



Oil and Natural Gas Price Fundamentals- Chaos, Volatility & Uncertainty

AADE

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****IMPORTANT DISCLOSURES ON PAGE 31 OF THIS DOCUMENT****

Summary

- Crude Oil - \$100/bbl Long Term

- Bias higher longer term
- Near term uncertainty
 - Europe contagion/global demand
 - Iran - all turban and no camel?
 - OPEC - excess capacity?

- Natural gas - Too...much...gas

- Near term looks ugly
- Medium term \$4/mcf
- Longterm \$6+/mcf requires LNG exports, demand acceleration...or both!

Oil Market Forecast

Near-Term (3-6 months):

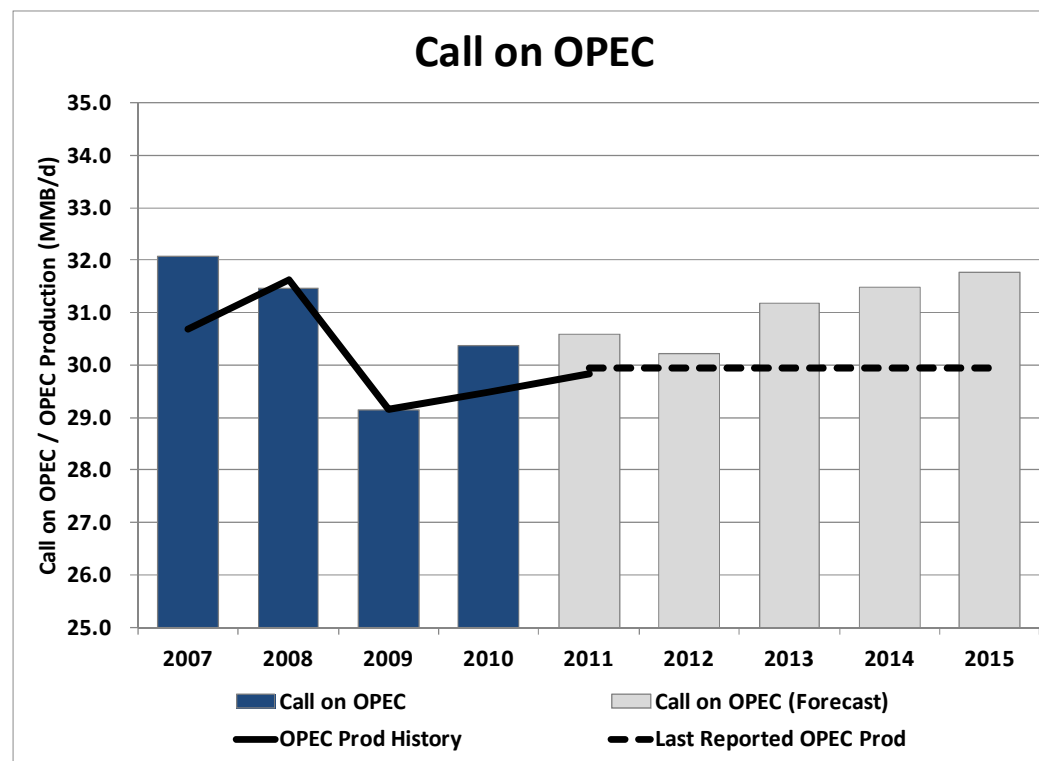
- Uncertain Euro economy
- Global oil demand likely fares better than in '08/'09
- OPEC support at ~\$90/bbl Brent.

Medium-Term (12 months):

- OPEC comfortably controls market in most scenarios.

Long-Term (2-5 years):

- Call on Saudi reaches new highs, supporting price at \$100+/bbl Brent.
- Market provides room for incremental Iraqi and US-lower 48 output.



kbd	2007	2008	2009	2010	2011	2012	2013	2014	2015
Call on OPEC	32.1	31.5	29.1	30.4	30.6	30.2	31.2	31.5	31.8
OPEC Prod History	30.7	31.6	29.1	29.5	29.8				
Last Reported OPEC Prod					30.2				

2012 Supply/Demand Scenarios

Summary:

■ Base case

- Call on OPEC flat vs. current prod.
- Saudi cuts as Libya returns to production.

■ High Case

- In a recession-free 2012
- Saudi capacity may be tested

■ Uber- draconian test case.

- Implied Saudi Cut of 2.1 mmb/d
 - Repeat of the '08 demand destruction
 - Complete rebound in Libyan output
 - Virtually no supply response in non-OPEC

2012 SCENARIOS				
mmb/d	Draconian	Low	Mid	High
U.S.	18.0	18.5	18.9	19.2
OECD Europe	13.8	14.0	14.2	14.3
Japan	3.9	4.1	4.3	4.5
Other OECD	7.5	7.6	7.7	7.7
China	9.6	9.8	10.0	10.1
Other Non-OECD	34.1	34.4	34.8	34.8
GLOBAL DEMAND	86.9	88.4	89.9	90.5
NON-OPEC SUPPLY + OPEC NGLs	59.4	59.5	59.7	59.7
CALL ON OPEC	27.5	28.9	30.2	30.8
<i>Implied OPEC increase/(cut)</i>	<i>(2.6)</i>	<i>(1.3)</i>	<i>0.1</i>	<i>0.7</i>
Libya	1.5	1.2	0.9	0.1
Iraq	2.6	2.6	2.6	2.6
Other ex-Saudi Arabia OPEC	15.7	16.6	17.6	17.6
EX-SAUDI OPEC	19.9	20.5	21.1	20.3
CALL ON SAUDI ARABIA	7.6	8.4	9.1	10.5
<i>Implied Saudi increase/(cut)</i>	<i>(2.1)</i>	<i>(1.3)</i>	<i>(0.6)</i>	<i>0.8</i>

Structurally Higher Call on Saudi

Current:

- 9.8 mmb/d Jul-'11,
+0.8 mmb/d vs. May-'11

Base Case (2012):

- 9.1 mmb/d

High Case (IEA demand):

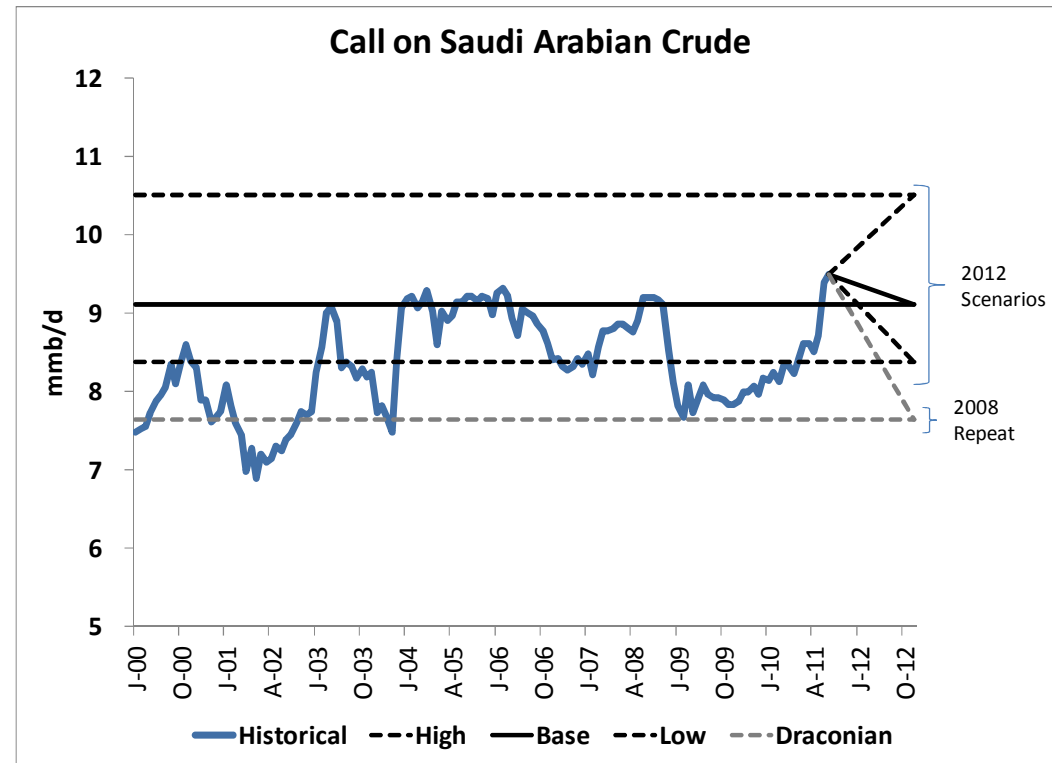
- 10.5 mmb/d,
unreachable?

Low Case (50% chance of '08):

- 8.4 mmb/d,
back to mid-'10 prod levels

Draconian (repeat '08 declines**):

- 7.6 mmb/d,
back to mid-'02 prod levels.



**Draconian scenario assumes '12 y/y demand declines similar to the '09 y/y declines (but from a lower base), complete restoration of Libyan production to 1.5 mmbpd, and no material supply response from non-OPEC.

