OPEC’s Dilemma
The oil world cycles of 2003-2023

Ray Leonard: Hyperdynamics
Art Berman: Labyrinth Consulting
University of Arizona
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“Prediction is very hard, especially about the future” - Yogi Berra

Cautions in viewing predictions
- End of history illusion
- Smartest guy in the room
- Consider the source
OPEC’s Dilemma: the oil world cycles of 2003-2023

- Through its history, the oil industry has consistently been through cycles of shortage, leading to price spikes, increased production and overproduction, then a price collapse leading to reduced production and shortage, beginning the cycle all over again.
- The factors driving these cycles include geology, engineering (technology), economics and politics.
- The first quarter of the 21st century is proving to be a continuation of this pattern. An extended period of low prices (1986-2003) was followed by a 20-year period which included three price increases due to shortages separated by two price collapses.
- OPEC has a strength and weakness: The strength is that they possess the only excess production capacity, giving them a way to control the market. The weakness is that oil revenue forms a disproportionate role in their economy and government revenues leaving them vulnerable to low prices.
The Oil World of 2003-2023

This 20 year period can be divided into five periods, representing the boom and bust cycles of the industry. Each period began with a clearly defined event.

- The end of the glut: (Oct. 2003-Sept. 2008) An increase in demand due to strong world economy combined with the peak production of conventional oil in 2005 resulted in an oil-price rise and spike, ending an extended period of low prices.

- The price collapse and rapid recovery: (Oct. 2008-Dec. 2009) A drop in demand due to worldwide economic crisis was met by a swift OPEC production cut leading to a price recovery.

- The rise of the high cost oil: (Jan. 2010-Oct. 2014) Supported by high prices and cheap credit, high-cost unconventional, heavy oil and deep-water oil production dramatically increased. Loss of production due to political events in the Middle East and in North Africa preserved demand/supply balance and high prices.

- Price collapse and rebalancing the market: (Nov. 2014-2018) Overproduction of high cost oil plus re-emergence of Iran and Iraq production caused price collapse. OPEC refused to cut production, preferring to preserve market-share and allow low prices to reduce high-priced production and increase demand.

The Oil World in 2003

- Oil prices had averaged $34/bbl. (2015 dollars) since the price collapse of 1986
- Non-OPEC production has risen for 10 consecutive years but would plateau in 2004
- 86% of oil production is low-cost conventional in 2003. Most of unconventional in form of NGL’s
- New Technology has been developed for deep-water and heavy oil production but economics are marginal at current price
- Increases in demand had been matched by supply increases in various non-OPEC countries since 1993; the latest was the production renaissance in Russia with 50% rise in 2000-2003, a majority of the non-OPEC increase in that period.
In October 2003, Mikhail Khodorkovsky, CEO of YUKOS was arrested, YUKOS eventually destroyed, leading to reduction in rate of Russian oil production increase.

With only minimal Russian production growth after 2003 and steady decline in other non-OPEC conventional production, oil production reached a peak and began to decline in 2005.
With strong GDP growth (averaging over 4%), world demand continued to grow and with OPEC discipline holding, significant shortages resulted in a price rise from $30/bbl. in late 2003 to $140 bbl. in September 2014.

The price rise supported the growth of high-cost exploration and production. In particular, these years can be viewed as the “golden age” or breakthrough years of deep-water production, which increased 280% in the 5-year period.
The price collapse of 2008 and rapid reaction of OPEC

Demand significantly exceeded supply in 2007 to 1Q 2008 resulting in price rise from $54-$132/bbl. in 3Q 2008.

Three consecutive quarters of oversupply, along with demand reduction due to world economic crisis resulted in price collapse to $43/bbl. by January 2009.

OPEC cut production (Saudi Arabia 40% of cut) in Q4 2008-1Q 2009 to restore market balance, leading to recovery to near $80/bbl. by end 2009.

