

The World's Biggest Bet: Rolling The Dice On Energy's Future



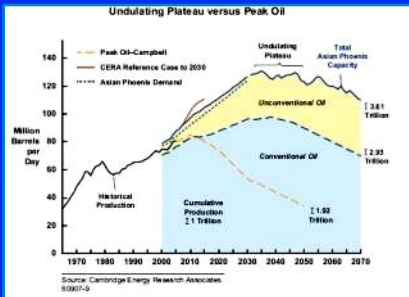
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By:
Matthew R. Simmons, Chairman
Simmons & Company International

2009: Energy Bet's Super Bowl

- For two decades, optimists and pessimists debated future of energy.

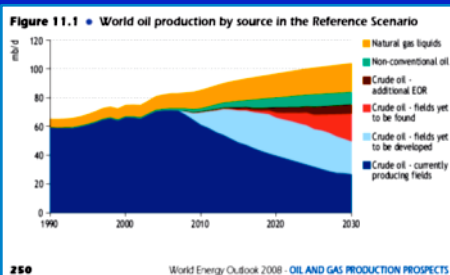
- **Optimist View:**



Abundant long-term resource base:

- Low energy prices: The future energy paradigm
- Technology: A game-changer for cheap supply
- Climate change: Rules will lessen fossil fuel reliance

- **Pessimist View:**



Finite Oil and gas resources will peak:

- Long-term energy prices need to rise
- Technology advances accelerated decline of oil and gas production

- 2008: “Warm-up” for “grand finale” Super Bowl bet.

2008:

A Year Which Will Live In Energy Infamy

- Oil and gas prices climbed to record highs by July 2008.
- By the Fall of 2008, oil prices had greatest ever plunge, in both speed and magnitude of collapse.
- Natural gas prices followed suit.
- By late fall, the oil and gas system began unraveling.
- By February 2009, oil and gas prices were at dangerously low levels.



Pearl Harbor – A day that will live in infamy.

Were High Oil And Gas Prices An Anomaly?

- Optimists' view: We created classic bubble:
 - High oil prices led to most of our economic woes
 - Prices then collapsed
 - Oil demand plunged
 - Gluts of oil (and gas) grew
 - Classic case study proving oil and gas are simply cyclical commodities
- Pessimists took a different view:
 - High prices not enough to stimulate sustained supply growth
 - Tightness in “rigs and equipment” were endemic
 - Best parts of North America and the world economy were benefiting from high prices



3rd Week in September 2008: Energy Pearl Harbor (or 9/11)

- Mid-July to mid-September oil prices had moderated early July peaks.
- U.S. natural gas prices gradually weakened on fear that shale gas created new glut.
- From 9/22 – 12/22, oil prices plunged by 74% (and stayed at low levels ever since).
- U.S. natural gas prices also collapsed -- now weakest in a decade or more.
- By year-end, all supply additions ended.
- New E&P mantra:
 - “It is time to squeeze out oilfield inflation”
 - Plummeting rig count leading to contract cancellations
 - Lay-offs just starting to get ugly



By Late Fall, Numerous Reports Told Of Plunging Demand

	<u>Gasoline Demand</u>	<u>Distillate</u>
	----- '000 BBI/Day -----	
2005 - 2007	9,236	4,161
1st Q '08	8,910	4,199
2nd Q '08	9,135	3,921
July	9,072	3,672
August	9,090	3,657 ←Down 12%
September	8,469 ←Down 8%	3,740

Source: EIA Monthly Energy Review – February, 2009

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U.S. Oil Demand Then Rebounded... But Few Noticed

	Motor Gasoline	Distillate	Total U.S. Oil
	----- '000 Bbl/Day -----		
Sept. '08	8,469	3,740	17,796
Oct.	8,986	4,173	19,643
Nov.	8,889	3,870	19,001
Dec.	9,033	4,133	19,993
Jan. '09	8,789	4,066	19,565
Feb.*	9,032	4,055	19,545
1stQ 2008	8,910	4,161	19,893

*Rolling 8-week average

Source: EIA Monthly Energy Review, Barclays

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Old Record Levels Of U.S. Demand Were Unsustainable

- We cannot sustain 9.5+ mb/d gasoline use.
- Or 4.3 – 4.4 mb/d of distillate.
- Let alone 20.5 – 21.0 mb/d of total petroleum!

U.S. Supply System

Domestic Crude	5,000	(and falling)
Imported Crude	10,500	(100% pipeline capacity)
Input to Refineries	15,500	
LNG	1,900	(peak output)
Processing Gains	1,000	(peak output)
Finished Products Imports/Net	2,000	(peak output)
Total	20,400	(Best case for maximum US supply)

No system can run at 100% on 24/7/365 basis.

Plunging U.S. Oil Demand Was Soon Assumed To Be Global

- WTI's plunging price and bearish sentiments about weak U.S. demand spread globally.
- Stockpiles grew rumors.
- Rising WTI contango led to tanker's story of glutted oil.
- Cushing Oklahoma (no room at the inn) became the "glut's barometer."

Figure 33: Crude oil inventories (mb)

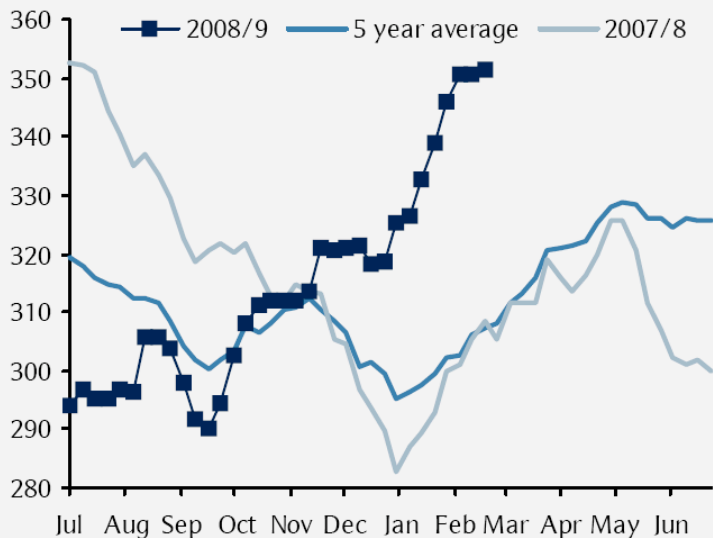
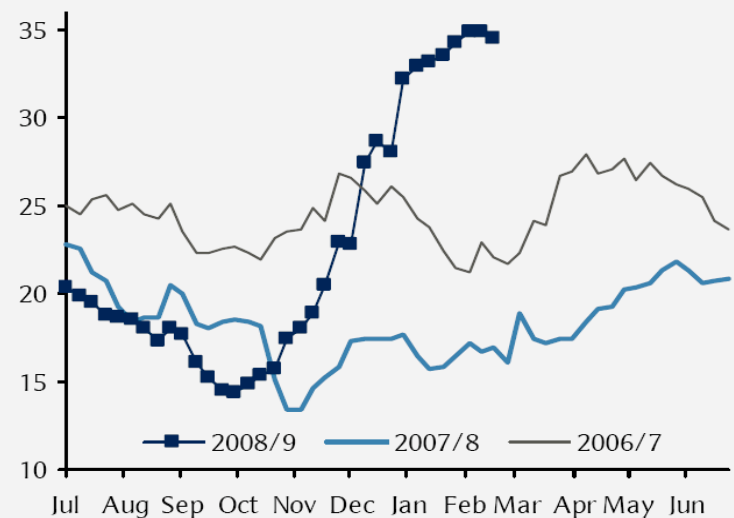


Figure 34: Crude inventories at Cushing, OK (mb)



How Badly Has Global Oil Demand Plunged (Thus Far)?