Source: IEA, TPH

Demand: Less Sensitive Than in '08

Then (2008 & 2009):

- **Demand destruction:**
NAM 1st, Europe 2nd
- Global oil demand loss: -1.6 mmb/d (-2%)
 - OECD: -3.7 mmb/d (-8%)
 - NAM: -2.2 mmb/d (-9%)
 - OECD Pacific: -0.7 mmb/d (-8%)
 - Europe: -0.8 mmb/d (-5%)
 - Non-OECD: +2.1 mmb/d (+6%)
 - Middle East: +0.7 mmb/d (+10%)
 - China: +0.5 mmb/d (+6%)

Now (2011):

- **Demand Destruction:**
Europe 1st, NAM 2nd?
 - OECD Europe oil demand today is 43% of what NAM demand was in '07.
- **Non-OECD Demand has grown.**
 - Up 12% (+4.4 mmb/d) '07 to '10.

'08 Revisited: Rise of the Rest

*In the last recession, global oil demand declined a cumulative 2% over 2 years.
OECD declined 8%, while Non-OECD grew 6%*

DEMAND	2007	2008	2009	2010	2008	2009	2010	2008	2009	2010
OECD										
North America	25,484	24,182	23,294	23,759	(1,301)	(889)	465	-5%	-4%	2%
Europe	15,474	15,390	14,663	14,581	(84)	(727)	(82)	-1%	-5%	-1%
Pacific	8,385	8,052	7,684	7,814	(333)	(368)	130	-4%	-5%	2%
Total OECD	49,343	47,624	45,641	46,154	(1,719)	(1,983)	513	-3%	-4%	1%
NON-OECD										
FSU	4,133	4,229	4,185	4,480	96	(44)	294	2%	-1%	7%
Europe	761	761	715	688	(0)	(46)	(27)	0%	-6%	-4%
China	7,573	7,744	8,063	9,069	170	320	1,005	2%	4%	12%
Other Asia	9,612	9,699	10,123	10,436	88	424	313	1%	4%	3%
Latin America	5,734	5,996	5,995	6,296	262	(1)	300	5%	0%	5%
Middle East	6,837	7,207	7,489	7,777	370	281	289	5%	4%	4%
Africa	3,109	3,275	3,329	3,384	166	54	56	5%	2%	2%
Total NON-OECD	37,759	38,911	39,899	42,129	1,152	988	2,231	3%	3%	6%
TOTAL DEMAND	87,102	86,535	85,540	88,283	(567)	(995)	2,744	-1%	-1%	3%

Lower Ex-Saudi OPEC Production

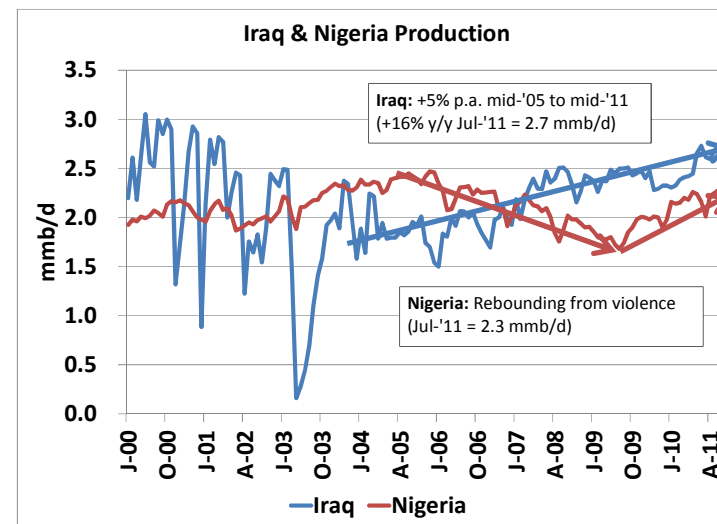
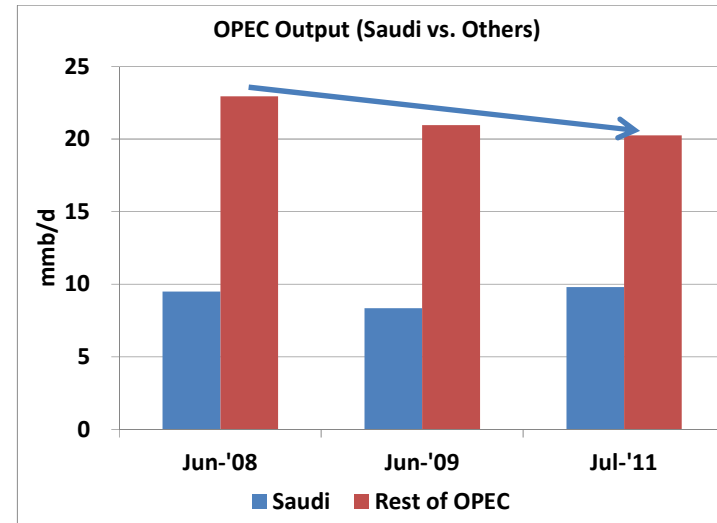
(Or Check Under The Couch Cushions For Beer \$\$\$)

Calling on Saudi:

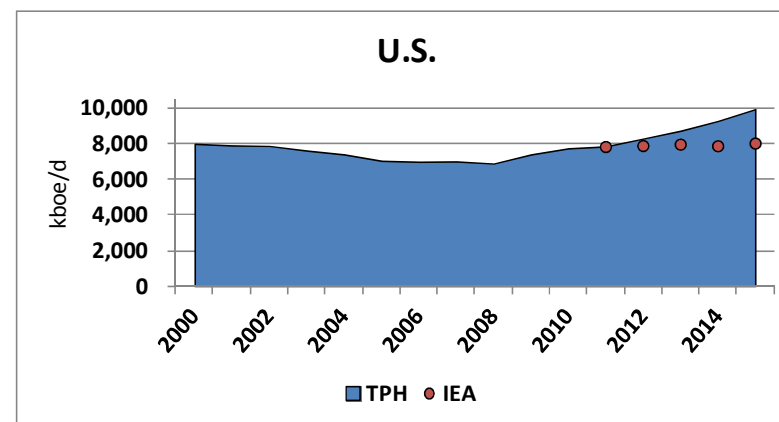
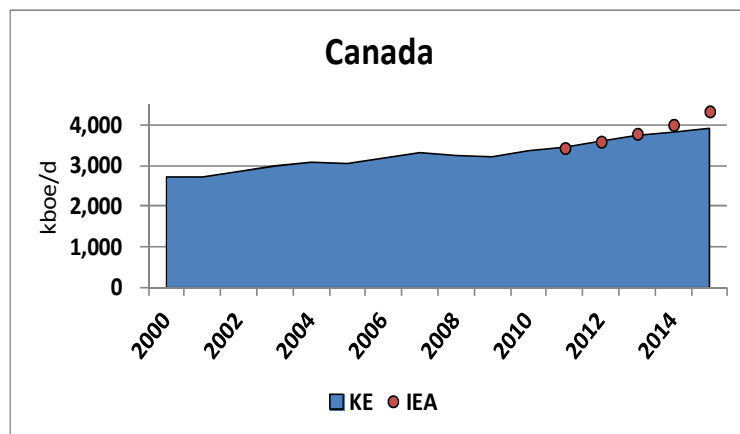
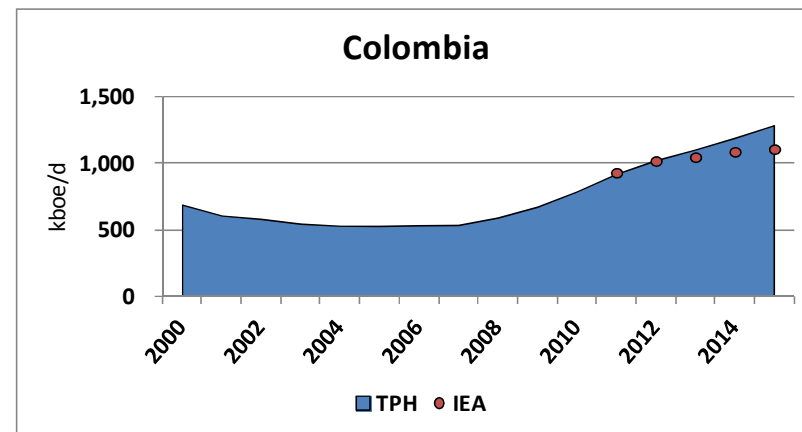
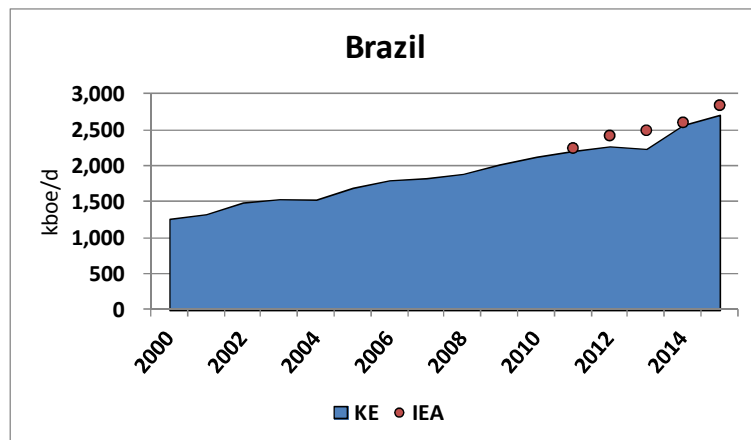
■ Versus '08, Ex-Saudi OPEC production has declined 2.7 mmb/d:

