Topics

❖ How did we get to where we are today
  ▪ The oil price Supercycle
  ▪ Three M&A consolidation waves
  ▪ Evolution of technology

❖ Today’s Transformed Outlook
  ▪ Natural gas
  ▪ Oil and NGLs
  ▪ Path to petroleum Flexibility

❖ Conclusions: Implications for Private Capital
The Oil Price Supercycle

WORLD EVENTS AND OIL PRICES – NOMINAL PRICING (1971 – 2013)

- Iranian Revolution: shah deposed
- Saudis abandon “swing producer” role; oil prices collapse
- Iran-Iraq War begins; oil prices peak
- OPEC agrees to quotas
- OPEC agrees to quota increase
- Gulf War ends
- Iraq invades Kuwait
- OPEC agrees to quota increase
- Prices spike on Iraq war, rapid demand increases, constrained OPEC capacity, low inventories, etc.
- Prices rise sharply on OPEC cutbacks, increased demand
- Prices fall sharply on 9/11 attacks, economy weakness
- Back from the abyss
- Syrian civil war escalates
- Fiscal Cliff fallout concerns
- Fear of global economic meltdown

1971 Arab Oil Embargo

- 1973
- 1975
- 1980
- 1985
- 1990
- 1995
- 2000
- 2005
- 2010
- 2013
M&A Consolidation Waves

THE ACQUISITIONS OF COMPANIES THAT HAVE CREATED BIG OIL

Source: Thomas A. Petrie’s Following Oil.
Evolution of Technology

HUBBERT’S 1956 PREDICTION OF FUTURE U.S. PRODUCTION OF CRUDE OIL

Premised on the old exploration model

Source: Hubbert prediction of future production of crude oil in the conterminous United States and adjacent continental shelves. (Hubbert, 1956, fig. 21. Reproduced with the permission of American Petroleum Institute).
Evolution of Technology


(1) Successful gas exploratory drilling footage.
(2) Total new fields discovered and new reservoir discoveries divided by successful exploratory drilling footage.
Evolution of Technology
HORIZONTAL WELLS – THE NEW EXPLOITATION MODEL
100+ Tcfe
Horn River

70 Tcfe
Montney

4 – 6 BBoe
Niobrara

3 – 6 BBoe
Mississippian

9+ Tcfe
Granite Wash

2 – 20 BBoe
Permian

12 – 24 BBoe
Bakken

25 – 45 Tcfe
Fayetteville

250 – 500 Tcfe
Marcellus

10 – 30 Tcfe
Woodford

700 – 1,400 Tcfe from gas and liquids-rich gas shale plays

20 – 60 BBoe from unconventional oil shale plays

700 – 1,400 Tcfe from gas and liquids-rich gas shale plays

• 700 – 1,400 Tcfe from gas and liquids-rich gas shale plays
• 20 – 60 BBoe from unconventional oil shale plays

24+ Tcfe
Utica

250 – 500 Tcfe
Marcellus

10 – 30 Tcfe
Woodford

200 – 500 Tcfe
Haynesville

30 – 50 Tcfe
Bakken

30 – 50 Tcfe
Barnett

7 – 24 BBoe
Bakken

• 700 – 1,400 Tcfe from gas and liquids-rich gas shale plays
• 20 – 60 BBoe from unconventional oil shale plays

Source: United States Geological Survey, EIA and Select Wall Street research.
Today’s Transformed Outlook

- Powerful production increases are resulting from application of well-incentivized capital focused on unconventional fossil fuel resources
- The land rush is largely over
- High-grading of validated development projects is the new priority
- Efficiency of execution is now critical
- Avoidance of pitfalls still matters (capital destruction is still possible)
- Oil and NGL resource potential has expanded possibly four-fold
- Natural gas resource potential is probably at least 10-fold higher
Today’s Transformed Outlook

POTENTIAL GAS PRODUCTION RATE THAT COULD BE DELIVERED BY THE MAJOR U.S. SHALE PLAYS UP TO 2030

Today’s Transformed Outlook

U.S. OIL PRODUCTION BY TYPE IN NEW POLICIES SCENARIO

Note: The World Energy Model supply model starts producing yet-to-find oil after it has put all yet-to-develop fields into production. In reality, some yet-to-find fields would start production earlier than shown in the figure.

Today’s Transformed Outlook

EAGLE FORD SHALE PENETRATION WINDOWS

Source: Railroad Commission of Texas Production Data Query System (PDQ).
Today’s Transformed Outlook

BAKKEN SHALE OIL FIELD

Source: Continental Resources.
Today’s Transformed Outlook
A PATH TO PETROLEUM FLEXIBILITY

### 2010
- **US Production**: 7.0 MMBpd
- **US Imports**: 10.5 MMBpd
- **Total US Demand**: 17.5 MMBpd

### 2018
- **US Production**: 10.0 MMBpd
- **US Imports**: 6.9 MMBpd
- **Total US Demand**: 16.9 MMBpd

### 2025
- **US Production**: 11.0 MMBpd
- **US Imports**: 4.2 MMBpd
- **Total US Demand**: 15.2 MMBpd

**Oil equivalent of gas exports**
- **NA**
- **0.6 MMBpd**
- **1.5 MMBpd**

**Canadian Oil Supplies**
- **2.5 MMBpd**
- **3.0 MMBpd**
- **3.5 MMBpd**

**Non North American Imports**
- **8.0 MMBpd**
- **3.9 MMBpd**
- **0.7 MMBpd**

**Increase in production combined with decrease in demand signals the likelihood of domestic surplus**

Demand reduction from 2010 to 2018 results from fuel efficiencies and hybrid vehicles.

Demand reduction from 2018 to 2025 results from fuel efficiencies and gas/electric vehicles.

Source: IEA, World Energy Outlook 2012 and Thomas A. Petrie’s Following Oil.
Prices are adjusted for inflation to July 2013 prices using the Consumer Price Index (CPI-U) as presented by the Bureau of Labor Statistics.

(1) Prices are adjusted for inflation to July 2013 prices using the Consumer Price Index (CPI-U) as presented by the Bureau of Labor Statistics.
Conclusion: Implications for Private Equity

- Markets continuously endeavor to work but do so in their own time and at their own pace

- Flawed economic and policy initiatives ultimately cause (or at least exacerbate) supply shortfalls, and sometimes even surpluses

- Whether supply is in surplus or deficit, both conditions present ripe candidates to be capitalized upon by private equity

- Periodic consolidation and reorganization (via mergers and sales) are integral to the natural order of the petroleum sector economy
**Conclusion: Implications for Private Equity (cont’d)**

- Enormous reconfiguration of infrastructure is called for basin by basin

- Fossil fuel price volatility requires continuous management efforts

- New demand needs to be created

- Exports are required (the pressure relief valve)