- Best-in-class data is enlightening:

<u>Demand Estimates</u>	<u>2007</u>	----- 2008 -----				<u>Total 2008</u>	<u>Change 07/08</u>
		<u>1st Q</u>	<u>2nd Q</u>	<u>3rd Q</u>	<u>4th Q</u>		
Barclays Capital	86.1	86.9	85.5	84.9	86.0	85.8	(0.3)
IEA	86.1	86.8	85.7	85.2	85.0	85.7	(0.4)
OPEC	85.9	86.7	85.4	85.0	85.8	85.7	(0.2)
EIA	85.9	86.4	85.2	84.7	87.1	85.9	-
Average	<u>86.0</u>	<u>86.7</u>	<u>85.5</u>	<u>85.0</u>	<u>86.0</u>	<u>85.8</u>	<u>(0.2)</u>

So far, drop has been de minimous with almost all occurring in U.S. during September/October 2008

So Far, No Hard Data Can Find Evidence Of Plunging Oil Demand

- Ignore hurricane impact and U.S. oil demand has been “flat.”
- Ignore stock rebound post-hurricane and most crude stocks “normal” with 2007 levels.
- Finished motor gasoline stocks very low.
- Heating oil/propane stocks very low.

So, Why Did Oil Prices Soar And Then Collapse?

- Is “Adam Smith’s Invisible Hand” pushing down oil prices as part of stimulus package?
- Did high prices start/add to our economic meltdown?
- When were oil prices finally “too high”?
- Are they now “normal” or dangerously low?
- Does anyone have a clue when prices are too high or too low?
- How many people grasp how prices get set?



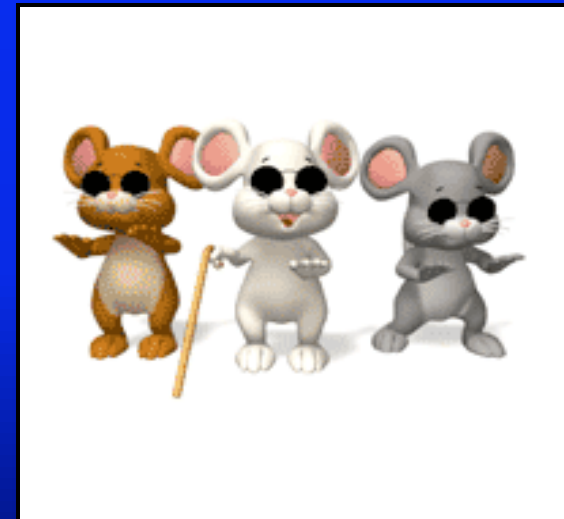
The Evolution Of Pricing Chaos

■ Good Old Days:

- Posted prices, pro-ration, import limits and long-term supply contracts

■ The Wild West²:

- No long-term contracts
- All oil spot market purchased
- Buyers buy on FOB delivery
- They fill in price by checking price of WTI NYMEX



The blind are leading the blind (Three Blind Mice)

Industry's Pricing Mechanism Is Insane

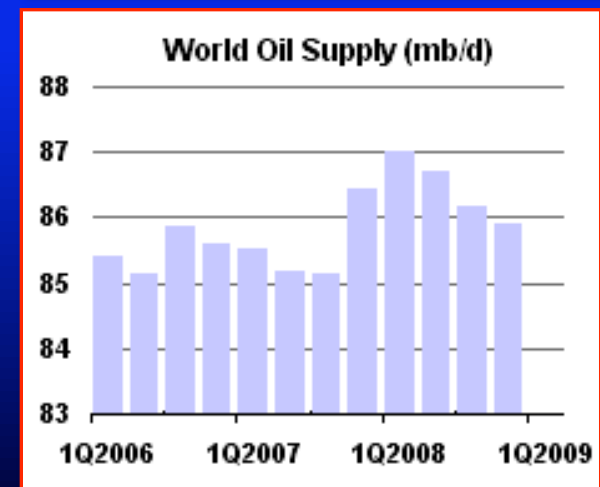
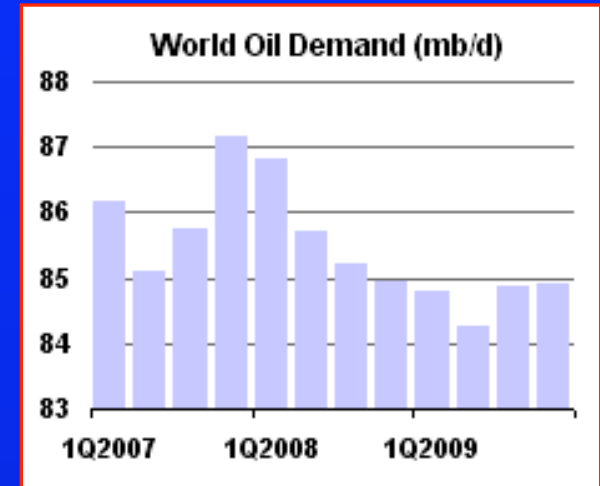
- Being chronic price takers vs. price makers is industrial stupidity.
- Having no long-term contracts is casino mentality.
- Buying a car FOB delivery and setting the price by checking Auto NYMEX would be dumb.
- Yet, this is how world's largest and most important industry chose to price its product.

Fundamentals Finally Matter

- In a topsy/turvy world of extreme price volatility and booms and busts, real fundamentals finally rule the day.
- The fundamental demand story has been powerful.
- The fundamentals of faltering crude supply even more powerful.

Prices Rose Because Demand Grew Faster Than Crude Supply

- Oil prices rose 15-fold over past decade.
- The “final run” might have been speculator squeeze.
- But, balance was created by demand rising too fast while crude supply lagged.
- Too often, the gap got filled by stock liquidation.
- Soaring rig count and ultra-expensive expansion projects failed to offset accelerating declines worldwide.



When Did Prices Start Hurting The System?

- In many “experts” minds, \$30 to \$40 oil was harmful.
- In reality, as oil prices crossed \$100, economic prosperity was spreading through Latin America, parts of Asia, the Middle East and North Africa.
- High prices for U.S. oil and gas (and iron ore, copper, lead, etc.) were creating booming economies in:

- Texas
- Ozarks
- Rocky Mountains
- Upper Midwest
- Louisiana
- Alberta
- Oklahoma
- Saskatchewan
- Alaska
- Parts of Caribbean

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 What Matters Weblog
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India			Japan		
Oct. 2007	July 2008	Dec. 2008	June 2007	July 2008	Dec. 2008
43.52 INR/L	55.01 INR/L	50.62 INR/L	135.21 ¥/L	180.23 ¥/L	127.90 ¥/L
0.88 USD/L	1.11 USD/L	1.02 USD/L	1.46 USD/L	1.94 USD/L	1.38 USD/L
3.33 USD/gal	4.20 USD/gal	3.86 USD/gal	5.53 USD/gal	7.34 USD/gal	5.22 USD/gal

(exchange rates: Dec. 5 2008
 sources: bloomberg.com; New Dehli resident / sources: theblackship.com)

China (#93 gasoline)			USA (regular grade)		
May 2006	July 2008	Dec. 2008	Dec 2007	July 2008	Dec. 2008
5.09 CNY/L	6.2 CNY/L	6.37 CNY/L	0.74 USD/L	1.09 USD/L	0.48 USD/L
0.74 USD/L	0.90 USD/L	0.93 USD/L	3.06 USD/gal	4.11 USD/gal	1.81 USD/gal
2.80 USD/gal	3.41 USD/gal	3.52 USD/gal	(data from eia.doe.gov; Dec. 5, 2008)		

(exchange rates: Dec 5 2008
 sources: bjreview.com.cn / Xinhua / Feb. 22, 1999: \$ 0.91/gallon (source: swivel.com))

England			Germany		
Oct 2007	July 2008	Dec. 2008	June 2007	July 2008	Dec. 2008
1.02 £/L	1.19 £/L	0.89 £/L	1.38 €/L	1.58 €/L	1.17 €/L
1.49 USD/L	1.74 USD/L	1.49 USD/L	1.75 USD/L	2.01 USD/L	1.49 USD/L
5.63 USD/gal	6.59 USD/gal	5.64 USD/gal	6.62 USD/gal	7.61 USD/gal	5.64 USD/gal

(exchange rates: Dec 5, 2008
 sources: standard.co.uk / sources: Munich resident)

How Full Are U.S. Crude Stocks?