- Libya: -1.7 mmb/d
- Venezuela: -0.5 mmb/d
- Iran: -0.4 mmb/d
- Angola: -0.3 mmb/d
- UAE: -0.2 mmb/d
- Kuwait: -0.1 mmb/d
- Algeria: -0.1 mmb/d
- Ecuador: -- mmb/d
- Qatar: -- mmb/d
- Iraq: +0.2 mmb/d
- Nigeria: +0.4 mmb/d

■ Saudi Arabia: +0.3 mmb/d vs. mid-'08

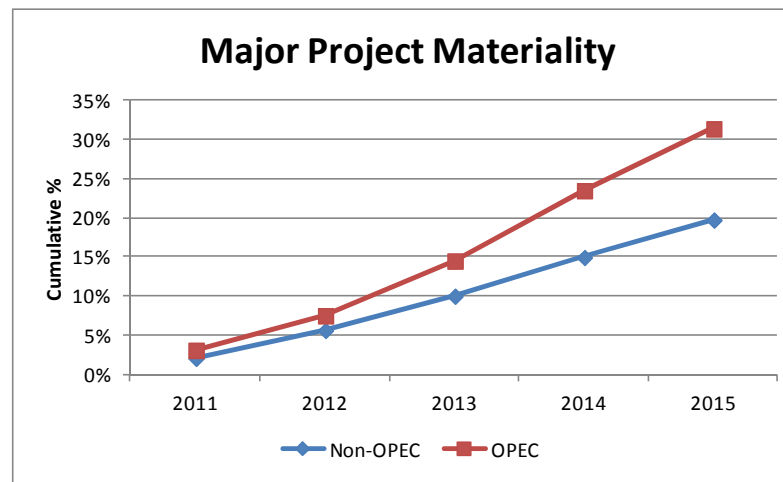


Non-OPEC Supply: Key Growth Regions

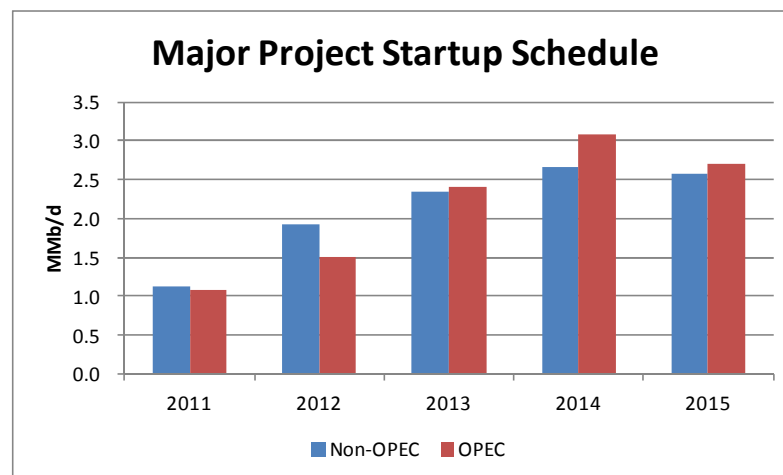


Major Oil Projects

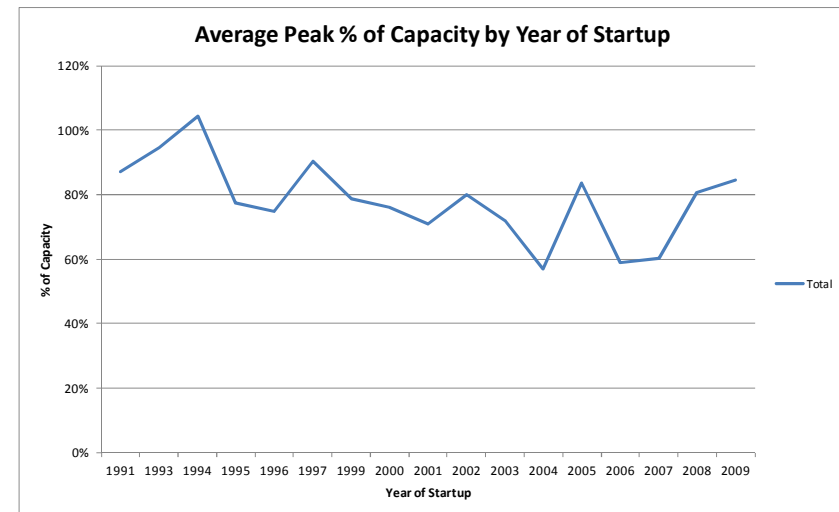
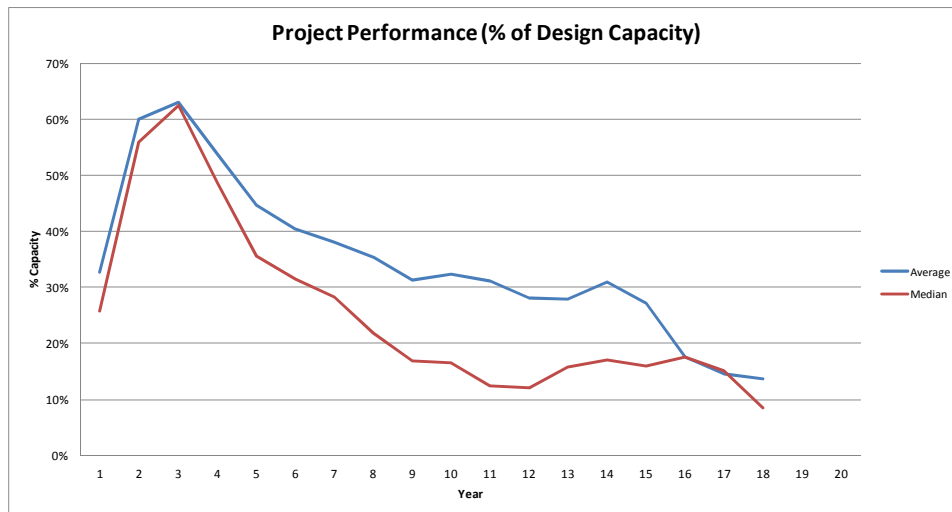
	2011	2012	2013	2014	2015	TOTAL	Actual 2010	% of Current
Non-OPEC								
Azerbaijan	0	0	185	0	0	185	1,042	18%
Brazil	179	381	1,070	410	750	2,790	2,137	131%
Canada	183	257	178	350	610	1,578	3,370	47%
China	0	115	0	85	0	200	4,103	5%
Kazakhstan	0	175	0	220	100	495	1,635	30%
Mexico	0	0	75	75	0	150	2,960	5%
Norway	20	185	114	208	60	587	2,169	27%
Russia	100	190	190	205	420	1,105	10,450	11%
U.K.	40	80	68	157	0	345	1,370	25%
U.S.A.	169	155	80	425	500	1,329	7,772	17%
Other	443	388	388	524	142	1,885	16,809	11%
TOTAL NON-OPEC	1,134	1,926	2,348	2,659	2,582	10,649	53,818	20%
Cumulative %	2%	6%	10%	15%	20%			



	2011	2012	2013	2014	2015	TOTAL	Actual 2010	% of Current
OPEC								
Algeria	0	247	158	20	0	425	1,864	23%
Angola	245	313	63	260	310	1,191	1,821	65%
Ecuador	0	30	0	0	0	30	468	6%
Iraq	300	200	960	910	1,010	3,380	2,420	140%
Iran	80	185	155	136	140	696	4,236	16%
Kuwait	0	0	170	450	0	620	2,231	28%
Libya	0	0	15	165	0	180	1,662	11%
Nigeria	120	210	38	93	492	953	2,493	38%
Qatar	280	0	0	25	30	335	1,735	19%
Saudi Arabia	0	20	500	895	0	1,415	9,761	14%
United Arab Emirates	50	180	191	125	231	777	2,866	27%
Venezuela	0	125	155	0	500	780	2,745	28%
TOTAL OPEC	1,075	1,510	2,405	3,079	2,713	10,782	34,301	31%
Cumulative %	3%	8%	15%	24%	31%			