Price fluctuation was due to one specific event (demand reduction due to world economic crisis) that could be handled by OPEC reaction.
The rise of high price oil (2010-2014)

Five factors led to an unprecedented period of continued high oil prices and resultant supply of high cost unconventionals. By late 2014, one third of world oil production was deep-water + unconventional.

- **World economic growth:** Led by China, the world economy expanded reaching 5% GDP growth in 2010. World oil demand expanded dramatically that year, restoring the $100/bbl. price by 2011.

- **Political turmoil:** Various factors, from revolution and civil war to sanctions, removed about 3 MMBOD production from the Middle East and North Africa in the 2010-2012 period. This production loss was largely maintained through 2015.
The rise of high price oil (2010-2014)

- Low interest rates: Led by the USA, starting in 2009, low cost financing was available for development projects that were only marginally profitable even at high oil prices.
- New Technologies: Breakthroughs in deep-water and heavy oil production technology from the previous decade continued to show results, due to long cycle time of projects. Canadian synthetic crude and crude bitumen production doubled in 2010-2015.

The rise of high price oil (2010-2014)

point: Fracking

- Fracking: the marriage of fracking and horizontal drilling technology resulted in a production boom in the USA, facilitated by good fiscal terms, availability of capital and service companies and public databases.
- By February 2014 production rose to approximately 3.7 MMBD crude + 1.5 MMBD NGL in the US and Western Canada.
- Approximately 60% of reserves and production came from two plays; the Eagle Ford and Bakken.
- Production is characterized by high capital costs and rapid well decline rate (60-70% in first year).
- Even with the high oil prices, capital expenditures exceeded cash-flow pushing producers in debt.
- How did the production boom occur? E&P Companies focusing on the shale plays became the sub-prime derivative of the post-Financial crash period. Shale oil projects had access to almost infinite capital with no short term performance requirements other than making interest payments and avoiding debt covenants.

Source: Energy Aspects; In focus – the other tale of shale, Oct 2013; Other analysis EY
The rise of high price oil and the economics of Fracking

- Ultimate recovery per well varies widely in all of the plays, even in the Bakken and Eagle Ford, so a single “break-even” price can not be accurate. Often what is quoted is the “break-even” price for the best quality reservoirs.
- All shale plays are characterized by “sweet spots” with higher ultimate well recoveries.
- In both Bakken and Eagle Ford, the most efficient operators on best acreage have a “break even price” around $45/bbl. Most producers need $55-70/bbl.
- These are the two best shale plays. Break-even costs on other plays are generally higher.
Rebalancing the Market: the price collapse of late 2014

- By mid 2014, the increasing supply of deep-water + unconventional production was overwhelming demand.
- After 2013, there were no further reductions from Middle East/North Africa turmoil to offset this.
- In November 2104, with price collapse clearly imminent, OPEC met but did not agree on a price cut (in contrast to 2008) resulting in fall by early 2015 to below $50/oil.
- Following a brief rally to $60/bbl. in spring 2015, the price fell to $30/bbl. by January 2016.
- The current oversupply is about 1.12 MMBOD. (March 2016) In addition, the world has about 430 MMB excess oil stored from the oversupply of the 2014-2016 period.
Rebalancing the Market: OPEC’s Dilemma

The Current Oil Price Collapse and the Shale Revolution

- The current oil price collapse was caused by over-production of unconventional oil funded by debt. It is the classic “bubble”.
- OPEC’s dilemma is whether to cure the price collapse by reducing production in the short term, sacrificing market share or to allow a gradual market correction, absorbing the pain of low oil prices for a number of years.
- The brief price rally in spring 2015 (to $60/bbl.) and renewed investment in high price oil demonstrated to OPEC that the price drop of November 2014-March 2015 had not changed the market fundamentals.
Rebalancing the Market: OPEC’S Dilemma

In spring 2015, OPEC faced 3 choices

1. Cut production to allow rapid price rise to $80/bbl. (as in 2008). Taking this approach would likely allow the US shale producers to continue their production increase, thereby sacrificing OPEC market share.

