Energy Trends:
Dealing With Unintended Consequences

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Down the Rabbit Hole…

To the Wonderland of the Energy Markets

• Major longer-term trends
• Crude oil and natural gas markets
• Credit and bank issues
• NGL market
• Transportation outlook
• Utica/Marcellus issues

And many other scary things
“Faster! Faster!” cried the Red Queen

They seemed to skim through the air, until, exhausted, Alice, stopped and found herself on the ground.

The Queen propped her up by a tree.

Alice looked around in surprise. “I do believe we've been under this tree the whole time! Everything's just as it was!”

“Of course it is,' said the Queen, 'what would you have it?”
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• When you’re right, never let them forget it.
Primary Trend Theses

Perception: 100-year cheap ($3) gas supply
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  Perception: Climate Change needs action
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Governments will get more rent from energy
Primary Trend Theses

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- Perception: Climate Change needs action
- Nuclear and coal power losing to competition
- Increased globalization of energy markets
- Hydrocarbons (BTU basis) will converge ($)
- Slowing economies put pressure on to change
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Regulation will get worse, maybe much worse

The most expensive words in the English language:

“This time it’s different.”- Sir John Templeton
E&Ps: Serial Destroyers of Capital

Incentivized by shale; enabled by cheap money
Global O&G Production S/B Down 6%

Run rate decline at Y/E 2016 could be ~8%
Low Interest Rates Push Shale Drilling

Natural Gas

Interest Rate -10yr

Too much cheap capital chasing marginal projects
Increasing Importance of Credit Markets

• Forecast for extended slow economy, weak prices
• Fed concerned about bank capitalization
• Also: Seek to avoid voluminous foreclosures
• Credit agencies (Moody’s) helping the process
• Closing debt markets, pushing equity
• Austerity may leave only the biggest standing
• Implicit time frame: 2-3 years, minimum
• Nobody too big to avoid some pain
Leverage Soars at U.S. Oil Producers
Net debt/Ebitda for S&P 500 versus energy companies

- S&P 500 Energy Sector Index GICS Level 1
- S&P 500 Index

Source: Bloomberg

*Reason for Fed’s concern about banks*
Rates for Energy Names Higher Than Implied

Exxon (AAA) had 2016 debt priced like A rate
Capex Plowback Still High in 2016

Prices have come down faster than spending
E&P Debt Will Take Years to Bring Down

Even if prices recover, the debt hangover will remain
This implicitly assumes costs and prices of dry natural gas will not increase over future years.
Utica Source of Long-term Growth

More constrained than Marcellus by offtake

Source: Wood Mackenzie
All dry shale gas plays except Utica, Marcellus in decline already. They should be in decline by 2020, if not earlier.
Conventional Gas In Long-term Decline

Economics not supporting shallow drilling. Likely cut by 40% over next decade.

Decline 5%/yr

Non shale gas production
Shale Gas as Disruptive Innovation

Perceived bonanza for economy, energy supply

- Expand power, chemical, transportation
- Touted as 100-year supply

Priced artificially below $3/Mcf (33% of oil BTU)

Poised for LNG export (some), GTL (never)

Disrupts planning for nuclear, coal, renewables

Path to HUGE fuel imbalance

Increases volatility and disruption

Spillover affecting banks, credit markets (perhaps economy?)
“Trends” Run In Cycles (7-10 Years)

• 1999 – Crude oil at $10, forecast to stay there
• 2002– Power deregulation, favors nukes & merchants
• 2005 – Plans for 38 LNG import terminals
• 2006 - Natural gas hits $14/Mcf
• 2007 – Crude climbs to $140, rise of cellulosic ethanol
• 2011 – Nukes, merchants, coal plants being shuttered
• 2013 – 100-year supply of cheap ($3) natural gas
• 2014 – Plans for 30+ LNG export terminals
• 2015 - Crude oil drops from $100 to $30
It could be a LONG next seven years for gas.
Intermediate Energy Trends

• Majors cutting back on big projects
• MLPs ready for infrastructure roll-ups
• Oil service: Huge pressure to lower costs
• PE capital inflow to debt or assets, not equity
• Focus on upstream exports for all hydrocarbons
• Access to capital becoming problematic
• OPEC no longer supporting oil price
• Longer completion times vs. plans
• 2016-20 is Era of Infrastructure
Crude Oil Macro View

- **Drivers**: supply, demand, *global central bankers*

- **Primary Oil Major driver**: Avoid political risk

- **Energy demand** correlated to global GDP

- **Critical supply elements**:
  - Saudis only OPEC swing producer, rest at maximum
  - OECD supply growth centered on US shale
  - Saudi Arabia no longer supporting price targets

- **Shale introduces faster S/D response, more volatility**
  - Major projects getting pushed off (bullish)
  - Capacity delayed, lumpy when it arrives
November 2014 – Saudis decide to not cut production
Fiscal Breakeven For OPEC Countries

Increased chance for heightened political risk
Historical Oil Price, In Current Dollars

Move from “cheap” to “affordable” crude oil. Large increase in volatility, new “normal”.
Natural Gas – Macro View

• Production less subject to “subsurface risk”
  • Transition: “hunters” to “gatherers” to “farmers”
  • Highly technical process/logistics

• Stressful pricing while awaiting infrastructure

• Mediocre results away from “sweet spots”

• Will Asia drive marginal U.S. natgas price?