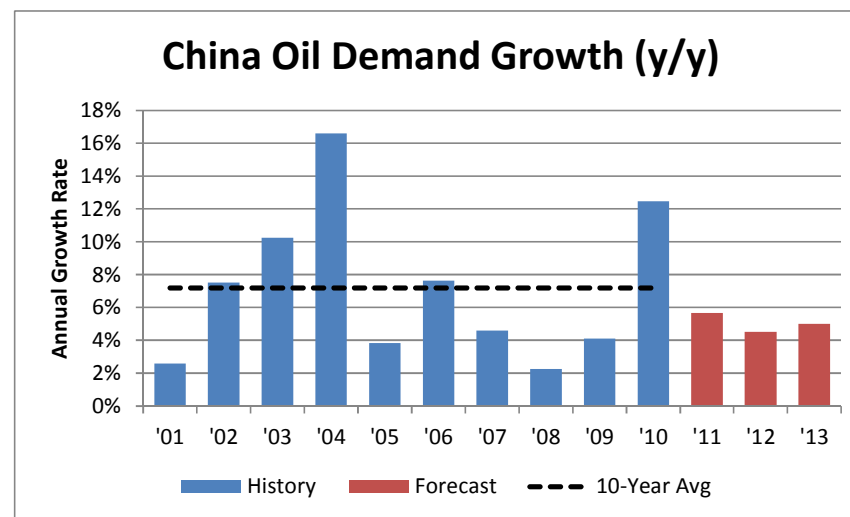
Project Performance



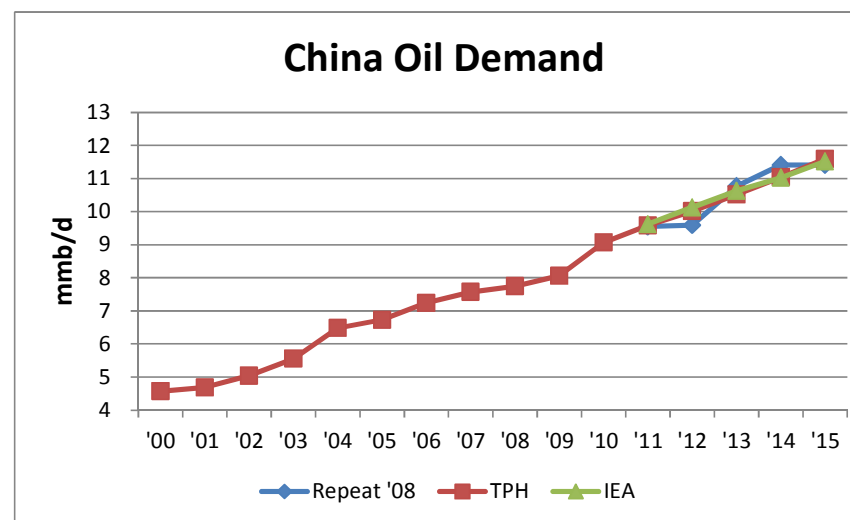
Source: Kessler Energy

China: Substantial Growth

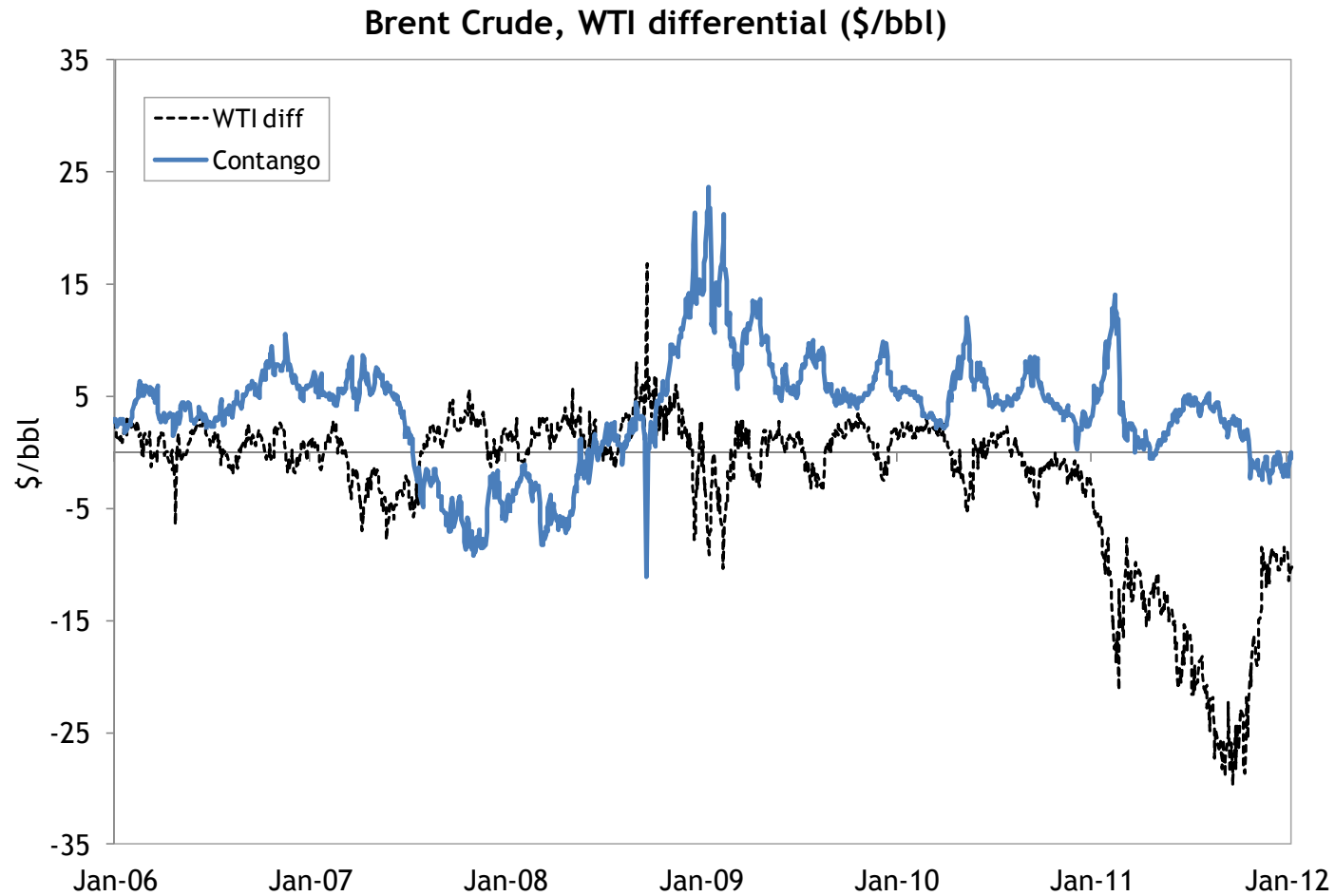
China Oil Demand		
	mmb/d	y/y%
2000	4,570	
2001	4,688	3%
2002	5,041	8%
2003	5,557	10%
2004	6,480	17%
2005	6,728	4%
2006	7,241	8%
2007	7,574	5%
2008	7,744	2%
2009	8,063	4%
2010	9,069	12%
2011e	9,583	6%
2012e	10,015	5%
2013e	10,516	5%



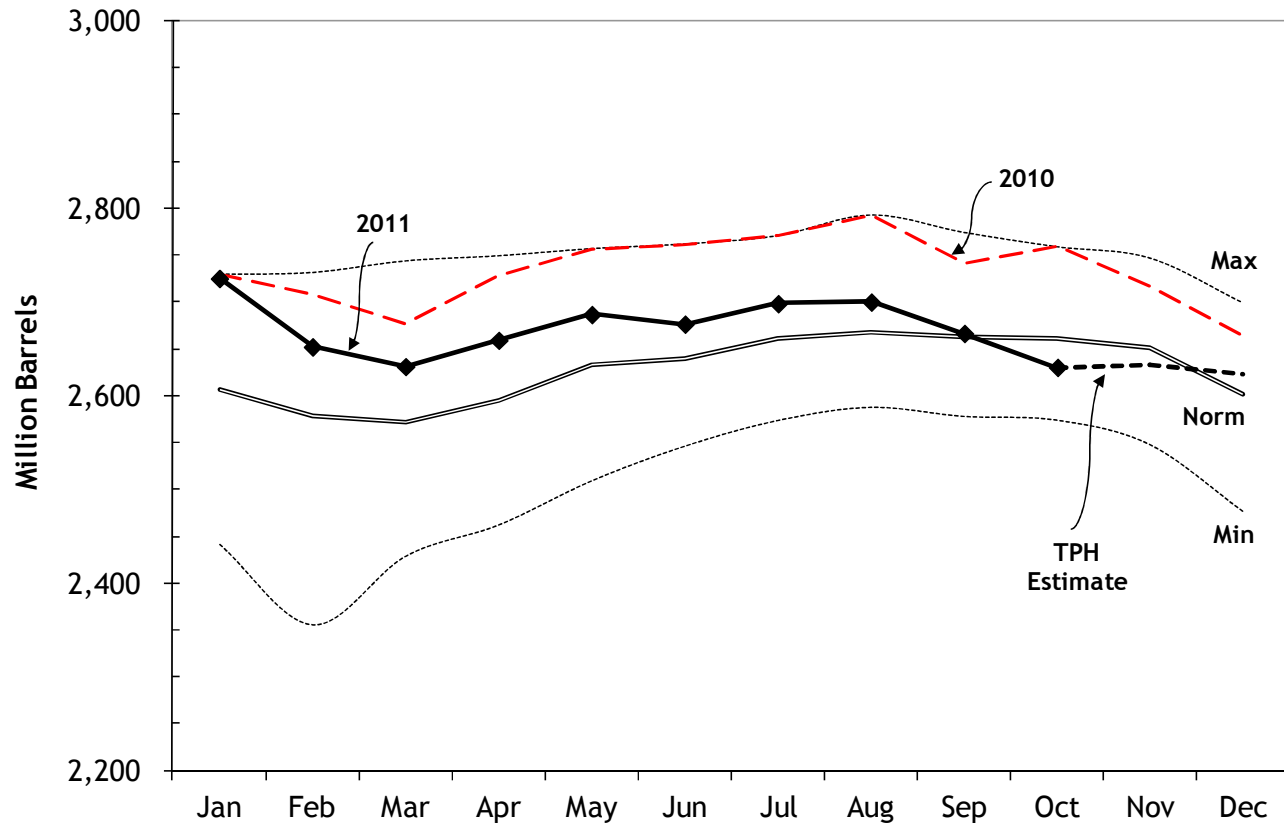
China Primary Energy Mix				
	China	World	% of	% of
	mmtoe	mmtoe	China	World
Oil	429	4,028	18%	11%
Natural Gas	98	2,858	4%	3%
Coal	1,714	3,556	70%	48%
Nuclear Energy	17	626	1%	3%
Hydro	163	776	7%	21%
Renewables	12	159	0%	8%
TOTAL	2,432	12,002	100%	20%



WTI vs. Brent Spread, 5-yrs



OECD Inventories - Where is the SPR?