Bulging Stocks (2/20/09)

Historical References

	----- MMBbls -----	
Crude Oil	351.1	342 (1979 - 1988 ave.) 344 (Feb - Apr 2006) 350 (Apr - Jun 2007)

Rapid stock rise from mid-October 2008 came from “dangerously low post-hurricanes” to normal levels

If System (Demand And Stocks) Normal Why Is Oil Price So Low?

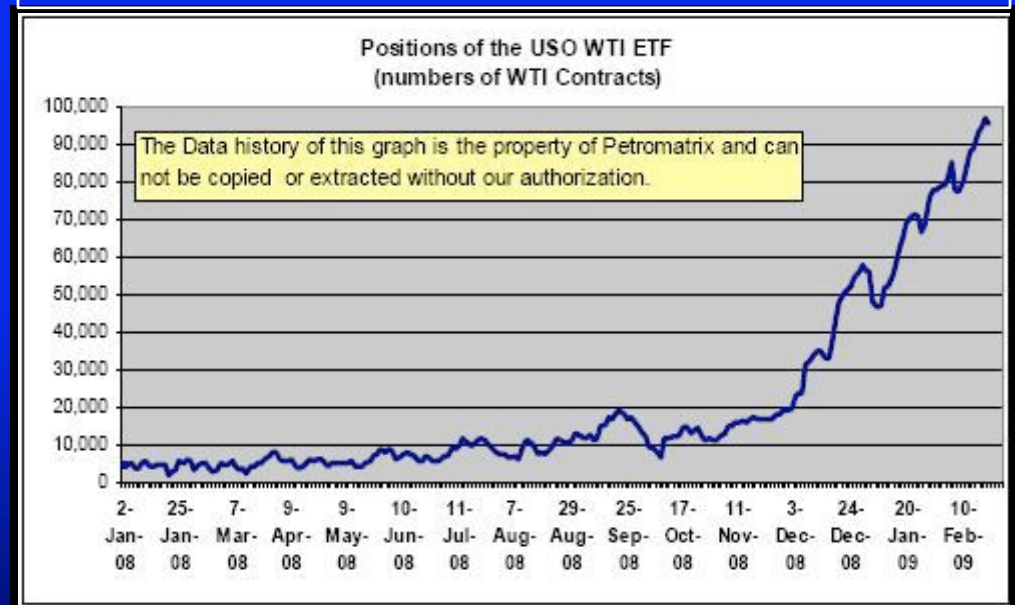
- There is no rationale for why oil prices plunged by 74% in 90 days.
- There is no rationale to explain why low WTI keeps bouncing around mid-\$30 to \$40 level.
- There is no rationale why so many other key crude grades stayed significantly higher.
- There is no rationale why:
 - December WTI 09 = \$48 (March 2, 2009)
 - December WTI 10 = \$54 (March 2, 2009)
 - December WTI 11 = \$59 (March 2, 2009)

There Are A Few Odd Pieces Of Inexplicable Data..

Glencore's Credit Default Swap on Public Debt – April 2008 – Jan 2009



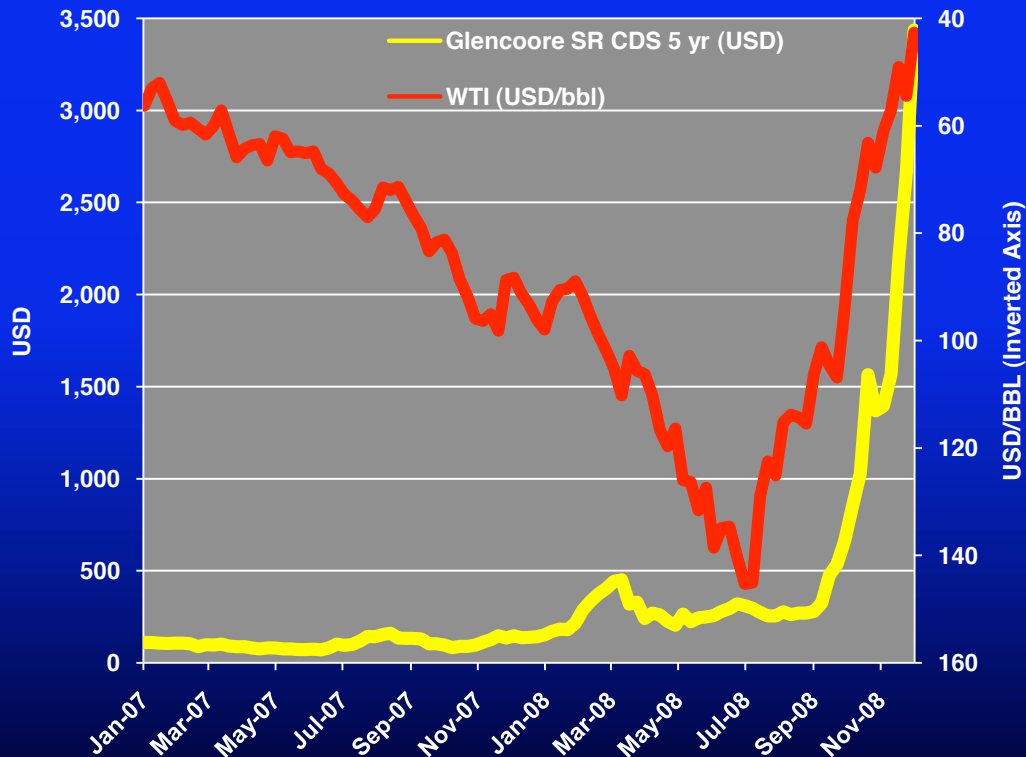
U.S. Oil Fund (EFT) Open Interest On WTI Near Month



Source: Courtesy of Olivier Jakob, Managing Director, PetroMatrix

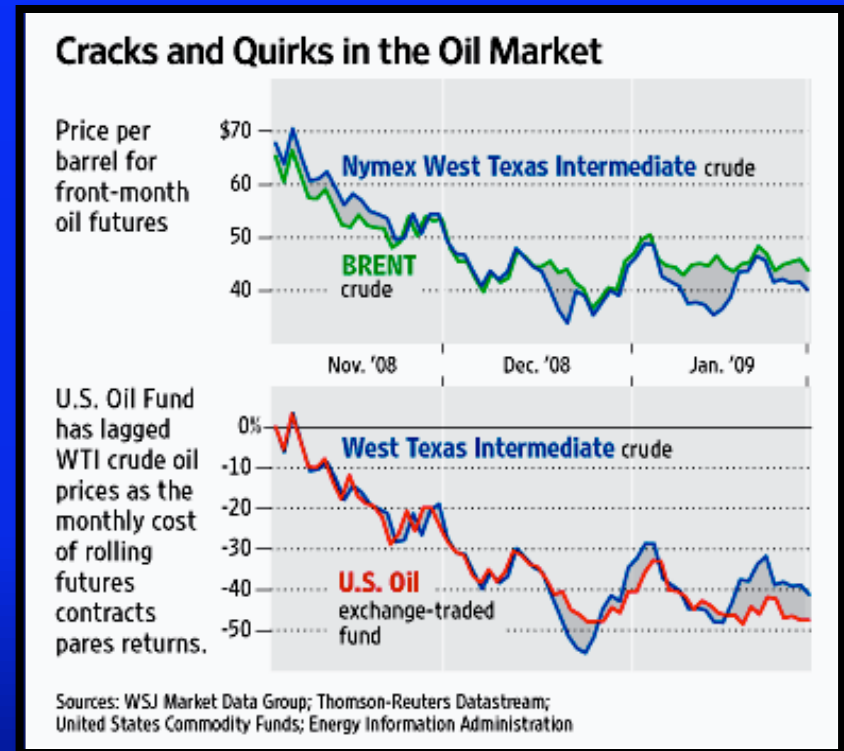
Is Curious Correlation A Random Event?

