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SHALE AND WALL STREET:

WAS THE DECLINE IN NATURAL GAS PRICES ORCHESTRATED?

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Wall Street and Shales

- Production target pressure by banks
- Over-leverage by companies
- Caused supply glut and price decline
- Decline in nat gas price paved way for billions in transactions for Wall Street

WS Adopted Same Playbook

- Bundled mortgages, bundled leases
- Off Balance sheet financing
- Complex financial products
- Lack of transparency in well data
- Congress encourages promotion

BarCap Deal
Off Balance Sheet Financing

- "The main challenges in putting together the Chesapeake VPP deal were getting the structure right and guiding the ratings agencies and institutional investors - who did not necessarily have deep familiarity with the energy business - through the complexities of natural gas production" - Risk, March, 2012

Congress Promoting But Insiders Uncertain

- "...you have to test whether or not the resource base is sufficient [for exportation]...I'm not sure that we have enough experience with shale gas to make the kind of judgment you have to make" - Lee Raymond, former CEO ExxonMobil, February, 2012

- "To sustain growth, companies will need to drill many wells at a rate beyond the capacity of the industry as currently defined...those who ballyhoo oil shale and say this will take care of us - no, it won't" - John Hofmeister, former Chief of Operations, Royal Dutch Shell, September, 2012

Bundling Leases

- "I can assure you that buying leases for x and selling them for 5x or 10x is a lot more profitable than trying to produce gas at $5 or $6 mcf." - Aubrey McClendon, CEO Chesapeake Energy, 2008

- "Surging prices for oil and natural gas shales...are raising concern of a bubble..." - Bloomberg, January, 2012

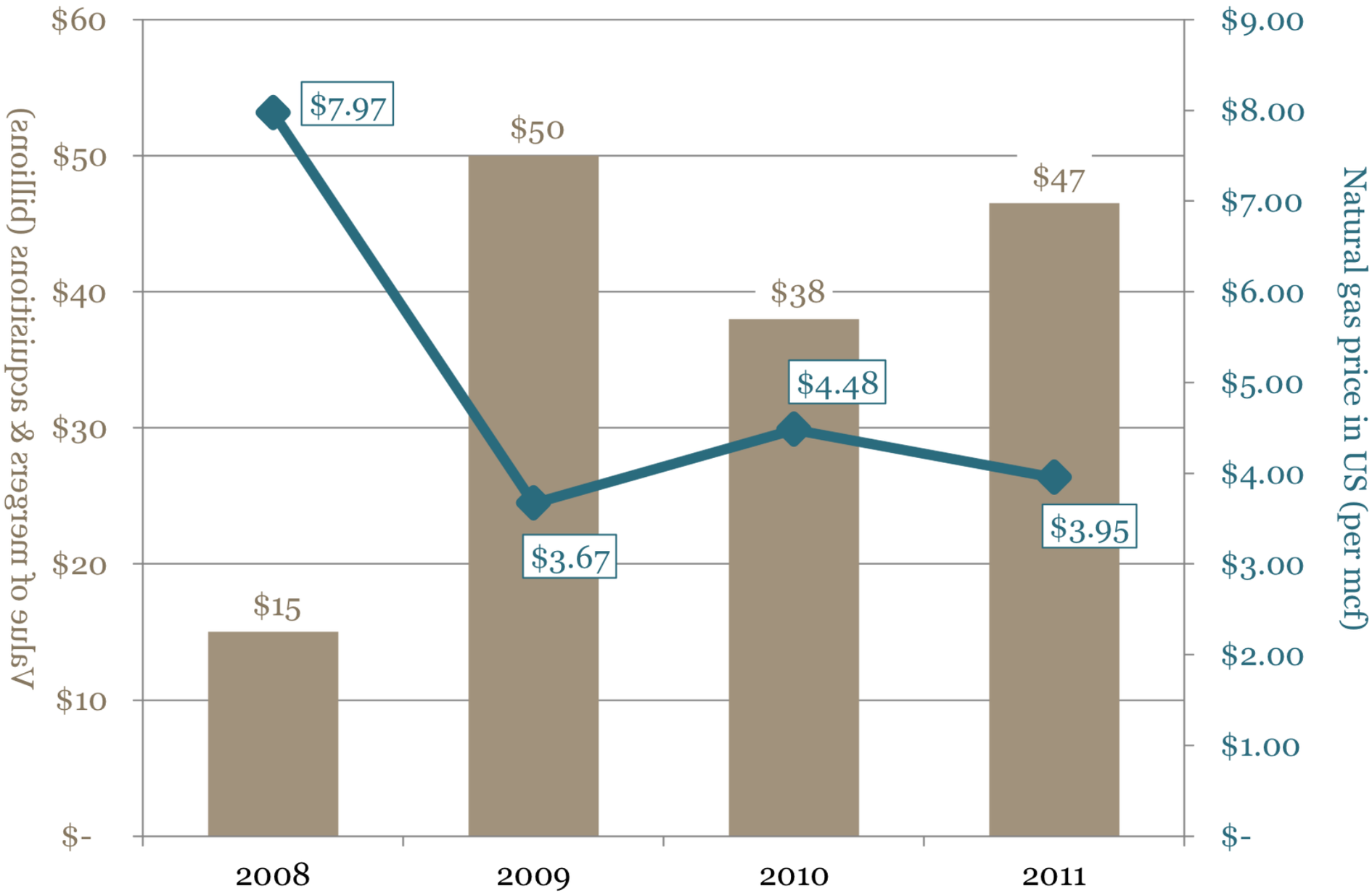
Shale M&A Explodes Shareholder Value Destroyed