“That’s mathematics son. You can argue with me but you can’t argue with figures” Foghorn Leghorn

Resource Triangle



Paradigm Shift - This is Key

Old: Hard to find...easy to produce

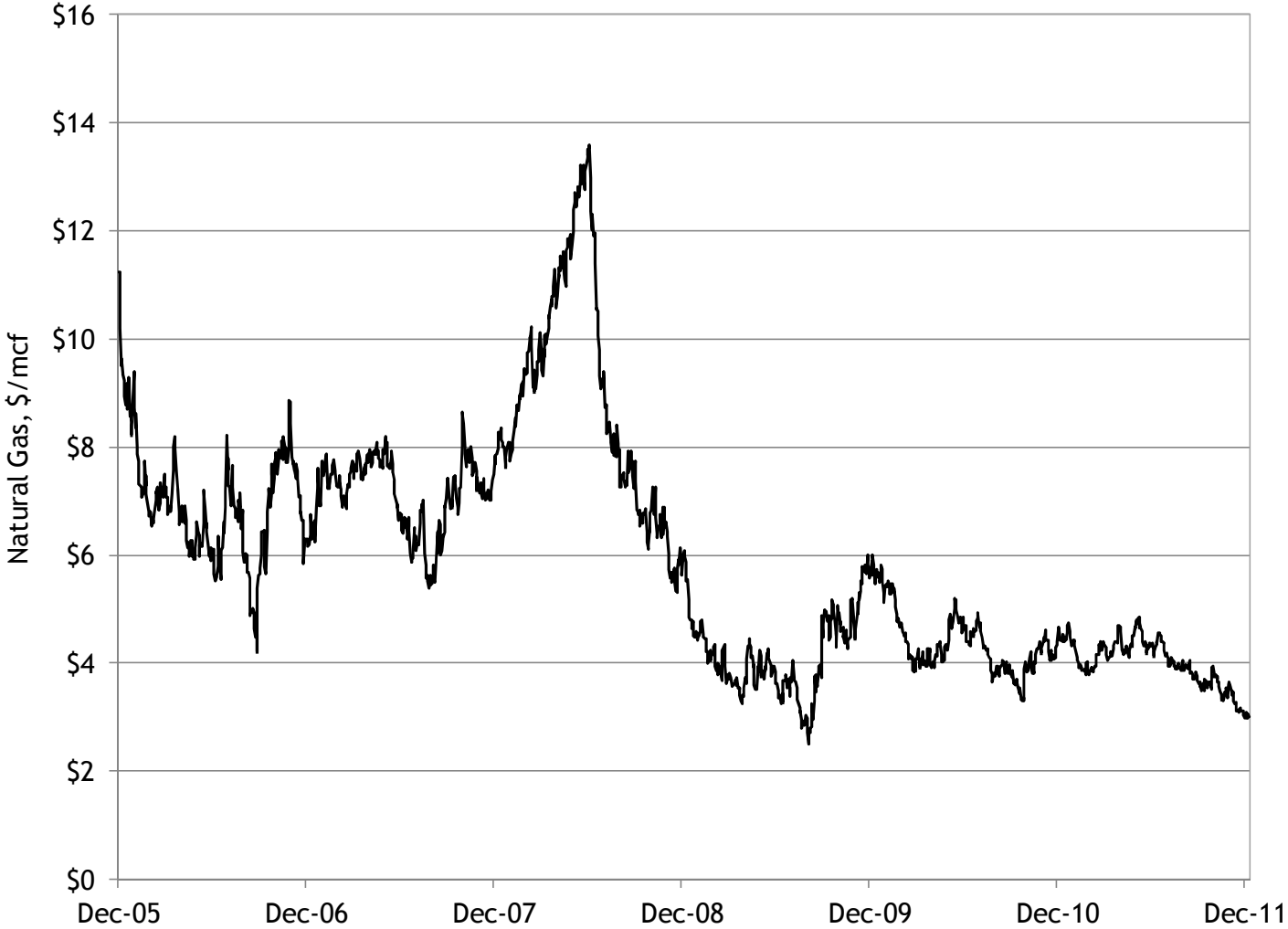
New: Easy to find...hard to produce