- As oil prices plunged, Glencore's credit risk soared, as did U.S. Oil Fund NYMEX oil contracts.



Glencore Could Be A Proxy For Many Other Oil Traders

- Credit markets globally went into unprecedented freeze post-Lehman and AIG collapse.
- To be an oil trader player, you need massive net worth or phenomenal use of margin debt.
- As was the case with the Hunts and silver, falling prices created need for more credit.
- The freeze made this hard for many traders and some contract liquidation had to occur.



U.S. Oil Fund (“USO”) Is A Baffling Story

- Why would an obscure EFT suddenly see a growth in its WTI open interest for 5 – 10,000 average contracts in 2008 until mid-September when volumes then rose to ≈100,000 by mid-February 2009?
- But, USO’s stock price fell as fast as oil.
- Who would keep pouring in new funds?
- Why did banks in December 2008 then begin creating “Reverse Convertible Notes” for USO?
- CFTC finally launched investigation into USO on February 23, 2009.

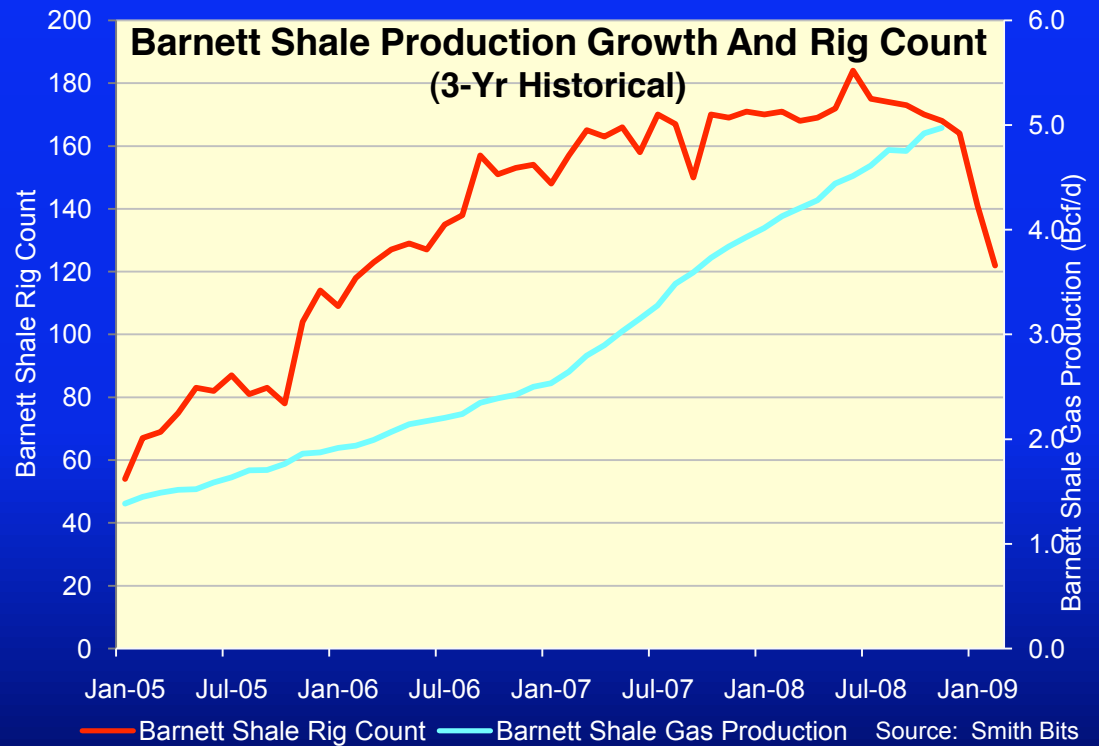


If Oil's Demise Was Odd, Natural Gas' Plight Was Far Worse

- A decade ago, gas pundits were certain we had an abundant resource base for natural gas to grow to 28 – 30 TCF by 2010, while prices stayed below \$3 “forever.”
(Meeting the Challenges of the Nation's Growing Natural Gas Demand. National Petroleum Council. December 1999)
- But prices soared, drilling soared and supply did not grow.
- LNG was supposed to come to the rescue with 28 – 30 TCF supply.
- Natural gas prices kept climbing and supply never grew.

Miraculous Shale Gas “Saved The Day” From Dwindling Supply

- Gas drilling soared to record levels (and gas well completions followed suit).
- Conventional dry gas output continued to drop.
- Coalbed methane petered out.
- Cracking how to recover Barnett Shale opened new source of non-conventional gas supply.
- By last summer, 15% of gas drilling rigs were drilling in Barnett Shale.



“Suddenly, There Was Shale Gas To Exploit Everywhere”

- The shale gas plays got “hot”:
 - Landsmen roamed the Ozarks, the Northeast, North Louisiana, Rockies and Canada for more shale acreage
 - Rigs started moving into these areas to drill
- Active players got “hot” too:
 - Several shale pioneer producers showed fabulous product growth
 - Others were buying acreage to join the fray
- Soon perceptions began growing that we had a gas glut again.

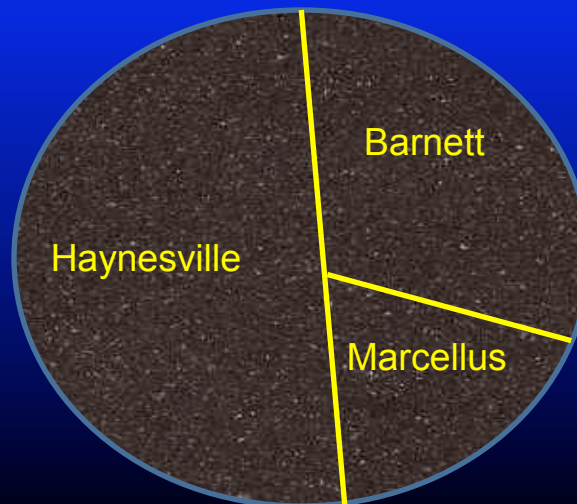
The Shale Gas Reality

- Between extended reach horizontal drilling and massive hydraulic fracs, shales can be busted into permeable rocks.
- The IP flows vary by plays and within plays.
- Declines begin early on (50 – 60% gone in year 1?)

