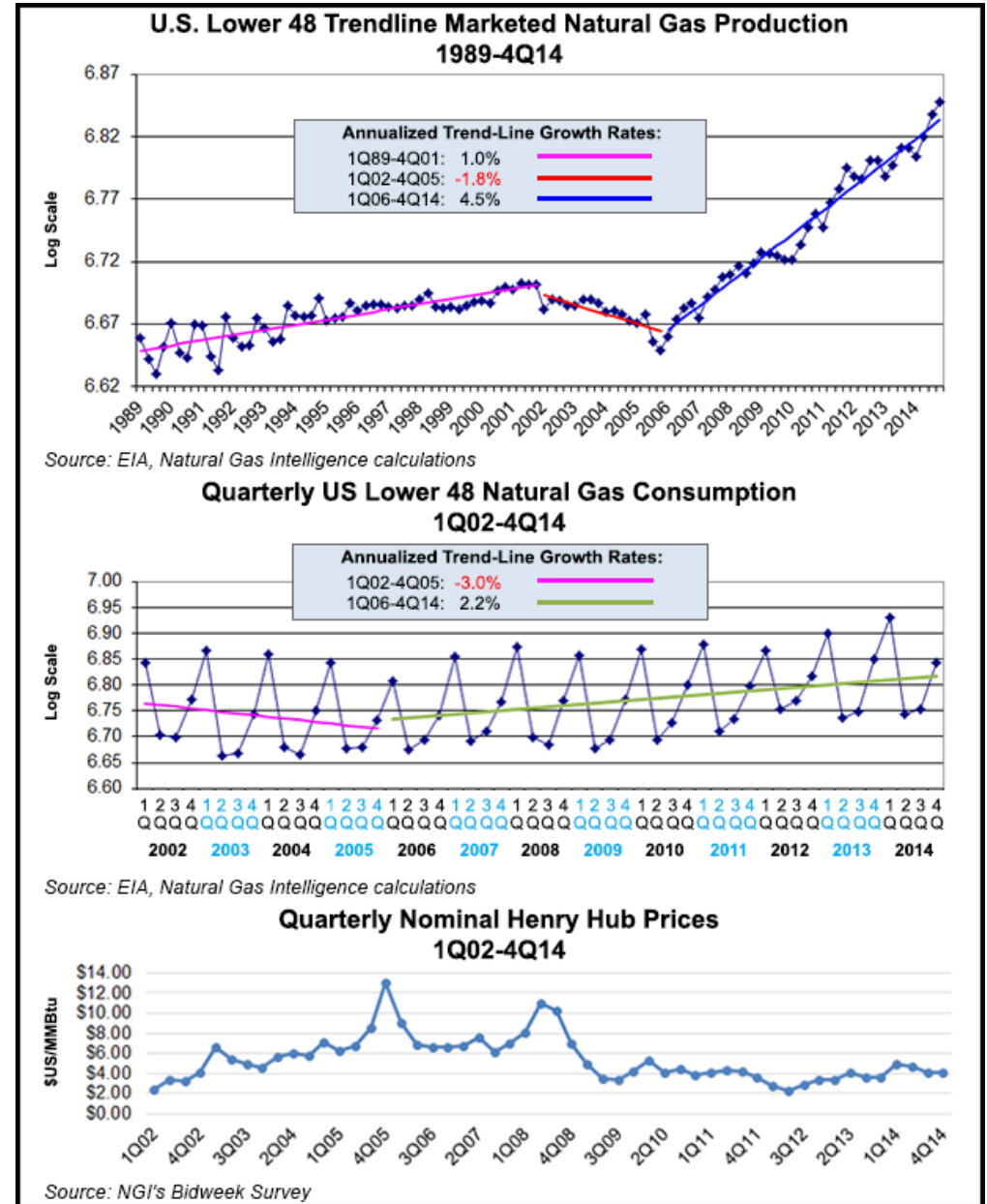


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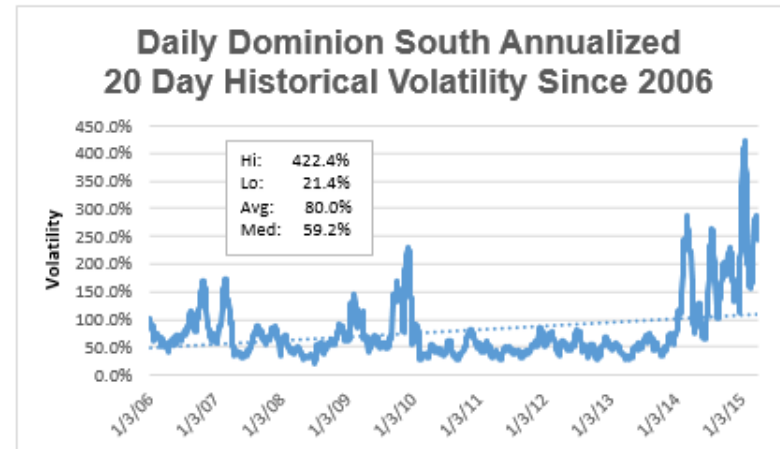
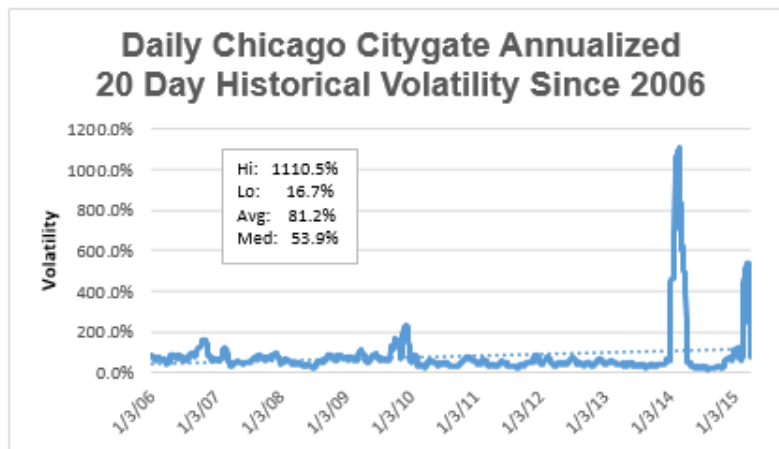
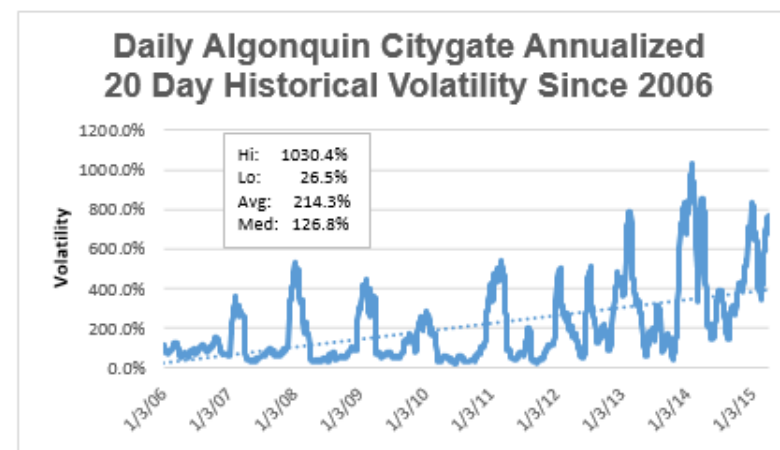
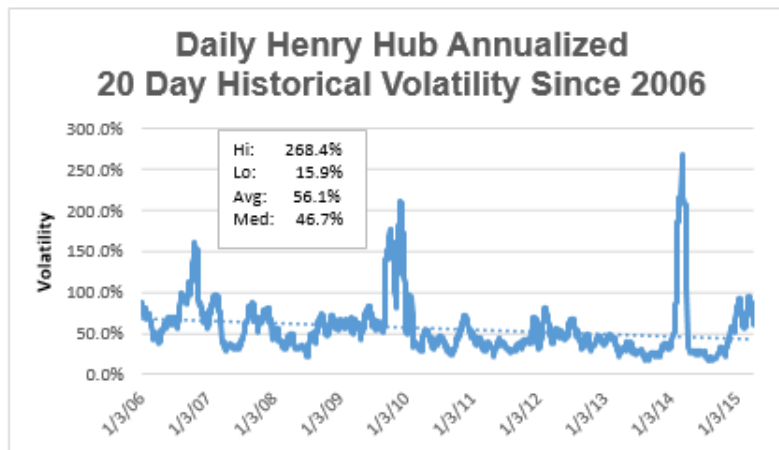


Secular Trends in the U.S. Natural Gas Market

- U.S. supply/demand profile really began to change in 1Q06