- Shale M&A market exploded in 2009
- Shales became one of the largest profit centers in the banks in direct parallel with decline in nat gas prices
- Massive write-downs have since occurred on shale assets destroying shareholder value

Conspiracy Theory?
Or Simple Math?

- Existing Production + Production Targets = Significant Number
- Significant Number - Current Demand = Considerable Surplus
- Considerable Surplus = Glut = Low Prices
- Low Prices = Asset Sales = $$$ in Fees

Value of Mergers & Acquisitions Compared to Natural Gas Prices, 2008-2011



Data: IHS Herold; Energy Information Administration.

Shale Frenzy

- Frenzy of deal making in shales
- BHP pays 65% premium over prior days close for PetroHawk
- $32B in M&A in Marcellus play since 2010
- By Q3 2012 activity fell to zero in Marcellus
- Q3 2012 write-downs begin in earnest

Massive Write Downs Q2-3 2012

- Encana - $1.7B
- Quicksilver - $2B
- Devon Energy - $2B
- Chesapeake - $2B
- BP - $2.11B
- BHP - $2.84B or 50%+ of purchase price of Fayetteville assets
- Significant shareholder destruction. Further, this is 2nd round of significant write downs since 2009.

Shale Exportation

- US seen as most favorable for shale production because fewer business hurdles
- Domestic price appr. $4/mcf; international price $18/mcf
- Gas fully costed delivered to Asia for appr.$9/ mcf
- Permits at DOE commit appr. 60% of current US demand to overseas markets

Recovery Efficiency

How Much Gas Can We Get Out?

- Based on actual production, reserves have been overestimated by a minimum of 100% and as much as 400-500% - Berman et al, U.S. Geological Survey, Post Carbon Institute

- "The recovery efficiency for the five major [shale gas] plays averages 6.5%...this contrasts significantly with recovery efficiencies of 75-80% for conventional gas fields." - Oil and Gas Journal, December, 2012

- Appr. 40% of 2012 reserve replacement for ExxonMobil came from 2 shale plays - Woodford and Bakken. Avg. well in the Bakken is 94% played out by year 5. Woodford in severe decline.