US Lower-48 Wet Gas Production

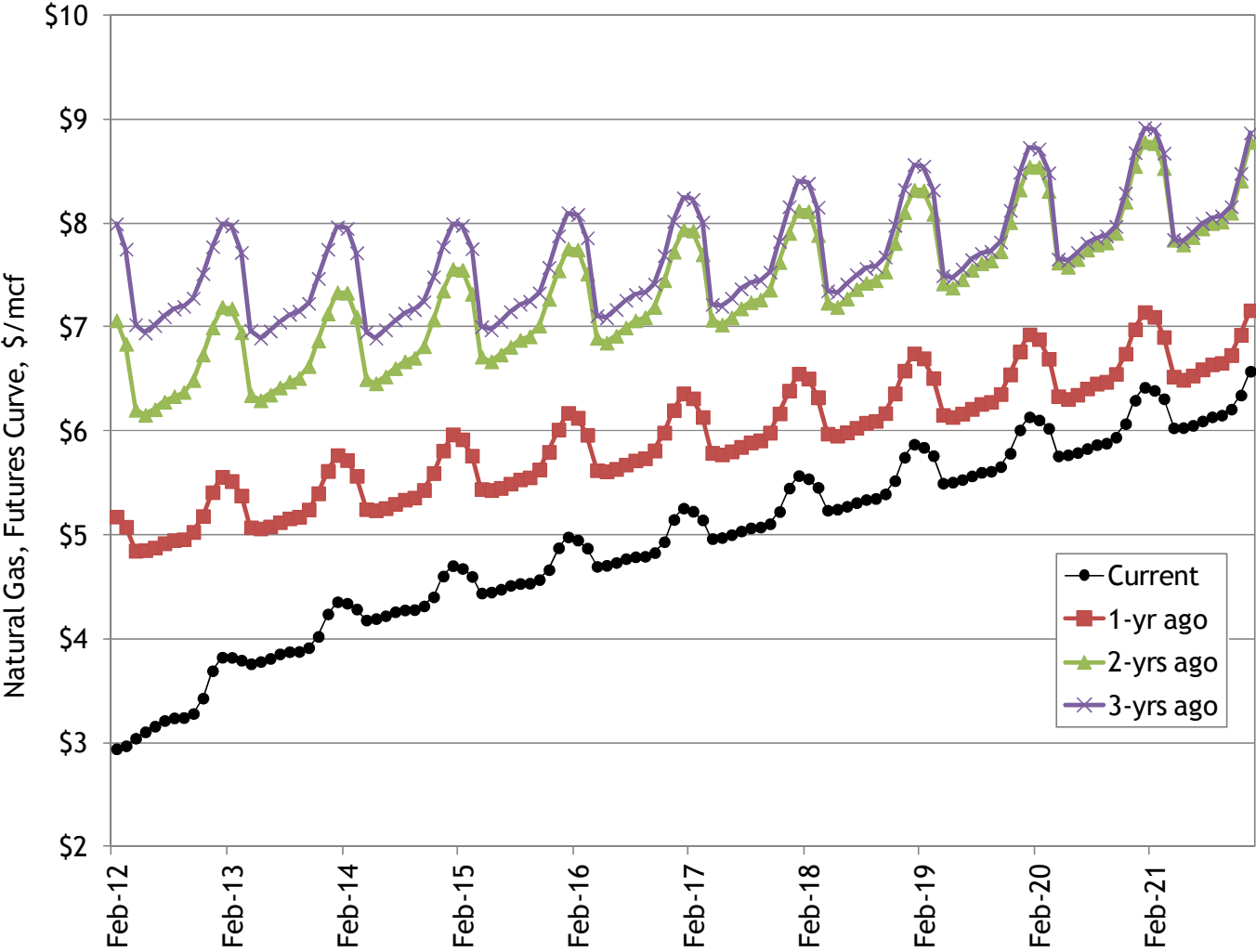


Source: EIA

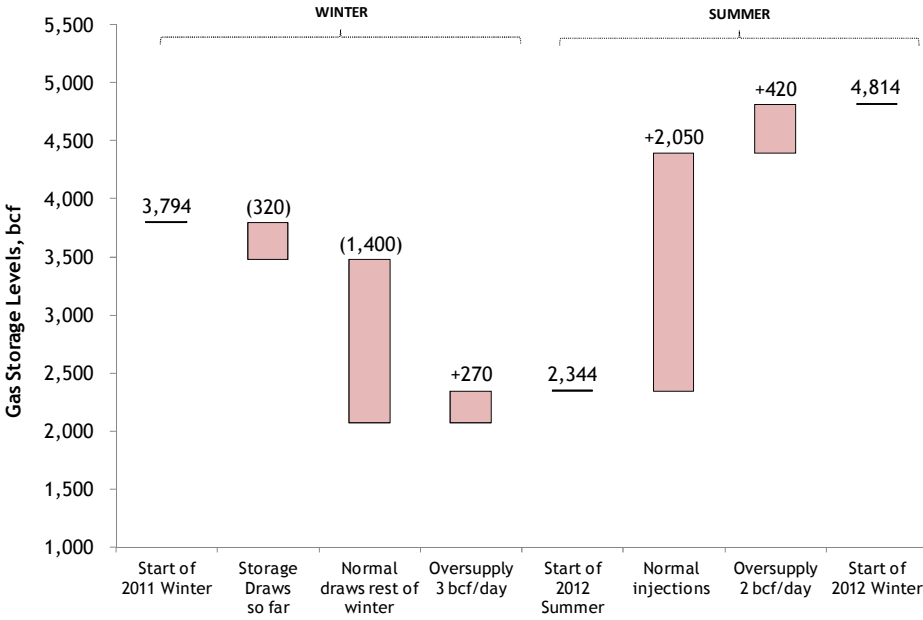
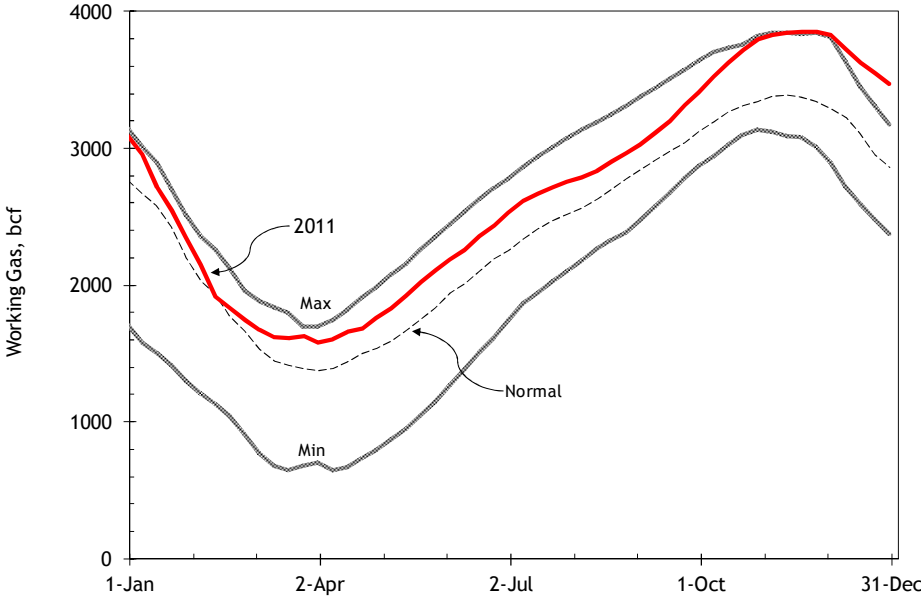
Natural Gas Volatility



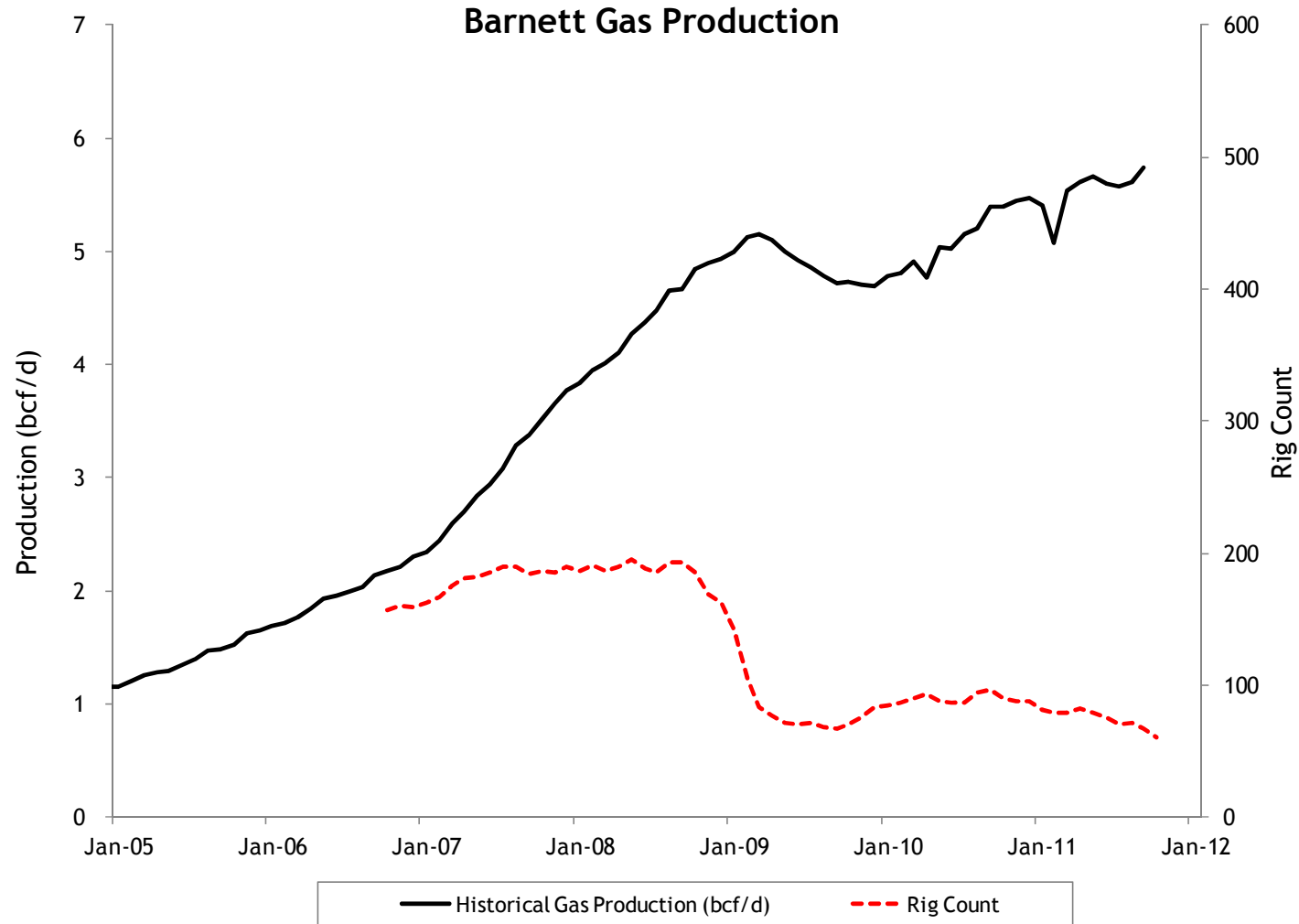
Natural Gas Futures, today vs. 1, 2 and 3-yrs ago