- Production led by unconventional & associated gas
- Supply growth >2x demand growth has had a predicable impact on the Henry Hub price.

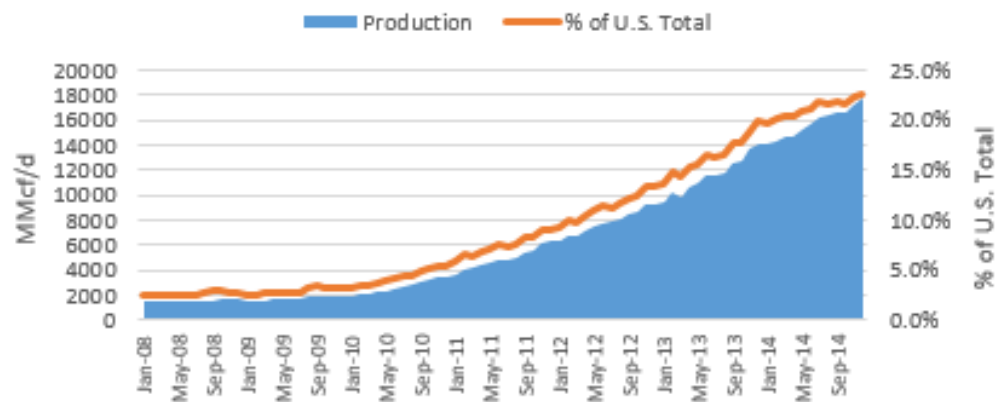


Henry Hub vs. Regional U.S. Price Volatility



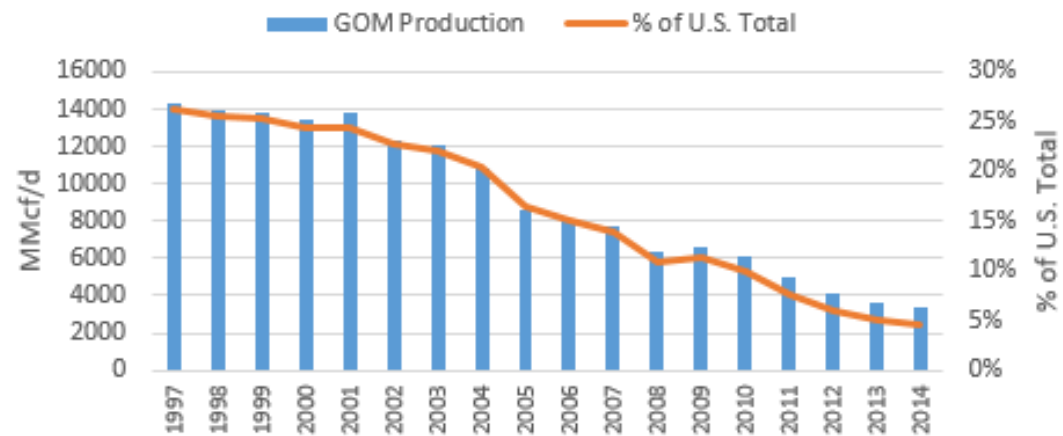
Appalachia & U.S. GOM Natural Gas Production As % of U.S. Total Have Flipped