Majors Struggling

- Majors have not been able to expand reserve replacement ratios materially
- 1/4 reserve growth has come from acquisitions only
- Acquiring shale assets made it appear that reserves were growing again
- Massive share repurchases to appear more profitable - spending as much as $5B or more per quarter

EROEI
Energy Returned On Energy Invested

- Crude, early U.S. - 100:1
- Crude today - 11:1
- Tar Sands - 3:1
- Shales - <5:1
- Troubling dependence on low EROEI fuels

Drilling Treadmill

Based on Actual Production Data

- Over-all shale field decline rates in U.S. - 30-50% per annum

- $42B and more than 7000 new wells just to maintain *flat* production profile

- 561 new wells per year needed in Marcellus just to keep production *flat*

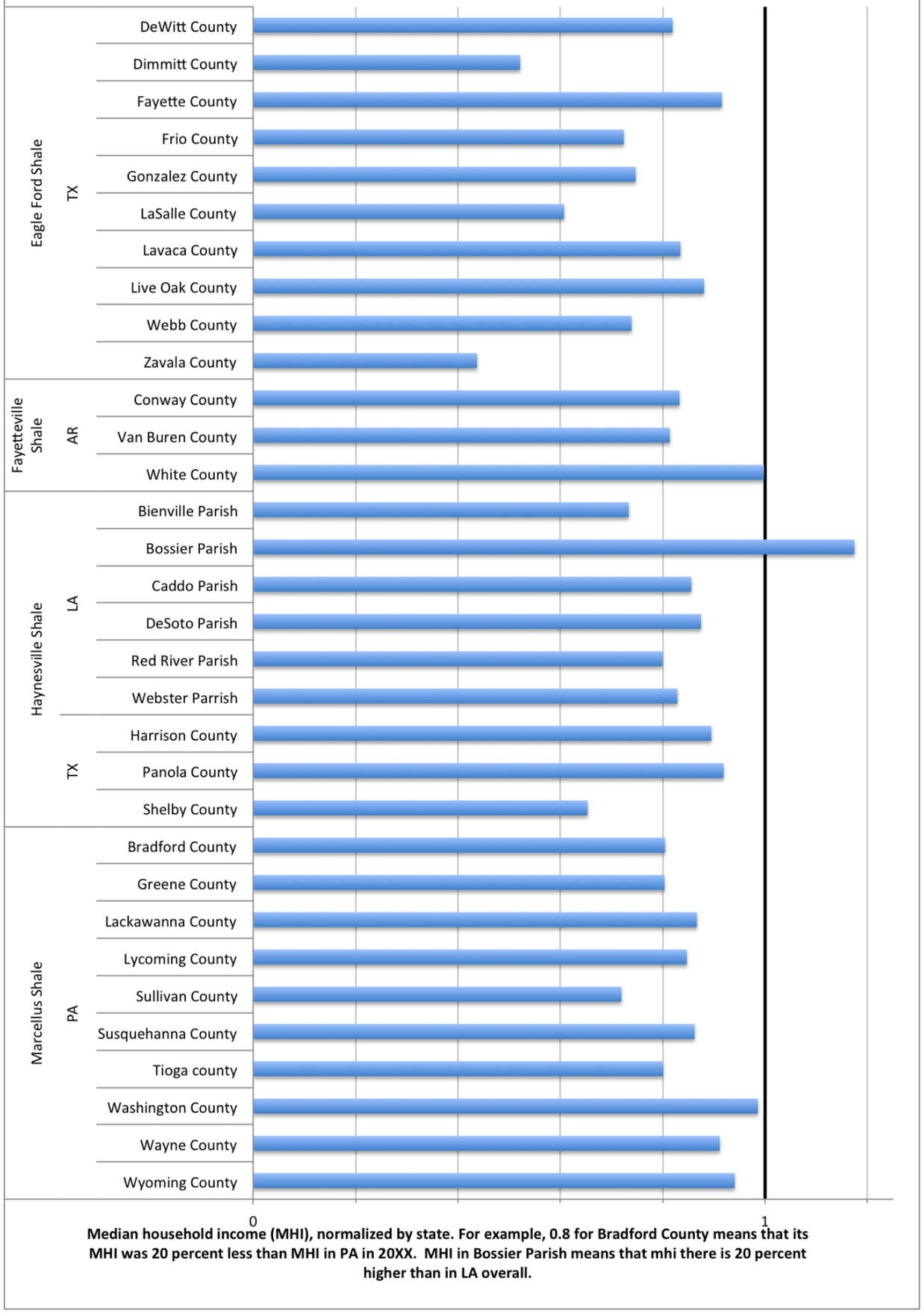
- Shale gas production likely peaked December 2011