Probable 2000 Shale Gas Production

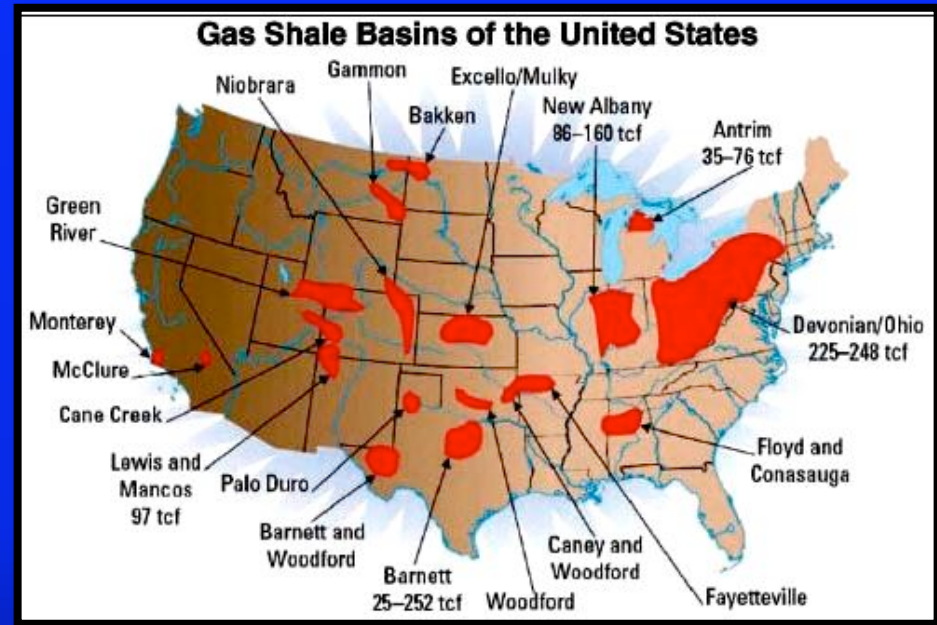
6 - 7 BCF/Day?

(10 – 13% of U.S. Supply)



Perceived Shale Gas “Glut” Took Savage Toll On Gas Prices

- As perceptions of gas glut grew, prices fell.
- As prices fell, the gas rig count collapsed.
- It is now 40% under peak drilling.
- Backlog of wells drilled but not fraced/completed is still high.
- But soon supply will plummet.



How Long Will Oil And Gas Prices Stay Low?

- The industry has stopped all new supply additions globally.
- This exposes natural declines of all production (versus observed declines net after vast \$\$ are spent).
- The longer prices stay low, the more supply will suffer.



How Much Supply Could We Lose?

- Will differ by region and whether oil or gas.
- In many basins, natural declines probably double what becomes net decline after Capex.
- Number of significant oil and gas field start-ups was not a staggering number when prices were high.



The Projects Now In Danger

- 117 projects either completed, nearing completion or in planning stage.
- Collectively they could add 9 MMB/d by 2014.

SCI'S Oil Project Start-Up Schedule

	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>
	----- Total Flow in '000 B/D -----					
Number of Projects	36	22	21	17	13	8
Total Project Initial Flow Rates	2,852	1,538	1,781	1,107	932	775
Average/Project	79	70	85	65	72	97
High/Low	320/5	200/10	200/15	180/10	200/20	375/20
# of 100,000 MB/D Projects	11	7	9	4	4	2

IEA's Estimated New Upstream Oil And Gas Projects

- IEA's WEO 2009 List:
 - 31 conventional oil projects
 - 13 non-conventional oil projects
 - 13 natural gas projects
- Peak capacity of these 57 projects is 9.090 MB/D of oil (1.220 non-conventional, 7.876 conventional and 237,000 mcm/year gas).
- Capital cost of these projects is a mere \$1.36 trillion.



Every project not completed is at risk in today's low prices.

The E&P Industry Spent Itself Silly

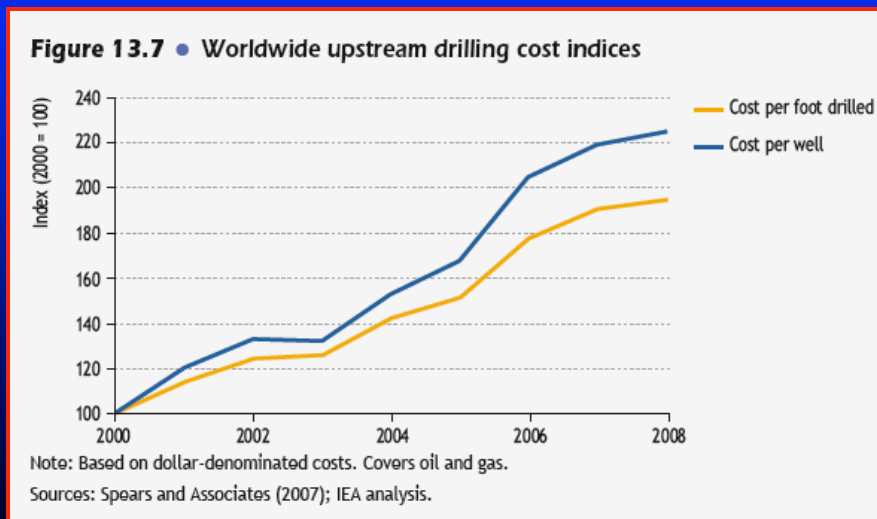
- From 2000 through 2008, upstream spending went from \$110 billion to almost \$400 billion.
- \$2.1 trillion barely budgeted crude supply growth.
- Why did more money not get spent?
- Why did supply not surge?
- Did the “vendors” simply hog all the economic rent?

It Is Easier To Lay Down A Rig Than Start Up Again

- As new projects stall, as rig counts drop, as some OPEC production is curtailed, all will have possible devastating impact on supply.
- “How fast and how deep” is what we all need to ponder.
- Once a mature field’s decline accelerates, it is hard to return to old pace of decline.

Most Spending Growth Went To Increased Drilling Costs

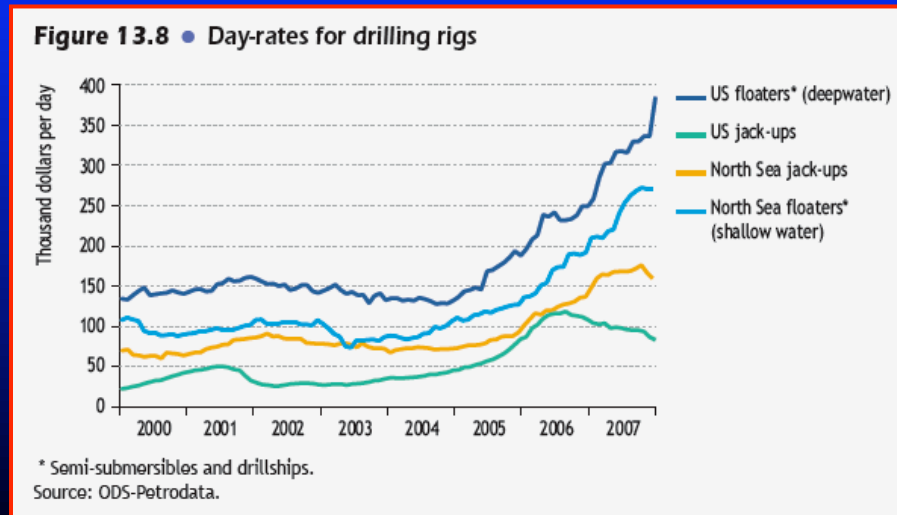
- For years, E&P spending was kept low through brutal pricing for rigs and other services.
- The oil service industry/drilling contractors had dismal returns, even after writing-off most of their assets.
- The assets are now too old and must be replaced.
- The customers were angered by rising “oilfield inflation” and vowed to create deflation again.