Monthly Utica & Marcellus NatGas Production As a % of Total U.S. Marketed NatGas Jan 08 - Dec 14



Source: EIA, NGI calculations

Annual U.S. Federal GOM Marketed NatGas Production 1997-2014



Source: EIA, NGI calculations

U.S. Supply Centers Have Been Shifting Away From “Traditional” Areas

Regional Breakdown of Lower 48 U.S. Marketed Natural Gas Production (Tcf)

Region	2006	% of Total	2010	% of Total	2014	% of Total
Gulf Coast/GOM	10.1	52.0%	11.4	50.9%	11.1	40.9%
Rockies	5.0	25.6%	5.6	25.1%	5.0	18.5%
Midcontinent	2.3	12.0%	3.1	13.8%	3.7	13.7%
Appalachia	0.5	2.5%	0.9	4.1%	5.7	20.8%
Other	1.5	7.8%	1.4	6.2%	1.7	6.2%
Total Lower 48	19.4	100.0%	22.4	100.0%	27.3	100.0%

Source: EIA, NGI calculations and estimates

Note: Percentages are rounded. Columns may not total because of rounding. **Gulf Coast/GOM** = Texas, Louisiana, Gulf of Mexico **Rockies** = Colorado, Utah, Wyoming **Midcontinent** = Arkansas, Oklahoma, Kansas **Appalachia** = Pennsylvania, Ohio, West Virginia **Other** = All other Lower 48 states

These Regional Production Changes Are Also Being Reflected in Relative Spot Market Trading Volumes

Region	2006 % of Total	2010 % of Total	2014 % of Total
Gulf Coast/GOM	45.3%	56.9%	31.6%
Rockies	23.9%	16.8%	15.2%
Midcontinent	24.4%	10.1%	26.7%
<i>Appalachia</i>	<i>6.4%</i>	<i>16.2%</i>	<i>26.4%</i>
Total	100.0%	100.0%	100.0%

Source: NGI's Bidweek Survey

NGI's Northeast Spot Market Price Table Has Expanded In Kind

- We have added 19 net listings to the Northeast section of our *Daily Gas Price Index* Spot Market Price Table since 2010.
- New points represent sub-regionalization of existing interstate pipelines and reflect increasing regional volatility.
- Tennessee Gas Pipeline (TGP) recently switched its cash-out mechanism to NGI's more detailed breakout of the TGP system.
- We will also break out our existing Chicago Citygate listing into its component parts beginning May 1.
- NGI also lists five Appalachia shale prices in its *Shale Daily* publication.

Changes to NGI's Daily GPI Northeast Spot Market Table Since 1/1/10

<u>Pipeline</u>	<u>1/1/2010</u>	<u>4/7/2015</u>	<u>Date Added</u>
Algonquin Citygate	Yes	Yes	N/A
Algonquin Receipts	Yes	Yes	N/A
Clarington (Non-Tenn)	No	Yes	2/1/2010
Clarington, Tenn	No	Yes	10/1/2010
Columbia Gas	Yes	Yes	N/A
Dominion North	No	Yes	4/1/2014
Dominion South	Yes	Yes	N/A
Dracut	Yes	Yes	N/A
Iroquois Zone 1	No	Yes	10/1/2010
Iroquois Zone 2	Yes	Yes	N/A
Iroquois, Waddington	Yes	Yes	N/A
Lebanon	Yes	Yes	N/A
Leidy Hub	Yes	Yes	N/A
Millennium East Pool	No	Yes	7/2/2012
Niagara	Yes	Yes	N/A
Tenn Zone 4 200L	No	Yes	10/3/2011
Tenn Zn 4 313 Pool	No	Yes	4/2/2012
Tenn Zn 4 Marcellus	No	Yes	4/2/2012
Tenn Zone 5 200L	No	Yes	10/3/2011
Tenn Zone 5 300L	No	Yes	10/3/2011
Tenn Zone 6 200L	No	Yes	10/3/2011
Tenn Zone 6 300L	No	Yes	10/3/2011
TETCO M-2, 30	Yes	Yes	N/A
TETCO M-2 Delivery	No	Yes	7/2/2012
TETCO M-2 Receipt*	No	Yes	7/2/2012
Texas Eastern, M-3	Yes	Yes	N/A
TETCO M-3 Delivery*	No	Yes	12/2/2013
TETCO M-3 Receipt	No	Yes	12/2/2013
Transco Zone 5	Yes	Yes	N/A
Transco Zone 6 non-NY	Yes	Yes	N/A
Transco Zone 6 non-NY North	No	Yes	8/1/2014
Transco Zone 6 non-NY South	No	Yes	8/1/2014
Transco Zone 6 NY	Yes	Yes	N/A
Transco Leidy-Line	No	Yes	4/2/2012
Total Listings	15	34	

*NGI has run a TETCO M-2 (receipts and deliveries) and TETCO M-3 (receipts and deliveries) since before 2010. We began listing separate receipts and delivery postings for each market zone in 2012 & 2013.