- Based on actual production history, ***all*** U.S. shale plays will be at stripper well status by 2024

Frackonomics

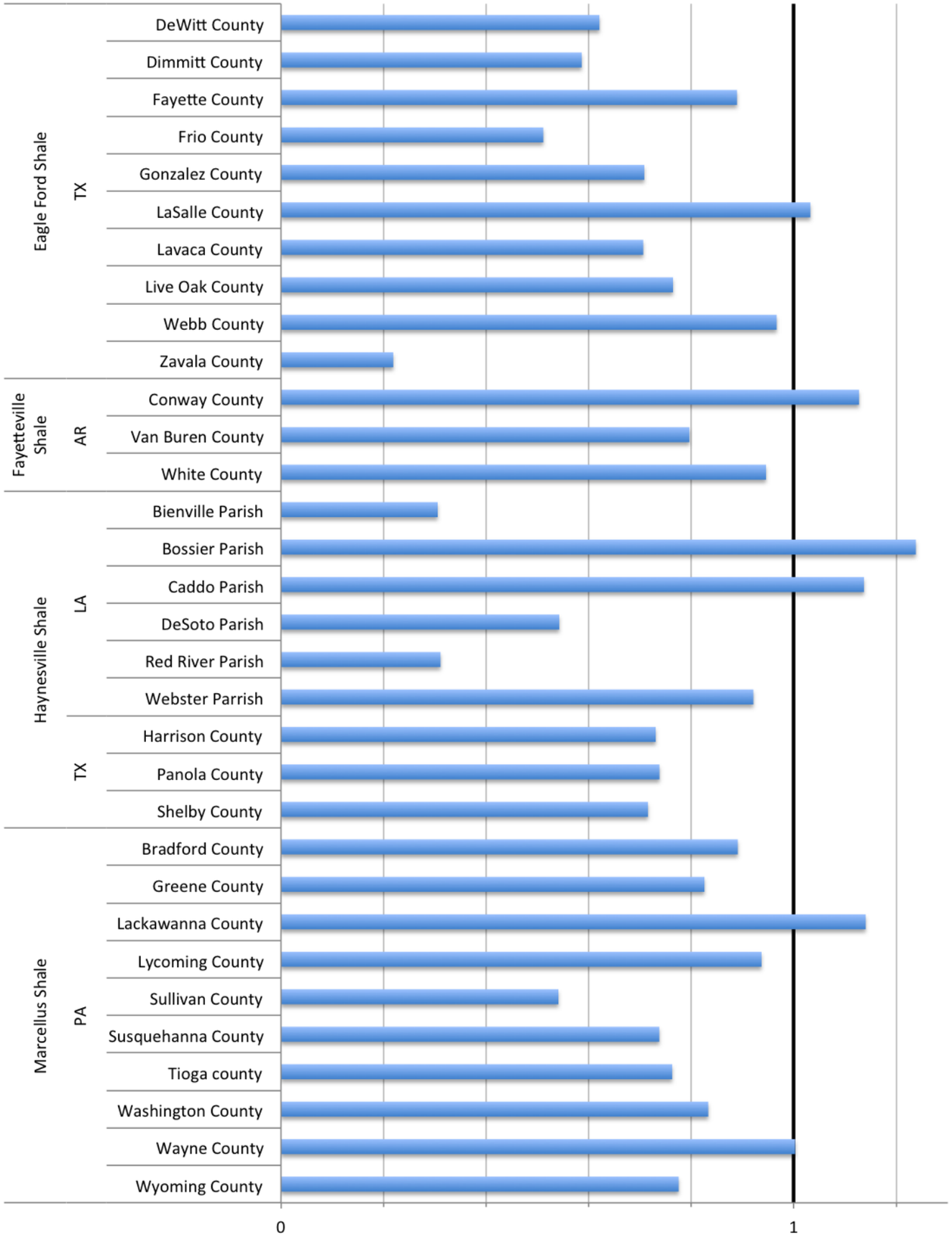
- Economic benefits short lived in every play thus far
- Direct industry jobs only 1/20 of 1% of US labor market
- Key economic indicators underperforming in core counties
- PUD's appear not have been properly reclassified due to threat of collateral default at some companies
- Exportation pursued for price differential to aid ailing balance sheets