Gas Storage - Plenty Of Supply

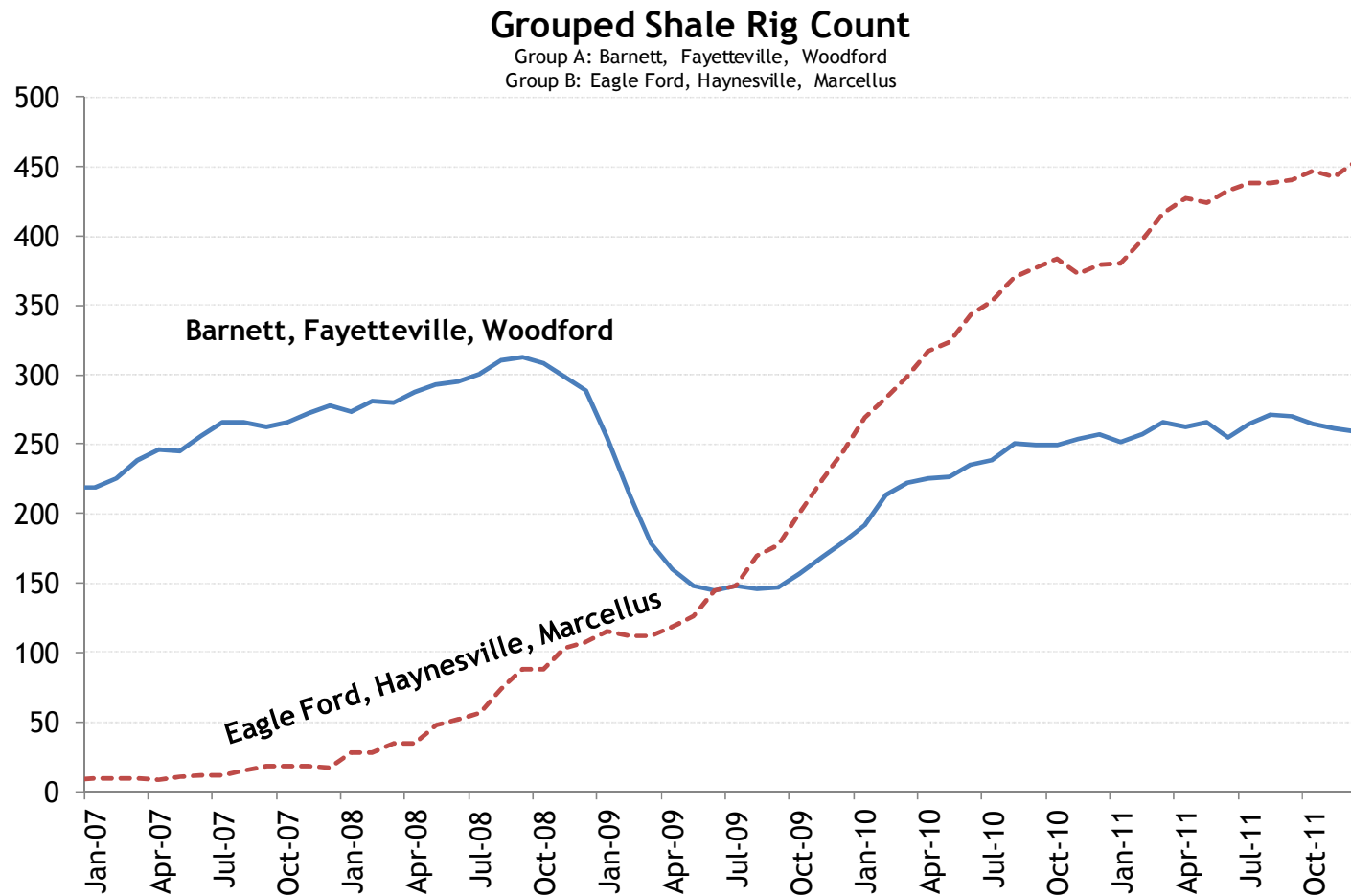


Barnett Activity



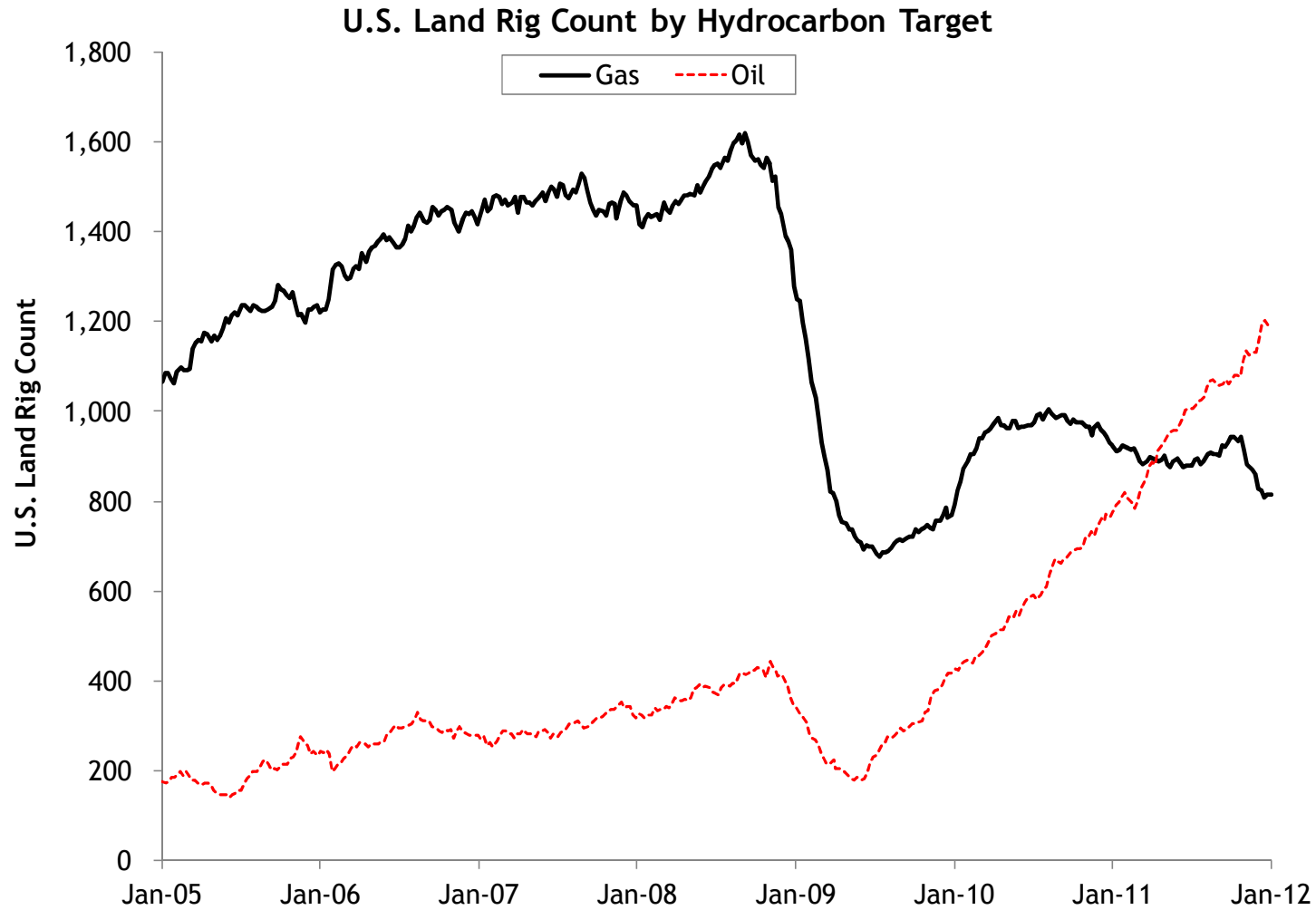
Source: HPDI, RigData, TPH Estimates

Where Are People Spending Their Capital?