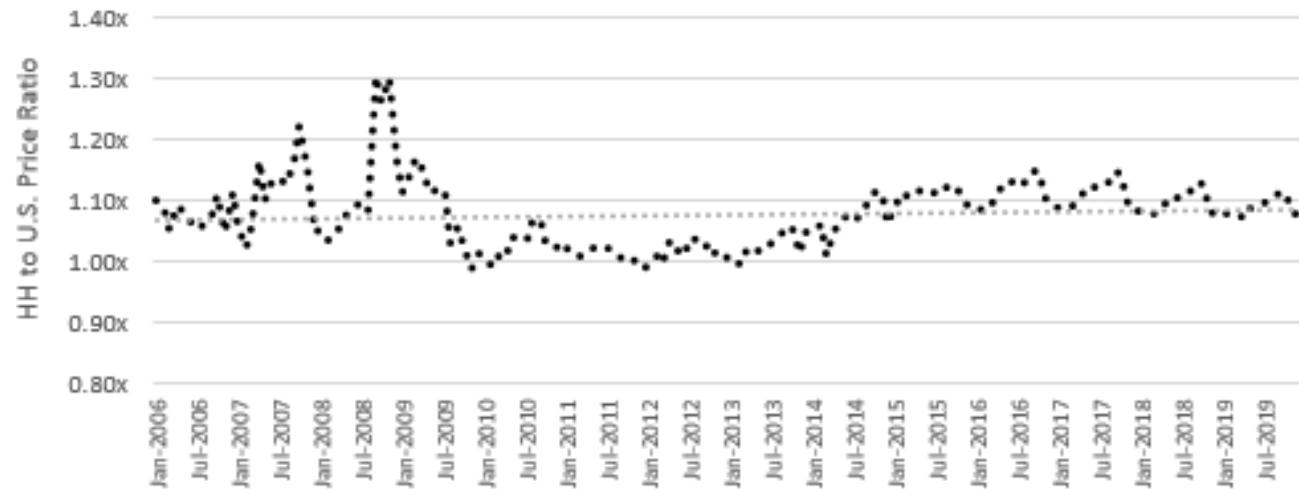
Will (Or Has) The Appalachia Take(n) Over the Henry Hub?

- *As the national pricing point for U.S. production?*
- *As the price of marginal production in the U.S.?*
- *As the reference point in basis trading?*

The Emergence of Appalachia Production Is Not Likely To Have Much of a Long-Term Impact on HH As a Proxy on National Price

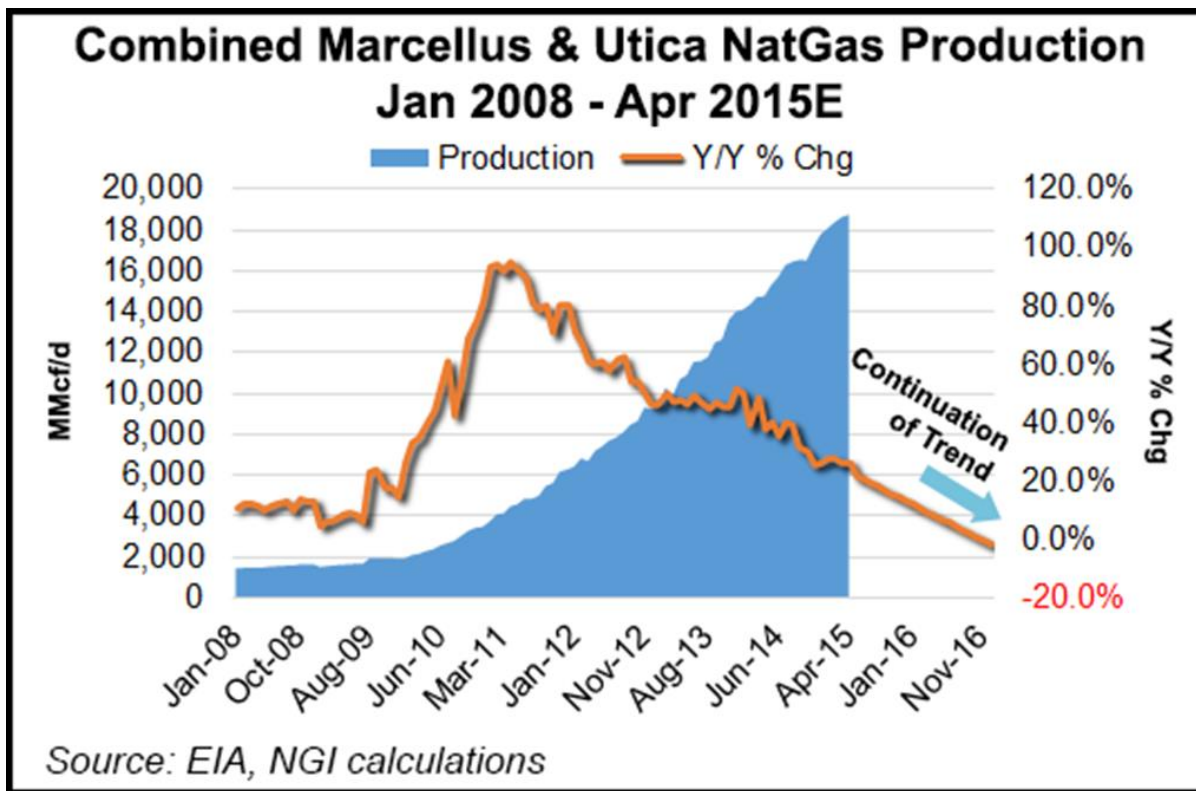
- Appalachia is NOT the national pricing point. Where else does gas get consistently sold for a \$1 handle?
- It has caused choppiness in the ratio of Henry Hub to the weighted average price of U.S. production over time.
- However, we expect this ratio to settle around 1.1x over time, right around where it was in early 2006.

Monthly Henry Hub to Weighted Average U.S. Production Price Ratio Jan 2006 - Dec 2019E



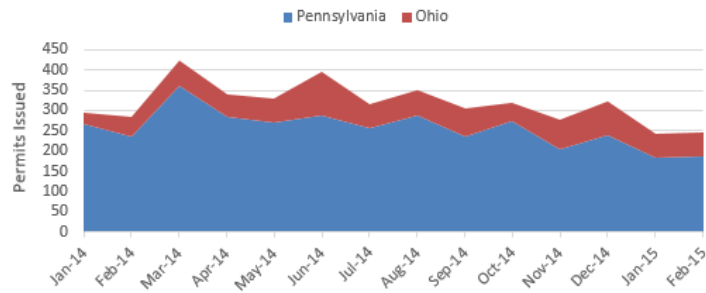
Source: EIA, NGI's Bidweek Survey, NGI estimates

Y/Y Marcellus & Utica Production Growth Can't Continue On Its Historical Pace Forever...