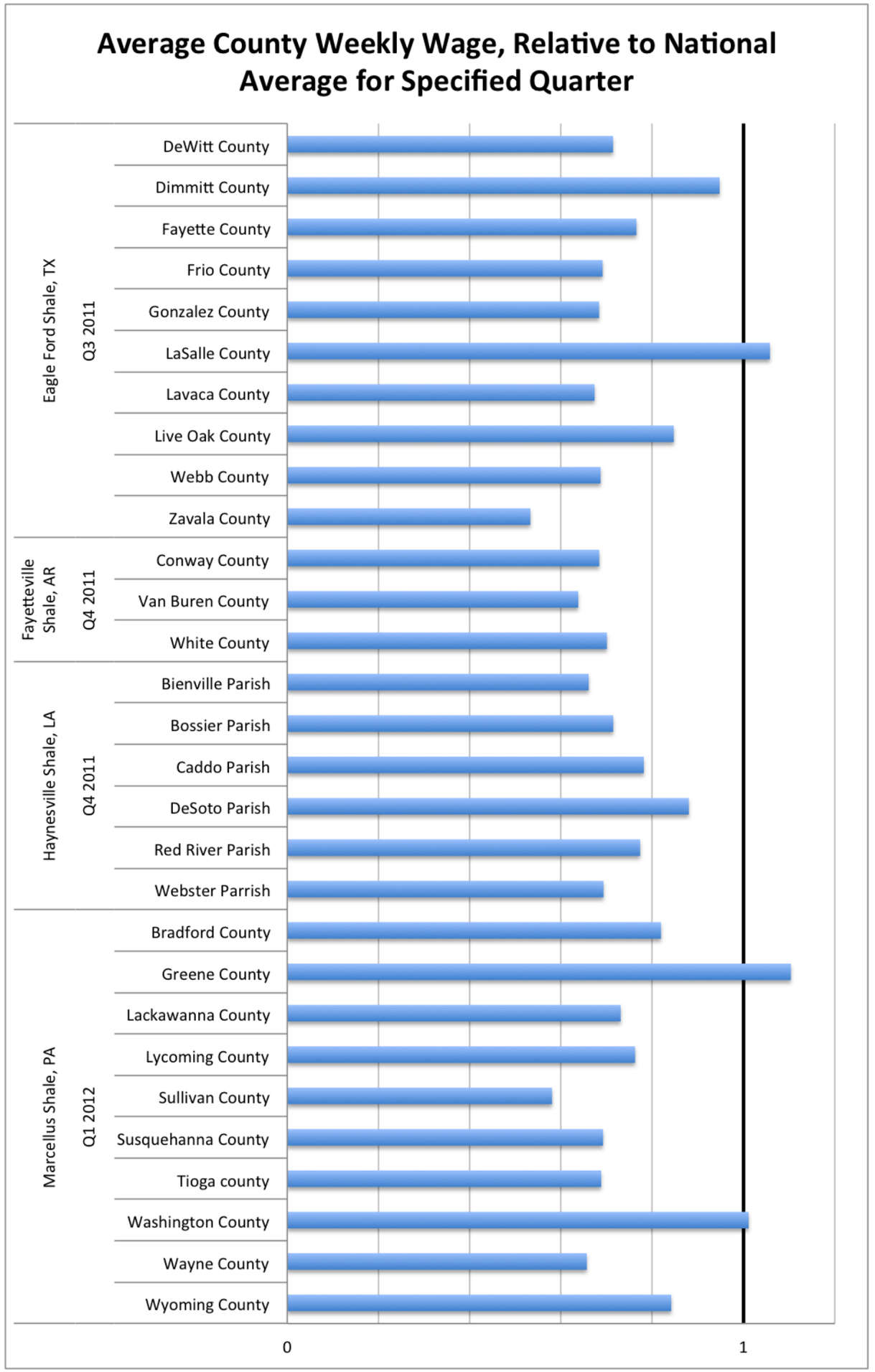
County Median Income in Shale Plays Compared to State Median Income, 2006-2010