Source: IEA World Energy Outlook 2008

The Pending Battle Between E&P Players And Vendors Could Get Vicious

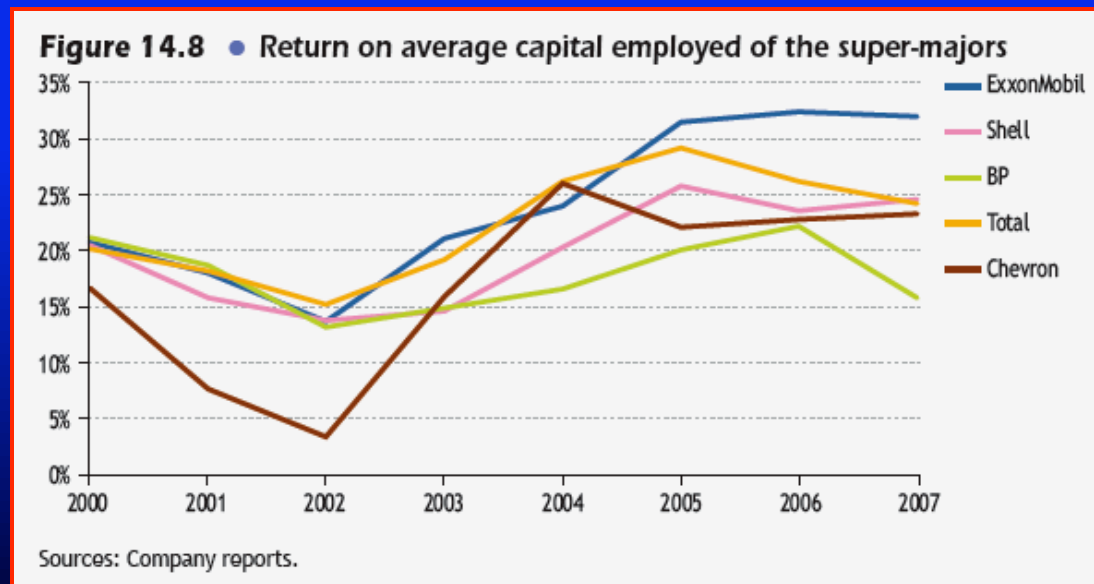
- The E&P mantra of 2009:
 - “This is the year to renegotiate all expensive contracts”
 - “In 2009, we will drive deflation up and down our supply chain”
 - “We are cancelling our rig needs until prices fall way back”
- The oil service industry should not blink:
 - If they are forced into many layoffs, the people crisis will never get solved
 - If prices fall, no one will begin addressing rusting asset issue



Source: IEA World Energy Outlook 2008

What Constitutes Fair Prices For “Oil” And “Rigs?”

- Oil company advertising in 2008 said Big Oil was not making unfair profits.
- In reality, they were finally earning respectable returns on average capital employed.
- Was it unfair that service companies finally began to prosper too?



Source: IEA World Energy Outlook 2008

How Far Could Non-OPEC Crude Fall?

- Assume current prices last another 18 months.
- Sample of key producers with significant decline exposure.

<u>Non-OPEC Crude</u>	<u>4th Q 2008</u>	---- MRS' Guess ----	
		<u>Likely Case</u>	<u>Worst Case</u>
	----- '000 BBL/Day -----		
USA	4,864	4,300	3,800
Canada	1,350	1,100	1,000
Mexico	3,117	2,800	2,600
UK	1,178	1,000	900
Norway	2,039	1,900	1,800
Other Europe	631	575	550
Australia/NZ /Japan	584	550	525
Russia	9,358	9,000	8,000
Other FSU	2,268	2,100	2,000
China	3,873	3,600	3,500
Other Asia	2,664	2,550	2,450
Latin America	4,094	3,950	3,850
Middle East	1,591	1,500	1,450
Africa	2,600	2,500	2,400
Total	40,211	37,425	34,825

Source: 2008 IEA database; Likely – worst case MRS' guess.

How Far Could OPEC Output Fall?

- Same assumptions:

<u>Middle East OPEC</u>	4th Q	--- MRS' Guess ---	
	2008	Likely Case	Worst Case
	----- '000 BBL/Day -----		
Iran	3,831	3,750	3,600
Iraq	2,340	2,100	1,800
Kuwait	2,303	2,100	2,000
Neutral Zone	545	525	475
Qatar	827	800	750
Saudi Arabia	8,664	7,700	7,000
UAE	2,425	2,300	2,100
Sub-Total	20,935	19,275	17,725
Algeria	1,364	1,250	1,150
Indonesia	843	800	700
Libya	1,718	1,650	1,500
Nigeria	1,913	1,800	1,700
Venezuela	2,350	2,000	1,700
Angola	1,817	1,800	1,600
Ecuador	494	450	400
Sub-Total	10,499	9,750	8,750
Total	31,434	29,025	26,475

Source: 2008 IEA database; Likely – worst case MRS' guess.

Summing Up Global Crude Supply Exposure

	(4th Q 2008)		
	Current	---- 18 to 24 Months Out ----	
	Run Rate	Likely Case	Worst Case
	----- '000 BBL/Day -----		
Non-OPEC	40,211	37,425	34,825
M.E. OPEC	20,914	19,275	17,725
Other OPEC	10,999	9,750	7,050
Total	72,124	66,450	59,600

Would world create savage shortages
halfway towards worst case?

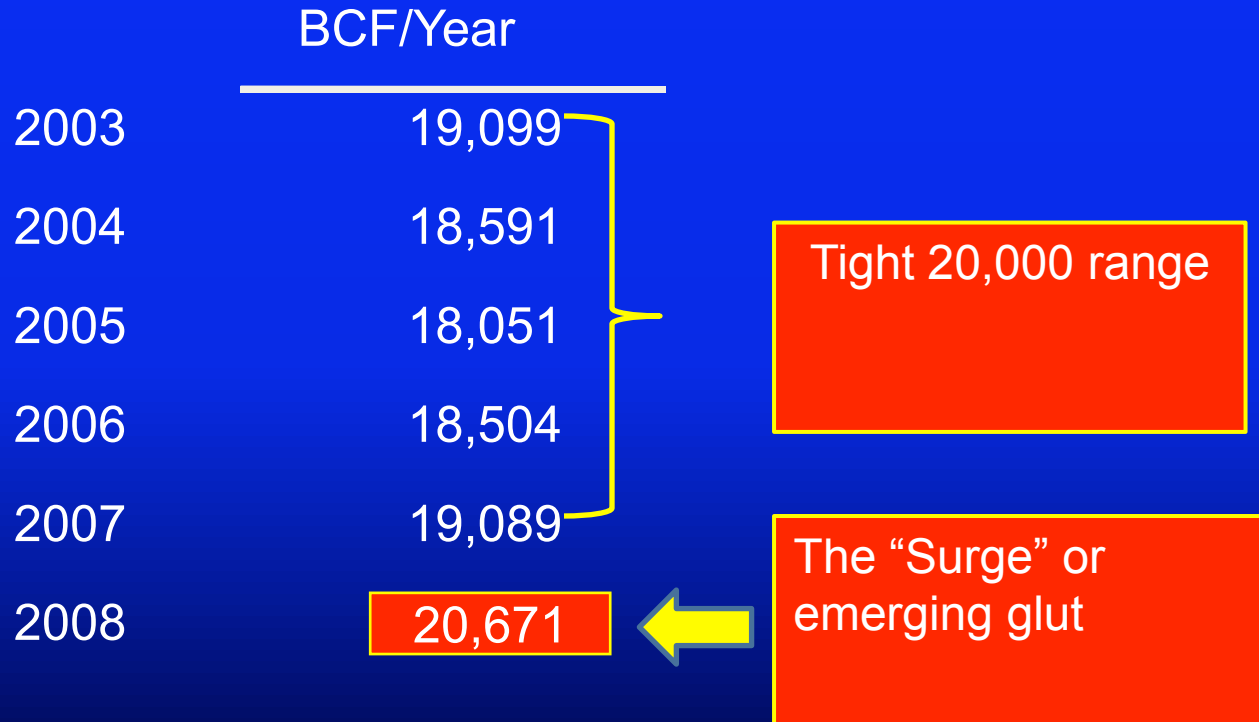
What/Who Caused The Gas Glut Surge?