2015 Appalachia NatGas Production Should Rise Double Digits, Despite Headwinds

Monthly Ohio & Pennsylvania Unconventional Drilling Permits Issued Jan 14 - Feb 15



Sources: PA Dept. of Environmental Protection, Ohio Dept. of Natural Resources, NGI's Shale Daily calculations

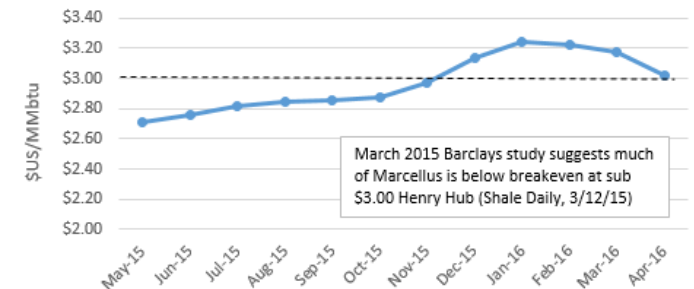
Weekly Marcellus & Utica Drilling Rig Count Since 12/5/14*

Date	U.S.	Marcellus	Utica	Total Marc/Utica	Total U.S. Ex-Appalachia
12/5/14	1,920	82	48	130	1,790
12/12/14	1,893	83	50	133	1,760
12/19/14	1,875	82	48	130	1,745
12/26/14	1,840	78	50	128	1,712
1/2/15	1,811	77	49	126	1,685
1/9/15	1,750	77	48	125	1,625
1/16/15	1,676	75	49	124	1,552
1/23/15	1,633	76	46	122	1,511
1/30/15	1,543	75	43	118	1,425
2/6/15	1,456	71	41	112	1,344
2/13/15	1,358	69	39	108	1,250
2/20/15	1,310	69	39	108	1,202
2/27/15	1,267	68	38	106	1,161
3/6/15	1,192	62	37	99	1,093
3/13/15	1,125	63	33	96	1,029
3/20/15	1,069	69	30	99	970
3/27/15	1,048	70	30	100	948
4/2/15	1,028	70	29	99	929
Change	-44.3%	-14.6%	-39.6%	-23.8%	-48.1%

*12/5/14 represents the last time the total U.S. oil & gas drilling rig count increased w/h.

Source: Baker Hughes, NGI's Shale Daily calculations

CME Group Natural Gas Futures 12-Month Strip As of 4/2/15



Source: CME Group

March 2015 Barclays study suggests much of Marcellus is below breakeven at sub \$3.00 Henry Hub (Shale Daily, 3/12/15)

According to guidance from 18 publicly traded companies, which we estimate collectively represent more than 65% of total Marcellus & Utica (M&U) production, total 2015 M&U production among these companies should rise by a double digit % Y/Y, despite an expected 27% reduction in combined Appalachia capex across these operators.

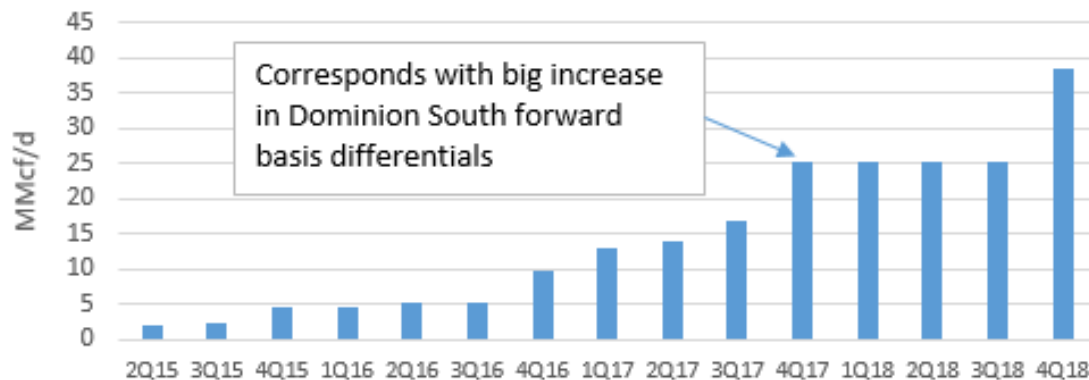
However, Future Appalachia NatGas Production Growth Should Tail Off

Negative (2016)	Positive (2016)
<ul style="list-style-type: none"> • Mid-cycle economics may be sub-optimal across much of the area. • Rig drops + hyperbolic decline = large incremental drop in production. • Fall 2015 revolving credit facility redeterminations likely to be difficult. • 2016 not as well hedged as 2015. 	<ul style="list-style-type: none"> • Oil services costs should fall to reflect the “new reality.” • Will coal to gas switching help set up a 2016 price rally? • Increases in takeaway capacity (Constitution, etc.) • Some well completions are being delayed until next year (ex. Antero Resources)
Negative (2017+)	Positive (2017+)
<ul style="list-style-type: none"> • Y/Y comps will be difficult • Will a new normal in lower crude oil prices negatively impact Appalachia wet gas production? 	<ul style="list-style-type: none"> • Appalachia production is being led by independent producers (read: growth stocks), who tend to have aggressive production plans. • Proximity to demand areas. • Upper Devonian/stacked pay intervals provide further upside. • Unit production costs should continue to fall, which we believe favors the Appalachia in particular. • CBM economics improving?

The “consensus” estimate for Marcellus & Utica production seems to be 25 Bcf/d by the end of 2020. That implies a CAGR of 5.8% between 2015-2020. However, that estimate assumed a MUCH higher crude oil price, and probably little competition from other production areas.