Median household income (MHI), normalized by state. For example, 0.8 for Bradford County means that its MHI was 20 percent less than MHI in PA in 20XX. MHI in Bossier Parish means that mhi there is 20 percent higher than in LA overall.

County Retail Sales per Capita in Shale Plays Relative to Respective State Level, 2006-2010




Average County Weekly Wage, Relative to National Average for Specified Quarter
Eagle Ford Shale, TX
Q3 2011
DeWitt County
Dimmitt County
Fayette County
Frio County
Gonzalez County
LaSalle County
Lavaca County
Live Oak County
Webb County
Zavala County
Fayetteville Shale, AR
Q4 2011
Conway County
Van Buren County
White County
Haynesville Shale, LA
Q4 2011
Bienville Parish
Bossier Parish
Caddo Parish
DeSoto Parish
Red River Parish
Webster Parrish
Marcellus Shale, PA
Q1 2012
Bradford County
Greene County
Lackawanna County
Lycoming County
Sullivan County
Susquehanna County
Tioga county
Washington County
Wayne County
Wyoming County
0
1

Lack of Confidence

- October 2011 Norse Energy put all its Marcellus leases up for sale - no takers

- Anschutz Exploration let Marcellus leases expire

- PDC Energy couldn't get JV partners for its Utica assets in spite of having "some of the best acreage"

- Oneok failed to secure partners for pipeline venture for the Bakken oil shale play. Crude to be shipped by rail at 3x cost of pipeline shipments.

Road Damages vs. Revenue

- Estimated road damages in Texas from drilling - $4.0B. Revenue $3.6B

- Estimated road damage in Aarkansas from drilling - $450M. Revenue $182M

- Funds needed to maintain PA roads - $3.5B

- Impact fee revenue - $204M

- PA drilling counties "hardest hit" by flooding due to poor road conditions from Hurricane Sandy

Health Impact Costs

- Barnett Shale - $73M per annum
- Fayetteville Shale - $33.5M per annum
- Marcellus Shale - $32M per annum
- Agricultural losses (cumulative) - $26M

Why Are Shales So Hyped? *Competition*

- Prudential Capital and GE are "investing in core infrastructure projects with high gross margins and revenues fixed for 20 to 25 years" - Forbes, March, 2012

- "These projects offer stable, low double-digit rate of returns (IRRs) while generally paying out an annual yield in the range of 6-8 percent" - Forbes, 2012

- "'Clean economy' grew 8.3% during economic downturn (2008-2009), appr. twice the overall economy" - Brookings Institute, 2011

The Real Job Story

- Appr. 181,000 direct industry jobs for oil and gas - Bureau of Labor Statistics, 2011
- Appr. 183,200 direct industry jobs renewables - AWEA, Solar Foundation and GEA reporting to BLS, 2011
- Oil and gas account for appr. 45% of total energy generation capacity
- Renewables account for appr. 15% of total energy generation capacity
- Renewables providing significantly more jobs per kilowatt capacity than oil and gas

Where Is The Smart Money Going?