2. Hold production at 30 mmbod quota allowing market and price to rebalance by 2016.

3. Increase production to 31.5 mmbod to keep price at level that would break the shale oil investment cycle.

In spring 2015, the Gulf States of OPEC decided on the third option and increased production to 31.5 MMBOD in order to keep the price low and break the investment cycle of high cost shale oil, heavy oil and deep-water oil. This would also increase demand and preserve their market share.
Rebalancing the Market: OPEC’S Dilemma

As 2016 begins, OPEC strategy appears to be working:

- The lower oil price raised world demand from 1.1% increase per year from 2011-2014 period to 1.8% increase in 2015, adding about 0.6 mmb/d demand above expectation to the market by year end. Future increases with continued low price of about 1.2% per year can be expected.

- After 6-month delay, US shale production began dropping in Q2 2015 at a rate of 20 kboe/d per month, then Q4 2015 at 63 kboe/d. By Q3 2016, if current price persists, US production will have dropped nearly 1.2 mmb/d from peak.

- The industry has reduced capital spending in 2015-2016 by 19% (48% cut of E&P spending) from the 2014 level, delaying high cost projects taking approximately 20 billion barrels from the market.

Source: Wood MacKenzie
Rebalancing the Market: OPEC's Dilemma
Why $30 oil cannot last

• Unlike 2003, in 2015, more than 30% of the world’s oil production is high cost unconventional and deep-water, unprofitable at this price

• Middle East/North Africa OPEC countries need $50-$120/bbl. oil price to support their countries budgets
OPEC’s Dilemma:
New Equilibrium and price rise (2019-2023)

- The balance of supply and demand, assuming no OPEC cut, is now only predicted to occur in early to mid 2017.
- At that point, drawdown of the excess inventory is likely to begin, a process that could take as long as 18 months.
- It will be facilitated by the drop in supply due to the budget cuts and project cancellations of 2015-2016.
- Significant price rise (above $50/bbl.) is only likely to begin in 2019.

Oil price based on 5-year Brent spread (Bloomberg) 2016-2020, 2021-2023 price authors projection.
The future of the profession

AAPG Membership reflects the cyclical nature of industry hiring:

- In 1983, during the “boom” cycle, new membership peaked as the older peak from ‘50’s “boom” neared retirement
- In 1996, during the lean years, new membership was low and attrition reduced the peak membership of the “boom” years
- In 2011, as a new “boom” was taking place, a new hiring cycle started while the membership of the early 1980’s “boom” nears retirement

Prices in 2011 dollars
The future of the profession

- The price collapse of 2014 is likely to extend through 2017 with gradual rise starting 2018, reducing budgets for new hiring in next two years.
- However, another cycle will soon begin for the reasons outlined in this presentation.
- The retirements of the class of 1975-85 will produce openings for a new generation of geoscientists.
- In face, the two biggest issues in long term planning of oil company executives are the retirement of the class of the “boom” of 1975-1985, known as the Great Crew Change and how to attract skilled new entrants.
- The future for a new entrant to the profession of petroleum geologist, with patience and perseverance, is bright.

Source: Oil and Gas Executive Outlook 2016. Reinsvold & Assoc.
The pattern of “boom” and bust” in the oil industry, typical of the 20\textsuperscript{th} century will continue into the 21\textsuperscript{st} century despite any efforts to control it.

Each price collapse is different. The 1986 collapse lasted so long because there were abundant sources of low cost conventional oil to be exploited and was “cured” by the worldwide peak of conventional oil production. The 2008 collapse was due to a specific economic event, not a fundamental oil market event and was quickly rectified by OPEC. The 2014 collapse is between the two. While it is caused by a fundamental event (rise of the deep-water and unconventional production) the current price cannot support a third of the world’s oil production, therefore it cannot last as long as the 1986 collapse.

OPEC’s reaction, to let market forces reduce the high cost production and bolster demand, was rational and will ultimately be successful in pushing the price to a sustainable level in the range of $60-80/bbl. in the early part of the next decade.

Geopolitical events and breakthroughs in technology must be considered “wild-cards” that could upset well reasoned predictions!