Appalachia Pipeline Constraints Don't Start to Ease Until Late 2016 – At the Earliest

"Best" Case Cumulative Direct Appalachia NatGas Pipeline Takeaway Capacity Additions 2Q15-4Q18



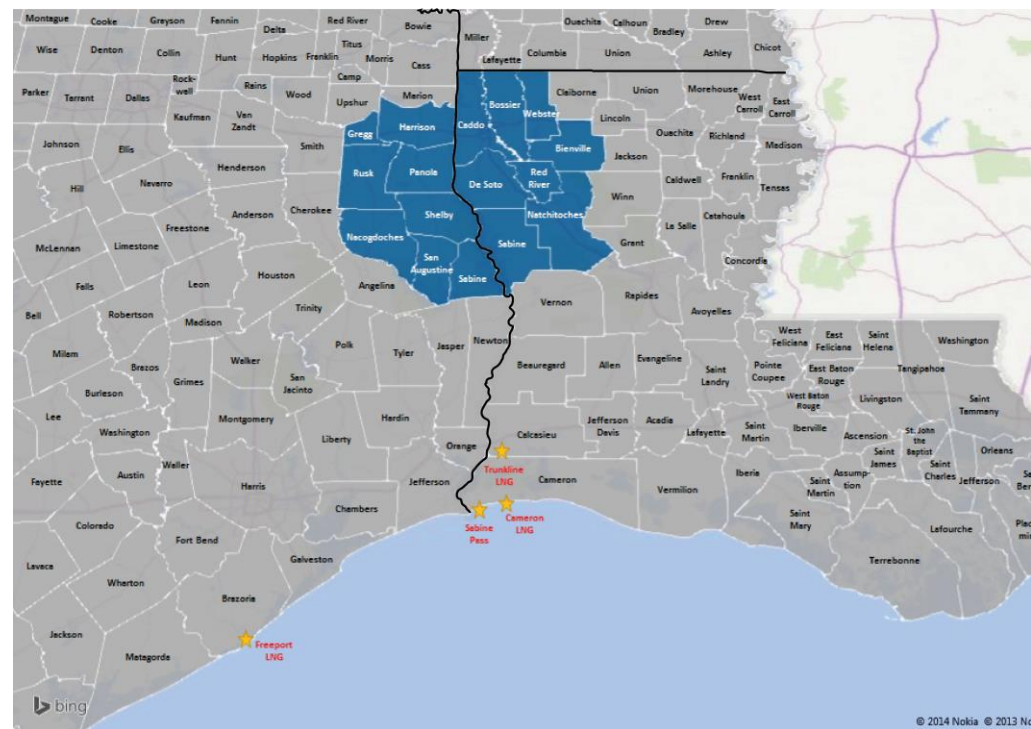
Source: Company documents, NGI estimates

Not all these projects will be built, nor will they all be completed on time

For a complete listing of existing and proposed natural gas pipelines in North America, please inquire about our latest Shale/Pipeline map at www.naturalgasintel.com

Expect the Appalachia to See Competition From the Haynesville

- Haynesville is located in North Louisiana and East Texas, close to proposed GOM export facilities
- Scalable: Current production 7 Bcf/d, but peaked at close to 11 Bcf/d.
- Anywhere from 35,000 – 50,000 wells left to be drilled there
- Lots of takeaway capacity
- Dry gas, so it doesn't have to be processed
- Potential for more cheap recompletions in Haynesville than in Marcellus
- BG Group a big player here (50/50 production JV with EXCO Resources, and holds LNG export capacity at Sabine Pass & Lake Charles)



The Appalachia is here to stay, and will be a major structural component of U.S. nat gas production going forward. However, production growth in the area should start trending closer to the national average by the end of the decade.

Chances of the Appalachia Taking Over As the Point of Reference For U.S. Basis Trading? Virtually Nil

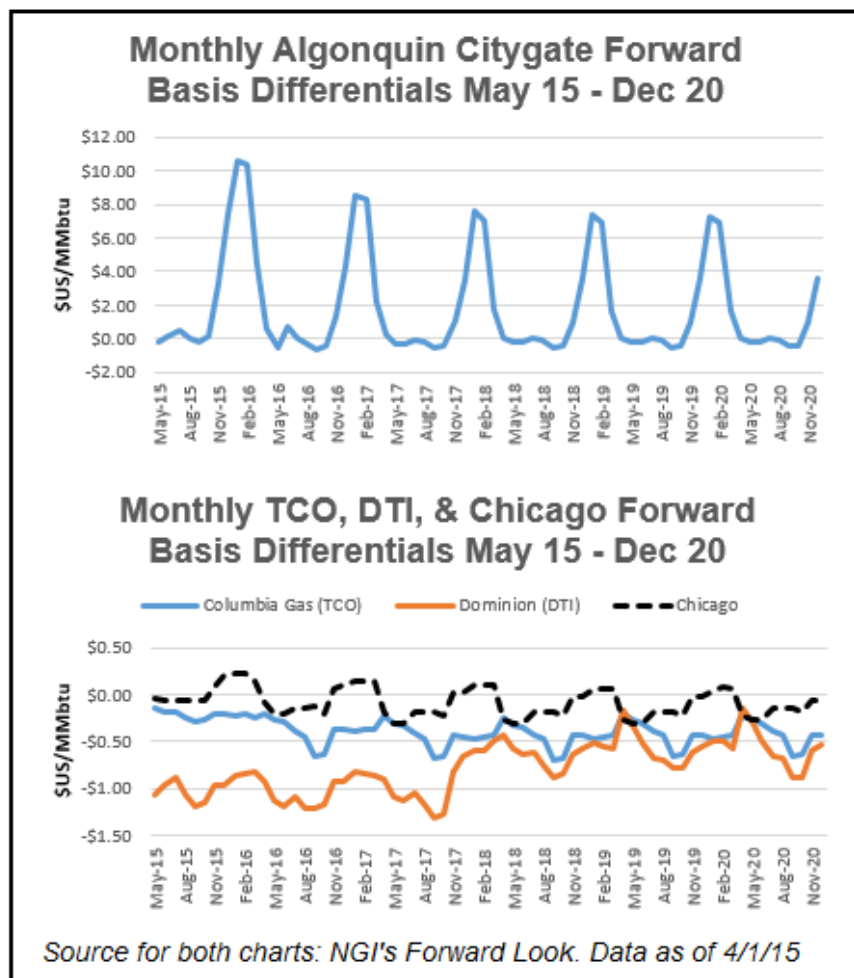
- We believe quoting transactions based off the Henry Hub is woven into the fabric of gas traders (no change for change's sake).
- Too many physical and financial contracts still tied to HH.
- A switch to an Appalachia basis reference point wouldn't be costless.
- Others have failed to establish a secondary U.S. nat gas futures contract: KCBT Waha.
- The Henry Hub is well positioned to handle future U.S. LNG export activity.