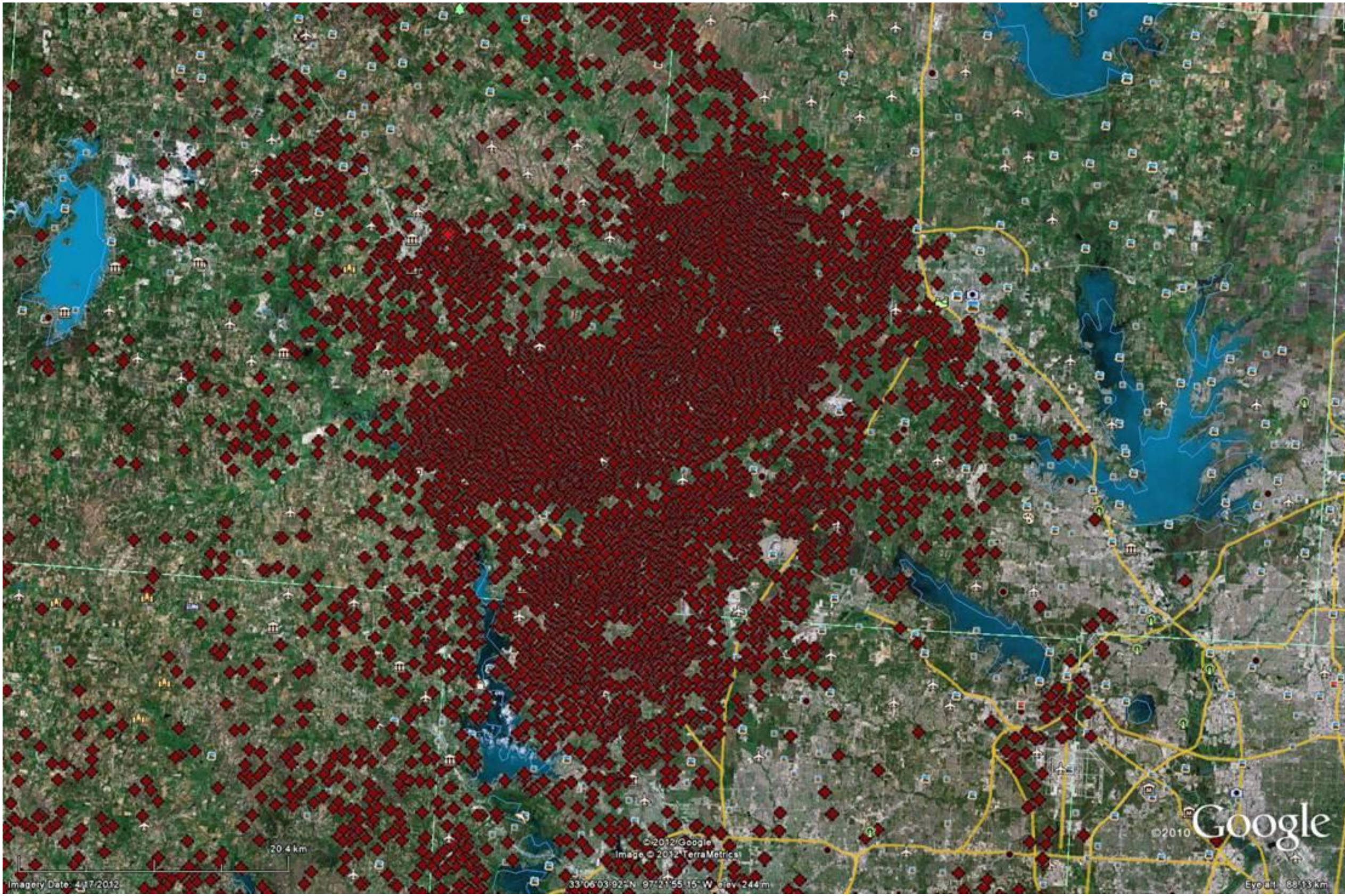
- U.S. added 1231 megawatts of new generating capacity in Jan. 2013 - all of it from renewable sources
- Represents a 3-fold increase over Jan. 2012
- Nuclear, hydro and fossil fuel sources provided NO new capacity that month
- Berkshire Hathaway, Google, MetLife and John Hancock poured $500 million into renewables last year