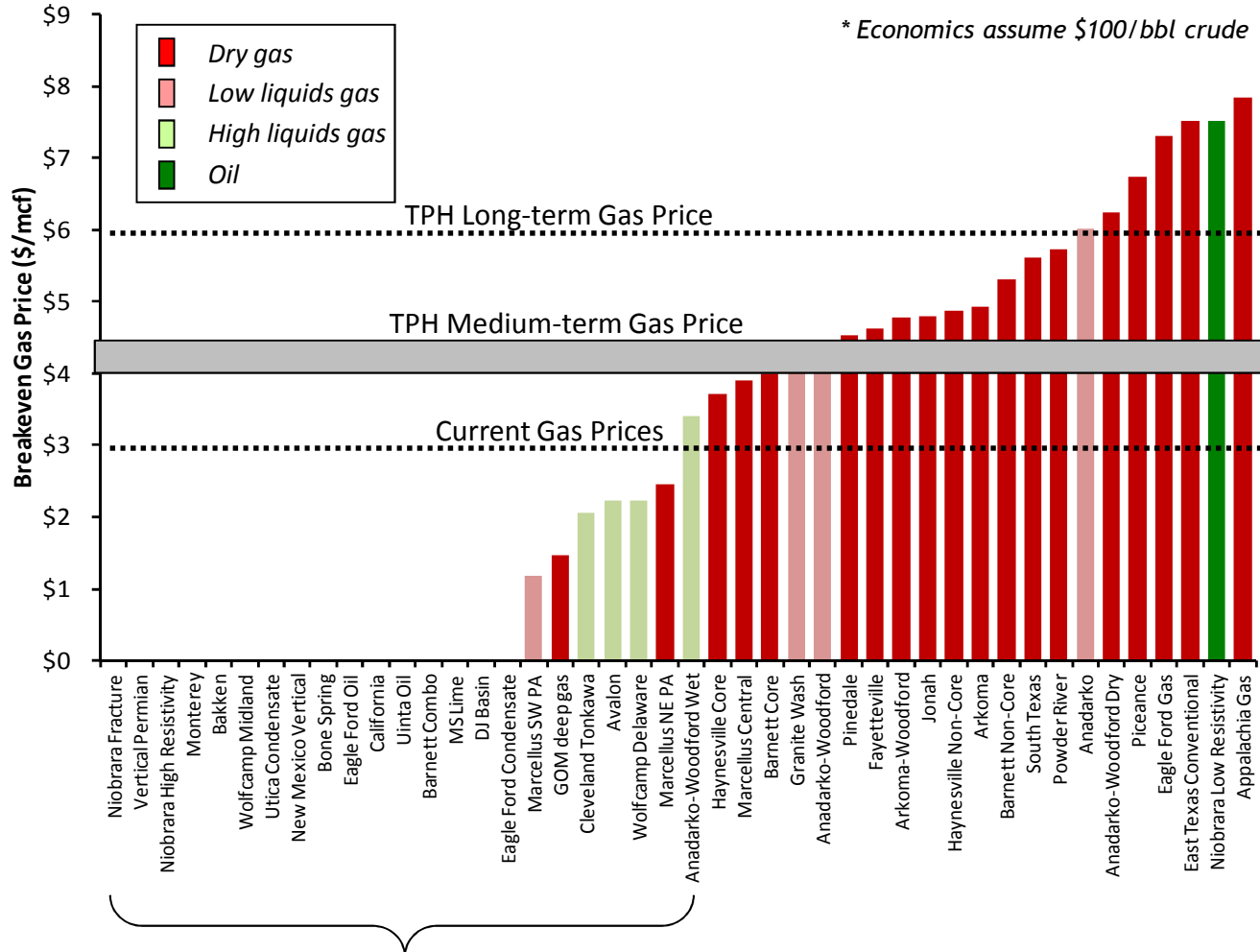
Source: RigData, TPH

There's Oil in Them Thar' Hills



Source: Baker Hughes

Basin Economics - Gas Price Required for 10% ATROR

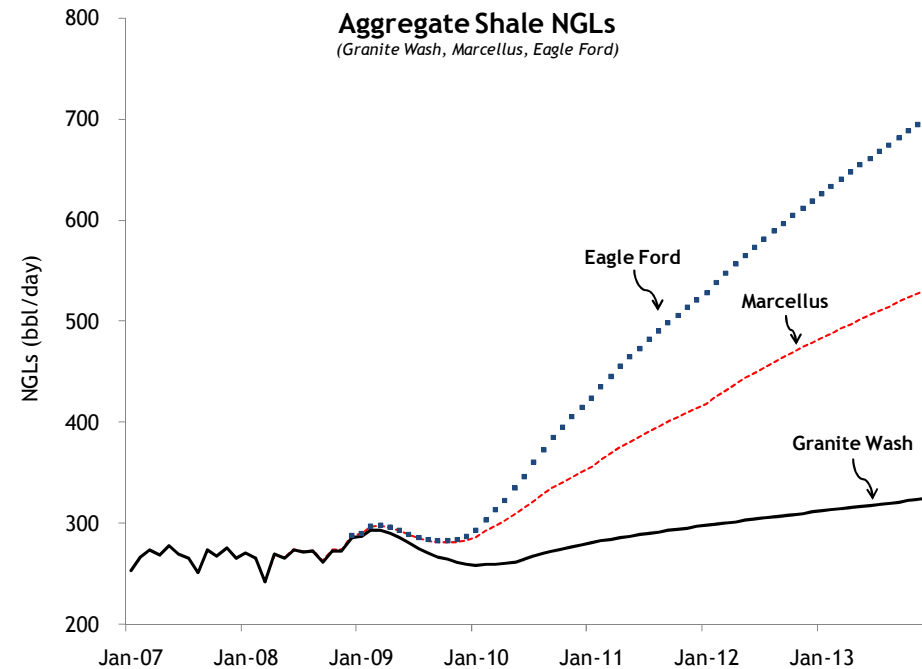


- Gas prices aren't sustainable below \$3/mcf gas. Marcellus is the only onshore gas play that truly works.
- Most basins fall below \$6/mcf gas, therefore, demand growth is needed to support our long-term gas price.
- Oil and liquids-rich plays lower the marginal cost of supply.
- Lower oil prices (we're assuming \$100/bbl) would increase the marginal cost

Gas produced from oil and liquids-rich plays is ~17% of the total the gas stack. These plays account for ~35% of the gas growth going forward.

NGL Focus

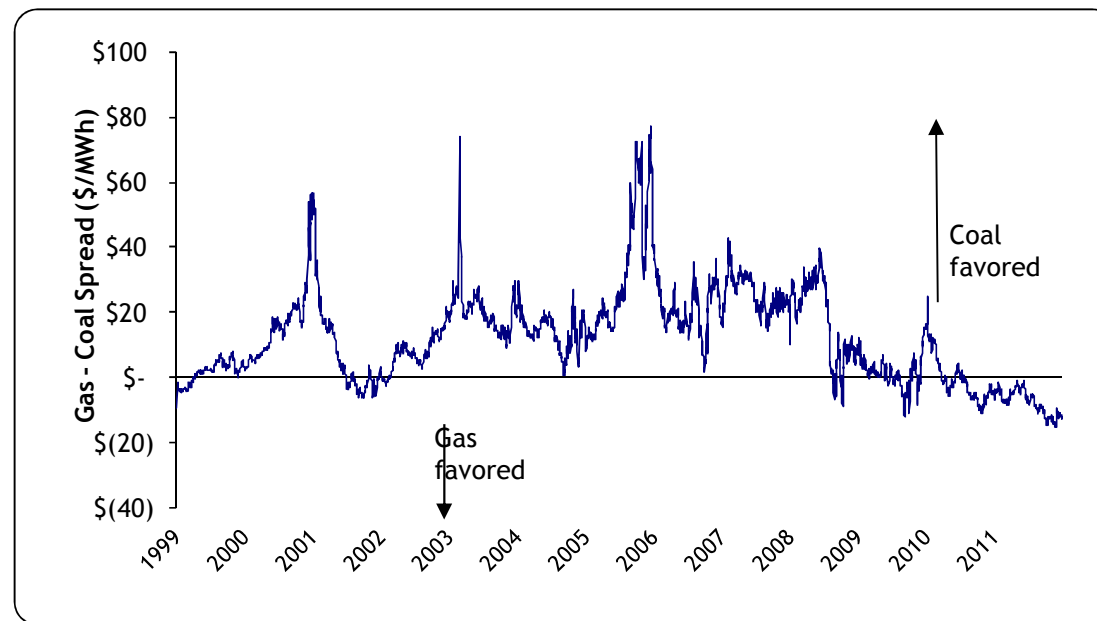
	Eagle Ford	Marcellus	Granite Wash
Ethane	48%	50%	40%
Propane	25%	28%	28%
Butanes	8%	6%	7%
Isobutane	10%	7%	10%
Pentanes	10%	10%	15%
Total NGLs	100%	100%	100%
Gal/Mcf	3.6	4.0	2.8
Yield/BBL (%)	50%	55%	38%
NGL BBL % of Crude (\$6/gas & \$90/oil)	42%	41%	46%
NGL BBL % of Crude (\$5/gas & \$90/oil)	40%	39%	45%
NGL BBL % of Crude (\$4/gas & \$90/oil)	38%	37%	43%



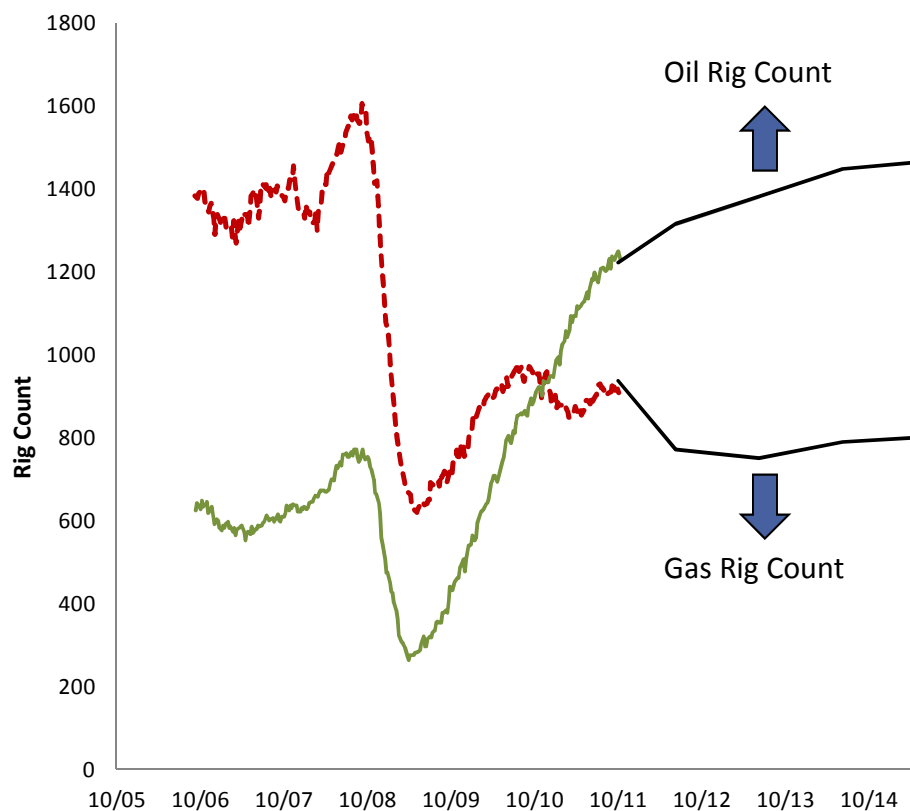
Coal to Gas Switching

- Power demand has grown ~1bcf/d each year since 2004.
- Recently, low gas prices and higher coal prices have favored gas-fired power generation.
- This scenario should persist through 2012 with our sub-\$4/mcf near-term gas price.

Gas - Coal Spread (\$/MWh), 1999 - Present



US Onshore Rig Count



*** Bias higher oil rig count and lower gas rig count

	Oct-2011	2012	2013
Gas	935	770	750
Oil	1,223	1315	1380

	2007	2008	2009	2010	2011	2012E	2013E
Haynesville	11	45	104	174	135	78	62
Marcellus	4	9	41	93	129	136	156
Barnett	163	171	77	83	68	43	39
Fayetteville	30	42	41	36	31	25	25
Woodford	42	45	25	27	18	15	15
Key Gas Shales	249	314	288	413	381	297	297
		26%	-8%	43%	-8%	-22%	0%
Granite Wash	14	33	21	69	107	103	101
Anadarko Woodford	5	10	13	29	55	51	51
Utica Condensate	0	0	1	2	2	15	34
Eagle Ford	14	21	19	81	172	207	210
Key Liquids Rich Shale	33	65	54	181	336	376	396
		94%	-17%	238%	86%	12%	5%
Williston	43	69	49	115	169	210	215
Permian HZ	15	28	10	33	74	109	131
Mississippi Lime	1	1	1	5	16	28	35
Niobrara HZ	1	1	2	7	15	16	16
Key Oil Shales	60	99	63	160	274	363	397
		65%	-36%	154%	71%	32%	9%
Total Key Shales (HZ)	342	477	405	754	991	1036	1090
		40%	-15%	86%	31%	5%	5%
Total Rig Count	1956	2142	1118	1676	2021	2085	2130

Persian Gulf



Biggest Risk: Economy. High oil prices ☹️



“I’m just here for the gasoline.”
Max, Road Warrior

Final Thought

Formula for success:

“Rise early, work hard, strike oil.”

J. Paul Getty

Note: Getty said “Oil”...not more shale gas!

Analyst Certification:

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