To Summarize

The Appalachia has NOT rendered the Henry Hub irrelevant

- HH is still a decent proxy for other producing regions (Haynesville, Eagle Ford, etc.).
- Volumes at the HH should benefit from LNG exports and increase in Gulf Coast industrial demand.
- HH should remain the reference point for basis trading.

Using NGI's Forward Look to Monitor Regional Volatility



Summary of Forward Basis As of 4/1/15

Date	Algonquin Citygate	TCO	DTI	Chicago
May-Dec 2015	\$1.370	-\$0.215	-\$1.035	-\$0.009
2016	\$2.548	-\$0.361	-\$1.028	-\$0.029
2017	\$1.831	-\$0.426	-\$0.994	-\$0.099
2018	\$1.619	-\$0.453	-\$0.636	-\$0.121
2019	\$1.583	-\$0.426	-\$0.565	-\$0.127
2020	\$1.573	-\$0.427	-\$0.561	-\$0.109

Summary of Forward Basis As of 3/2/15

Date	Algonquin Citygate	TCO	DTI	Chicago
May-Dec 2015	\$1.029	-\$0.198	-\$1.090	-\$0.046
2016	\$2.050	-\$0.334	-\$1.087	-\$0.064
2017	\$1.348	-\$0.421	-\$1.041	-\$0.139
2018	\$1.136	-\$0.465	-\$0.719	-\$0.153
2019	\$1.136	-\$0.443	-\$0.648	-\$0.154
2020	\$1.124	-\$0.443	-\$0.644	-\$0.133

% Difference

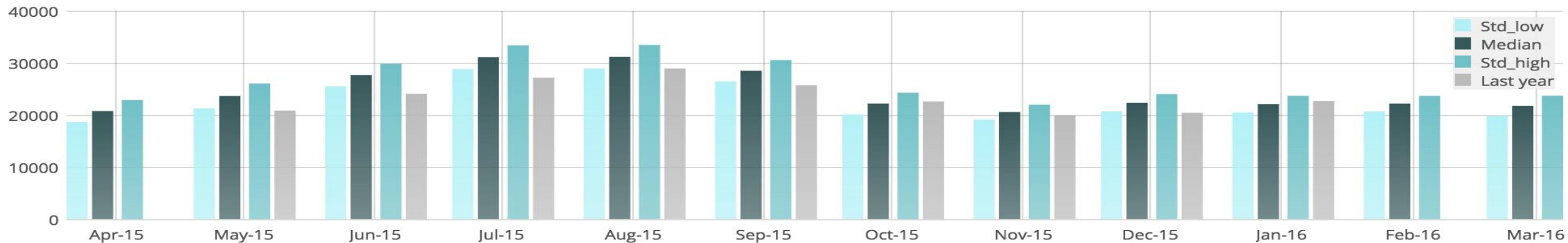
Date	Algonquin Citygate	TCO	DTI	Chicago
May-Dec 2015	33.2%	-8.3%	5.1%	81.3%
2016	24.3%	-8.0%	5.5%	55.2%
2017	35.9%	-1.3%	4.5%	29.1%
2018	42.5%	2.6%	11.6%	20.9%
2019	39.3%	3.8%	12.9%	17.6%
2020	40.0%	3.7%	13.0%	18.4%

Source: NGI's Forward Look, NGI calculations

Observ's Power Burn Forecast

- We are a bottom-up price-driven power burn forecast. The forecast is done at the state-level.
- Based on the the latest forward basis curve, the median scenario shows +2.3 bcf/d YoY increase in power burn for the summer. (+4.4 bcf/d summer burn increase in 1 σ high scenerio)
- The biggest increases come from South Central and Midwest (EIA region definition)
- Top uncertainties in forecasting power burn:
 - The lack of transparency in fuel cost for coal-fired plants
 - The behavior of gas-fired plants in Texas remains the biggest mystery
 - Generation profile of power plants may change over time
 - Utilization rate of renewables may accelerate
 - Coal plant outages are hard to predict

Comparison of Forecast Deviations (mmcf/d)



People who dig into regional market dynamics will win over the macro-only guys.



TOLL CALCULATOR

FROM **Kingsgate**

TO **Malin**

RESET GET REPORT

TOTAL

SERVICE FT IT

UNITS CA\$/GJ US\$Dth

Exchange Rate US\$ / CA\$	1.260
Spot Price \$	2.187
Fuel %	0.013
Demand \$	0.344
Commodity \$	0.011
Est. Cost of Fuel \$	0.000
Fixed Costs \$	0.344
Variable Costs \$	0.011
Total Est. Toll + Fuel Cost \$	0.356

Notes: For contact information click [HERE!](#)

ANR STORAGE CALCULATOR

HELP CONTACT FEEDBACK

The map displays a network of pipeline nodes across North America. Key nodes include Kingsgate (highlighted in blue), Malin (highlighted in green), NIT, A/BC, Empress, Emerson, North Bay, Dawn, Chicago, Dracut (Boston), and New York (IGTS Zone 2). A highlighted path shows the route from Kingsgate to Malin.