- Why did soaring gas drilling/well completions fail to grow supply from 2000 to mid-2007?
- What changed to suddenly create such a product surge?
- Who created the new glut?
- How long will it last?
- Are we sure the glut is real?



What Caused The Past 18-Month “Surge/Glut”?

Reported Dry Gas Produced



Who Really Grew Their U.S. Natural Gas?

	<u>2006</u>	<u>2007</u>	<u>2008*</u>
Total	18,504	19,089	20,495
Top 35	7,693	8,163	8,224
Remaining public company reporting	<u>974</u>	<u>830</u>	<u>913**</u>
	8,667	8,993	9,137
Remainder to match EIA supply est.	<u>9,837</u>	<u>10,096</u>	<u>11,358</u>
		+3%	+13%

*December, 2008 assumed to be same as October and November

**Assume 2008 is 2007 +10%

Could hundreds of privately owned independents collectively
add twice what best-in-class company did?

Top Growth Gas Producers

	<u>2006</u>	<u>2007</u>	<u>2008</u>	<u>▲in</u> <u>2008</u>	<u>%</u>
	----- BCF Per Year -----				
XTO Energy	433	532	696	+164	+31%
Chesapeake	526	655	773	+118	+18%
Anadarko	558	698	748	+50	+7%
Devon	566	635	724	+89	+14%
EOG Resources	304	361	425	+64	+18%
Southwestern	68	110	188	+78	+71%
Forest Oil	49	83	118	+35	+42%
Plains Exploration	21	30	79	+49	+63%
Range Resources	75	91	114	+23	+25%
Barrett	48	58	73	+16	+28%
Top Ten	2,648	3,253	3,938	+685	+21%

Source: 2008 IEA database; Likely – worst case MRS' guess.

Top 10 Gas Decliners

	2006	2007	2008	▲in 2008	
	----- BCF Per Year -----				
ExxonMobil	706	641	454	(187)	
British Petroleum	941	879	789	(90)	
ConocoPhillips	900	948	765	(183)	
Chevron	661	620	549	(71)	
Royal Dutch	424	411	385	(26)	
Marathon	194	174	164	(10)	
Noble Energy	165	150	144	(6)	
Newfield Exploration	190	185	173	(13)	
Hess	43	38	29	(9)	
Total SA	16	12	6	(6)	
Top Ten	<u>4,240</u>	<u>4,058</u>	<u>3,458</u>	<u>(601)</u>	(17%)
Rest of 33 (Other 13)	<u>905</u>	<u>952</u>	<u>868</u>	<u>(84)</u>	(10%)

Source: 2008 IEA database; Likely – worst case MRS' guess.

Since Gas Rig Count Down $\pm 40\%$ From Peak Supply Will Fall

- How fast is matter of debate.
- Whether backlog of wells drilled but yet-to-be completed get hooked up is debatable.
- The longer the rigs stay down, the further south supply will fall.

If we really had a gas glut
it will evaporate soon.

Has Global Oil Now Peaked?

- When only 9 key producing countries show any significant growth, **BAD SIGN.**
- When rest of world collectively falls by almost 5 MMB/D, **TERRIBLE SIGN!**

	2005	2008	Change
Major Increased Crude	----- MMB/Day -----		
Russia*	9,185	9,520	335
Azerbaijan	454	895	441
Kazakhstan	1,266	1,412	146
China*	3,617	3,810	193
Brazil	1,634	1,822	188
Iraq	1,992	2,374	382
Kuwait*	2,133	2,314	181
Angola	1,228	1,847	619
Sudan	305	480	175
Sub-Total	21,814	24,474	+2,660
Rest of World Crude	51,033	46,396	-4,637
Net Change	72,847	70,870	-1,977

*Now in decline, too.

Record Output

Too Much Of Our Oil System Too Old

- 1/3 of our global oil supply comes from a small number of giant and super-giant fields which began production before 1970.

20% of world's supply

Table 10.1 • The world's 10 biggest oilfields by production

Field	Country	Location	Year of discovery	Peak annual production		2007 production
				Year	kb/d	kb/d
Ghawar	Saudi Arabia	Onshore	1948	1980	5 588	5 100
Cantarell	Mexico	Offshore	1977	2003	2 054	1 675
Safaniyah	Saudi Arabia	On/off	1951	1998	2 128	1 408
Rumaila N & S	Iraq	Onshore	1953	1979	1 493	1 250
Greater Burgan	Kuwait	Onshore	1938	1972	2 415	1 170
Samotlor	Russia	Onshore	1960	1980	3 435	903
Ahwaz	Iran	Onshore	1958	1977	1 082	770
Zakum	Abu Dhabi (UAE)	Offshore	1964	1998	795	674
Azeri-Chirag-Guneshli	Azerbaijan	Offshore	1985	2007	658	658
Priobskoye	Russia	Onshore	1982	2007	652	652
Top 10 total						14 260

Sources: IHS, Deloitte & Touche and USGS databases; other industry sources; IEA estimates and analysis.

Average Age = 48 years

Source: IEA World Energy Outlook 2008

7% of world's supply

Table 10.1 • The world's next 10 biggest oilfields by production

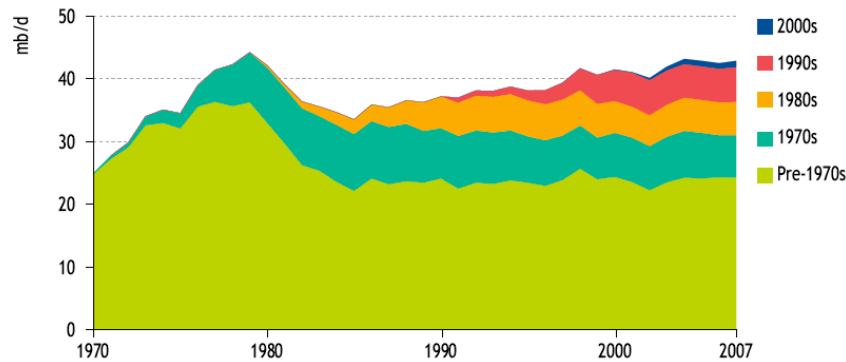
Field	Country	Location	Year of discovery	Peak annual production		2007 production
				Year	kb/d	kb/d
Bu Hasa	Abu Dhabi (UAE)	Onshore	1962	1973	794	550
Marun	Iran	Onshore	1964	1976	1 345	510
Raudhatain	Kuwait	Onshore	1955	2007	501	501
Gachsaran	Iran	Onshore	1928	1974	921	500
Qatif	Saudi Arabia	On/Off	1945	2006	500	500
Shaybah	Saudi Arabia	Onshore	1968	2003	520	500
Saertu (Daqing)	China	Onshore	1960	1993	633	470
Samotlor (Main)	Russia	Onshore	1961	1980	3 027	464
Fedorovo-Surguts	Russia	Onshore	1962	1983	1 022	458
Zuluf	Saudi Arabia	Offshore	1965	1981	677	450
Next 10 total						5203

Sources: IHS, Deloitte & Touche and USGS databases; other industry sources; IEA estimates and analysis.