Fundamentals of O&G

- Dwindling product line, not renewable
- Not competing on direct job growth per kilowatt capacity
- Volatile pricing which will rise with scarcity
- Dependence on low EROEI fuels
- Pricing tied to international markets, therefore can never provide true energy independence

Fundamentals of Renewables

- Unlimited amount of energy, renewable
- Significant job creation per kilowatt capacity
- "Power plants with no fuel costs" - Forbes, 2012
- Good hedge against volatile fossil fuel prices
- Pricing not tied to international markets, can provide true energy independence


20.4 km
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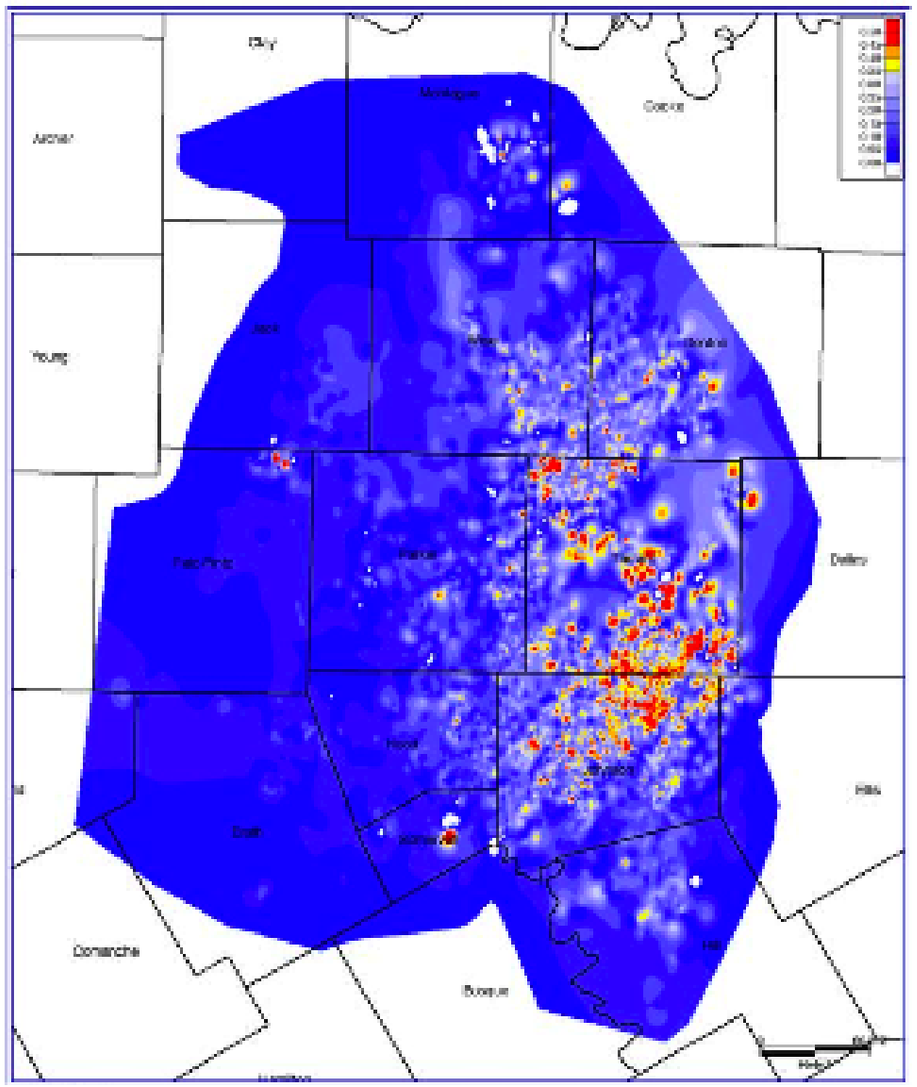
he Barnett Shale Play has contracted to small core areas



- Less than 10% of the play has the potential to be commercial.
- Even within the core areas, well performance is uneven and considerable commercial risk exists.

First 6-month cumulative production for Barnett Shale horizontal wells. Data source: HPDI

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