Which kind of nat gas market
player do you want to be?

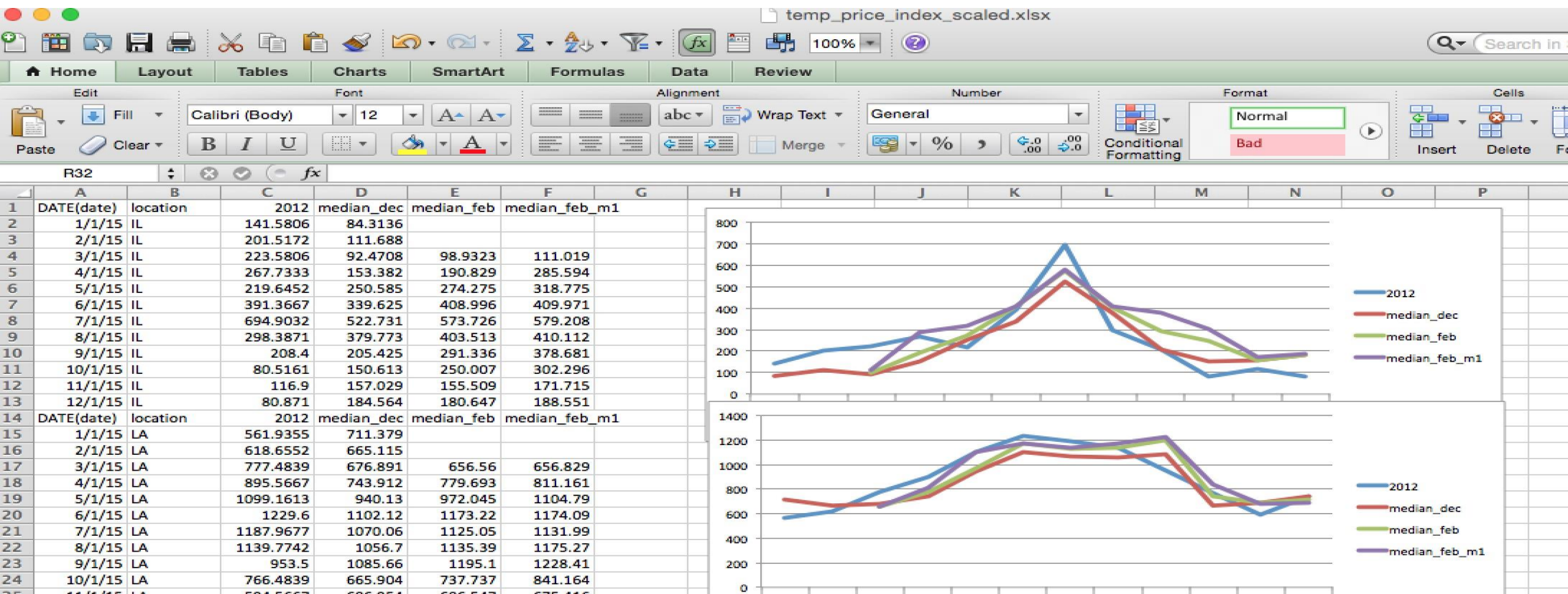
Old School Believers

My edge is my contact.



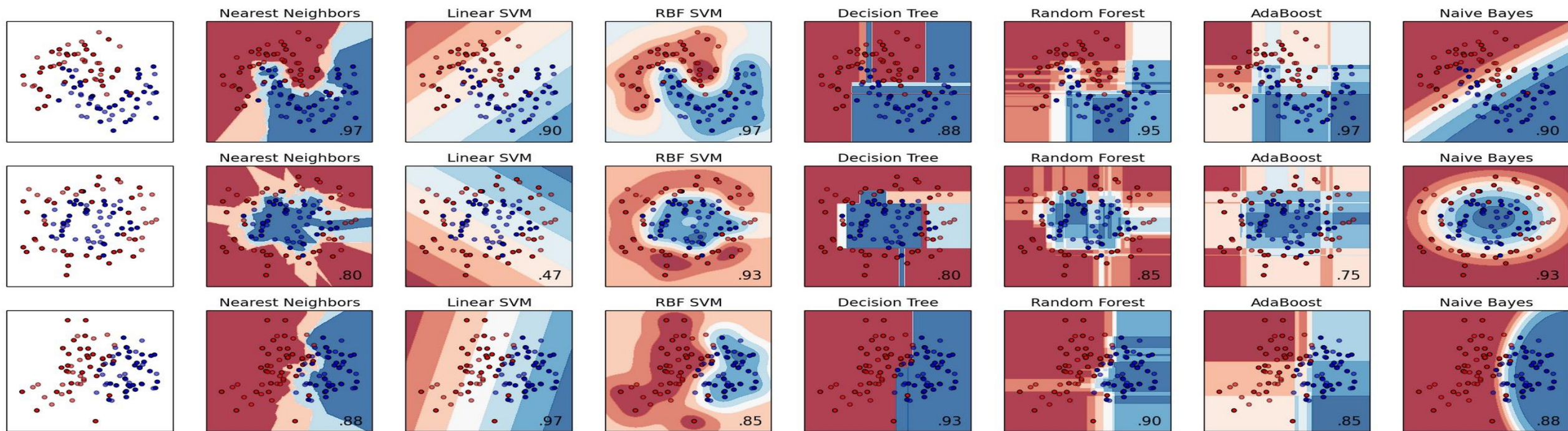
Excel Junkies

I can record a VBA macro to get me coffee. Can you?



Matlab/R Groupies

Python and Pandas are more than animals.



Trainer Lovers

Technologies train my mind to trade better.



“It is not the strongest of the species that survives, nor the most intelligent. It’s the one that is most adaptable to change.”

Let's open up for Q&A



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