• US natgas pricing a victim of its own success
  • Capital tightening (another round?)
  • Too many players, now and sidelines
  • Capital needs market pricing
Natural Gas Demand Growth

Power/heat: Displace coal – 4Bs/day by 2020
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**Export LNG (wild card)** - 8Bs/day by 2020
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• **Vehicle Transportation**- ???

**Added 20+Bs/day (30%) by 2020**

*(But economy may cut estimates by 40%)*
Hurdles To LNG Export Story

- Many foreign LNG entrants, Gazprom
- Other sources (e.g. Japan nuclear fleet)
- Link to oil price unraveling
- Low European gas prices
- Worker shortage to construct
- Distance from prime markets
- Reliance on current gas price

Crucial to gas price recovery
Global LNG Price Anticipating Supply

Supply likely to exceed demand for many years
Issues Affecting Utica/Marcellus

• Environmental issues
• Proposed severance tax(es)
• Infrastructure build-out
  • Time frame (2020 treadmill?)
  • Negative basis/cash flow
• Lack of “major players”
• Cloudy cycle (7-10 yr.) economics
• Closing of capital markets
The Good Acreage Gets Developed First

Two large Marcellus sweet spots
Wet in southwest, dry in northeast
Limited Acreage Profitable at $3/Mcf

Yellow Red EUR Above
8.4 Bcf/well
Commercial Threshold

Core profitable-at-$3 areas are smaller than sweet spots

Marcellus $4 Case
<table>
<thead>
<tr>
<th>Area (acres)</th>
<th>Wells</th>
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<tbody>
<tr>
<td>Main NE Core</td>
<td>288,193</td>
</tr>
<tr>
<td>Greene SW Core</td>
<td>52,520</td>
</tr>
<tr>
<td>Washington SW Core</td>
<td>10,941</td>
</tr>
<tr>
<td>Total Core Areas</td>
<td>351,654</td>
</tr>
<tr>
<td>Drilled Play Area</td>
<td>13,663,039</td>
</tr>
<tr>
<td>Percent Commercial</td>
<td>3%</td>
</tr>
</tbody>
</table>

SW Core Area Probably Conservative:
NGL Uplift Not Included Due to Lack of Information
All US Supply Growth From U/M

Region has more than 2500 drilled nonoperating wells with at least 10 Bcf/day initial production.
Utica/Marcellus Lowest Cost Shale Gas

Infrastructure, markets still huge hurdles

$2.50
Gas is cost “beneficiary” of oil price decline
Offtake Like Flying Through O’Hare

Longer than planned & unforeseen problems
NGL Overview

• Supply growing faster than demand
• Midstream, fractionation: Little resistance
• End-use infrastructure taking longer
• Take/Pay contracts forcing production
• Weak gas price hurting ethane rejection
• Slim export capacity growth short-term
• Crude oil drop, instability major hurdles
The ethane above blue line is “rejected”, left in methane stream to sell as natural gas. Leads to propane oversupply.
Domestic NGL Demand Will Lag Supply

Exports need pipelines, facilities, markets
How Does Oil Drive Natural Gas Price?

• Global LNG chases oil-based pricing

• Crude oil and NGL drilling brings “associated gas” production

• NGLs also priced off crude oil

• Ethane (NGL) “rejected” as feedstock, crowds dry natural gas supply

Commodities are priced at the margin
Less Spending! More Production?

ExxonMobil cutting spending, but could boost output 250M barrels/day

Antero Resources scales back on 2016 spending by 36 percent

Continental slashes 2016 budget by 40%

Halliburton cut 22,000 jobs in last year

Conoco Slashes Capex by 40% and Reduces Dividend 66%

Most 2016 spending cuts will come out of lowered Oil Service costs. Focus to be on best wells, for cash flow
Key Take Away Thoughts

• Natural gas infrastructure will take at least three years, lagging supply
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• **LNG “salvation” is facing headwinds, may disappoint**
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• Cheap capital, global monetary policy, high dollar, slowing economies have oversized effect on supply/demand
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- Decline rates, volatility, regulation & tax trends are bullish for crude oil
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- Utica/Marcellus are key to future for natural gas and NGL markets

The key is not to predict the future, but to be prepared for it. - Pericles
“Well, in OUR country”, said Alice…

still panting a little, “you'd generally get to somewhere else—if you ran very fast for a long time, as we've been doing.”

“A slow sort of country!' said the Queen. 'Now, HERE, you see, it takes all the running you can do, to keep in the same place. If you want to get somewhere else, you must run at least twice as fast as that!”
Thank you.
Any questions?