Average Age = 52 years

“The Era Of Cheap Oil Is Over” (IEA November 14, 2008)

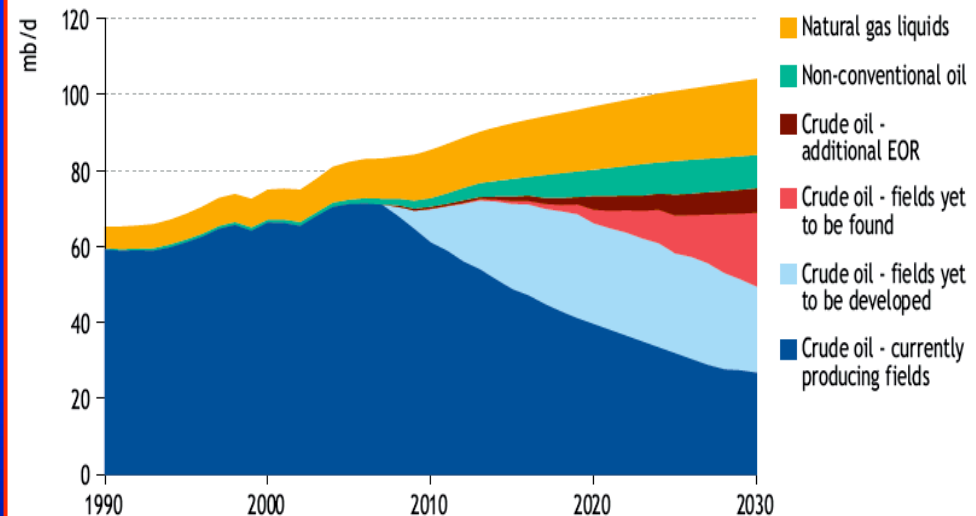
Figure 10.1 • World crude oil production from super-giant and giant fields by field vintage



Note: For fields covered by IEA field-by-field oil production database (which includes all the world's super-giant fields and most giant fields). Fields are classified according to the year of first production.

Sources: IHS and Deloitte & Touche databases; other industry sources; IEA estimates and analysis.

Figure 11.1 • World oil production by source in the Reference Scenario



Growth In NGL's And Non-Conventional Crudes

	<u>1999</u>	<u>2001</u>	<u>2003</u>	<u>2005</u>	<u>2007</u>	<u>Est. 2008</u>
	----- MMB/Day -----					
US-NGL	1,834	1,864	1,719	1,709	1,776	1,793
US-Other	386	382	428	433	597	786
Canada Bitumin	244	309	356	448	546	614
Canada NGL	649	692	674	705	723	681
Canada Syncrude	323	349	509	545	661	605
UK NGL	273	267	262	240	207	222
Norway NGL	120	188	222	271	285	274
Other Europe NGL	34	36	36	39	32	27
Other Europe Non-Conventional	31	19	17	22	36	58
Australia NGL	82	81	88	89	85	77
Other DOE NGL/Non-Conventional	26	31	26	28	31	31
Russia NGL	231	268	344	443	466	471
Brazil	261	251	311	377	450	450
OPEC NGL/Non-Conventional	<u>3,046</u>	<u>3,293</u>	<u>3,664</u>	<u>4,499</u>	<u>4,770</u>	<u>4,959</u>
Total	<u>7,540</u>	<u>8,030</u>	<u>8,656</u>	<u>9,848</u>	<u>10,665</u>	<u>11,048</u>
Processing Gains & Other Biofuels	<u>1,805</u>	<u>1,849</u>	<u>1,980</u>	<u>2,087</u>	<u>2,494</u>	<u>2,699</u>
Total	<u><u>9,345</u></u>	<u><u>9,879</u></u>	<u><u>10,636</u></u>	<u><u>11,935</u></u>	<u><u>13,159</u></u>	<u><u>13,747</u></u>

Source: Highly regarded confidential supply model.

OPEC's Magical Spare Capacity Is Mythological²

- OPEC's key producers struggle to keep imports to IEA member countries flat.
- Most “surges and cut-backs” are merely verbal boasts.
- 2008 cuts were real, are being implemented and are probably too deep.

How Much Oil Does Saudi Arabia Produce?

- Saudi Arabia is widely acknowledged to have over half the world's spare capacity (might be almost all).
- But, its exact production exports is still protected as a state secret.

	<u>2001</u>	<u>2002</u>	<u>2003</u>	<u>2004</u>	<u>2005</u>	<u>2006</u>	<u>2007</u>	<u>2008</u>
	----- MMB/D -----							
IEA's Est. Production	7.7	7.38	8.48	8.6	9.06	8.93	8.48	8.9
Exports to IEA Members	4.38	4.16	4.38	4.56	4.55	4.45	3.97	3.95

WHY DID SURGE PRODUCTION RARELY SHOW UP IN
IEA MEMBER COUNTRIES?

Upstream Crude Returns For Record Spending

	EIA's World Crude Production (incl. condensate)	Saudi Arabia	Remainder
	----- '000 BBL/Day -----		
2001	68,101	8,031	60,070
2002	67,162	7,634	59,528
2003	69,434	8,775	60,659
2004	72,493	9,101	63,392
2005	73,737	9,550	64,187
2006	73,461	9,152	64,309
2007	73,012	8,772	64,290
2008	73,885	9,330	64,555

Source: IEA

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How Fast Might Oil Prices Snap Back?

- Cannot quantify a real answer.
- But, supply will fall and could fall fast.
- Too many key regions were in steep decline despite high prices.
- If there is no real spare capacity and demand stays “flat”, a squeeze could come quicker than most believe.



How High Would Prices Need To Rise To Address Industry's Woes?

- The “woes” are like cancers to the oil and gas system.
 - People: Too many will soon retire
 - Rusty assets: Too much is beyond original design life
- People issue has no easy solution at any future price.
- “Rust” means rebuilding every aspect of the global oil and gas system.



Can The World Rebuild Our Oil And Gas System?

- Cost and magnitude to rebuild even 50% would cost up to \$50 - \$100 trillion.
- It would employ 10 to 20 million workers and become the world's largest construction project.
- These are “shovel ready” projects once they are designed.
- The cost of inaction is a nightmare!

Will A Green Revolution Change The Oil And Gas Game?

- The mood in D.C. is that climate change must be solved.
- Most green energy projects ignore the lurking problems in oil and gas.
- A collision could occur between the march to a green world and new energy efficiencies and physical shortages of oil and gas.



Back To The “Bet”

- We are at a historical crossroad: The bet has begun.
- Oil peaked.
- Gas might be peaking.
- Industry’s assets are too old.
- Volatility got too violent.
- Public-at-large is not concerned.
- Ignorance is bliss!



How The World Wins The Energy Bet

- We wake up soon.
- We triple the price of oil and natural gas and create a floor.
- We begin rebuilding the industry's assets.
- We create a field-by-field production and reserve transparency.
- We open access everywhere.
- We “Drill, Baby Drill” and get lucky.



Craps tables open at 3:00 PM!

What To Watch For As 2009 Unfolds

- Watch how rapidly rigs at work slow down.
- Watch oil stocks getting tight.
- Watch production starting to decline as drilling stops.
- Watch OPEC cut too deeply into tight market.
- Watch the horror of layoffs ending a nascent recruiting era.
- Watch for sharp rebound in oil and gas prices when supply drops outstrip demand.



Let's Ensure We Do Not Create “Twilight’s Last Gleaming”

- If industry does not quickly snap back:
 - Supplies will drop
 - Layoffs will increase
 - Rebuilding the industry will not begin
- How long this condition lasts will determine whether we created “Twilight’s last gleaming.”
- It would be inconvenient to have “the desert turn dark.”





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