The World Beyond:
Opportunities and Challenges in Global Energy Investing

IPAA Private Capital Conference
By Robin West

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A Little Perspective
Danger of Future Supply Crunch Remains

2020 call on OPEC
~25–37 mmb/d
given 0.5% - 1.5% growth

Source: PFC Energy Global Liquids Supply Forecast

* Includes Refinery Gain
Its Their Oil: Increasingly Limited Access—Particularly to the Easiest Reserves

Source: PFC Energy, Oil & Gas Journal, BP Statistical Review
SuperMajors Seem Unable to Grow

Source: PFC Energy
Value is Migrating to the Traded NOCs

- In 1999, traded NOCS made up 1% of the combined value of the **PFC Energy 50** companies; this share was 32% in 2009

- In a decade, this set expanded from two companies (Petrobras, Gazprom) with a combined value of worth $22 bn to eleven companies worth $1.2 trillion

- Unlike the SuperMajors, these companies promise
  - Growing demand
  - Access to resources

Source: PFC Energy PFC Energy 50
There Are Exceptions, But NOC Control Means Less Investment

- NOCs tend to invest less than IOCs in the upstream sector
- NOCs with declining sectors need major investments
- NOCs with growing production (e.g. Petrobras) need access to capital

Largest NOCs Spend Substantially Less than the Largest IOCs
Expect Dramatic Shifts in the Global Competitive Landscape 2010-2020

2000-2010

- Independents focused on the “incremental” gas shale play (tight gas) with enormous impacts on aggregate North American supply
- The number of NOCs overseas accelerated
- Large mergers reached a stopping point with ChevronTexaco
- Oil sands investment in Canada took off
- The world’s largest deepwater play was led by a NOC
- Independents made substantial impacts in new conventional plays overseas

2010-2020

- Tight gas technology will spread overseas, with success & failure
- Global Players move further into the North American tight gas play, reversing a 20 year pattern
- Deteriorating downstream value makes global players disaggregate – opening way for large mergers
- Independents continue substantial impacts in new conventional plays overseas
- Tight oil play takes off in the US
- Tight oil play spreads faster with greater impact overseas than tight gas
The New Hot International Destination: US!

- Gazprom Marketing & Trading USA Inc. begins buying and selling wholesale gas in the US
- Petrobras exercises its preference right to acquire 50% of Devon’s participation interest in the Cascade field in the GOM
- Maersk Oil pays $1.4 billion for Devon’s 25% working interest in the Jack Lower Tertiary development in the GOM
- BP, Statoil and TOTAL invest nearly $5 billion, plus similar amount in carried costs, in Chesapeake’s unconventional gas plays
- ExxonMobil makes $41 billion purchase of XTO
- Mitsui invests $1.4 billion to participate in Anadarko’s Marcellus Shale development
Going International
Cairn in India Led to Discovery of ~1 bnbbls of Recoverable Reserves – Extends Indian Plateau

Cairn’s Mangala, Bhagyam, Aishwarya complex of oil fields onshore Rajasthan will add enough incremental oil production in 2009/10 to extend the production plateau of the last 20 years into the early part of the next decade.

Corporate Acquisition

1996: Bought 10% interest from Shell in Rajasthan onshore block (RJ-ON-90/1)

Asset Acquisition

1997: Bought 40% interest from Shell in Rajasthan onshore block (RJ-ON-90/1)

1998: Bought 50% interest from Shell in Rajasthan onshore block (RJ-ON-90/1) for $7.25 mm

2002: Cairn Acquires Command Petroleum (interest in Ravva)

Source: PFC Energy Global Liquids Supply Forecast
What Triton (Hess) did for Equatorial Guinea

Provided new oil volumes as Zafiro was peaking

Source: PFC Energy Global Liquids Supply Forecast
Kosmos, Tullow and Anadarko Changed the West African Margin Play

Ghana: Oil Production Forecast by Reserve Category

Additional Success Outside Ghana

Source: PFC Energy Global Liquids Supply Forecast
Tullow Continued the East Africa Play

East Africa rift play was hot in the 1980s, but failed outside Sudan; Tullow came back to it

Source: PFC Energy Global Liquids Supply Forecast
Excellent Opportunities Exist for Companies That Bring Real Expertise—e.g. Drilling Efficiencies

- North America is far and away the world’s expert on land drilling. Of the 1.7 million wells that were drilled between 1980 and 2008, 90% were drilled in North America

- US technology, expertise and competition have delivered extraordinary productivity improvements—resulting in step-function cost reductions—for unconventional gas

Source: PFC Energy Global LNG Service
International Interest in Unconventional Gas, but Potential Looks Smaller…

Estimated Resources
- Coal Bed Methane
- Tight Gas
- Shale Gas

Sources: PFC Energy Global LNG Service; NPC 2007; Rogner 1997
...and Few of the Prerequisites for Unconventional Gas Plays are in Place Elsewhere Today

- Large and capable service sector with pre-positioned equipment
- Experienced field and drilling personnel
- Multitude of small players drilling aggressively and learning fast
- Sophisticated land title system
- Gas gathering infrastructure
- Good roads, bridges and other physical access
- Appropriate legislation/regulation
As More Countries’ Fields Mature, US EOR Expertise Will be in Demand Internationally

![Graph showing countries in plateau and countries in decline with their onsets and durations of plateau and decline.](image-url)

**Countries in Plateau**

- Russia
- Sudan
- Turkmenistan
- China
- India
- Malaysia
- Brunei
- Equatorial Guinea
- Chad
- Mexico
- Denmark
- Yemen
- Australia
- Colombia
- Congo
- Argentina
- New Zealand
- Oman
- Norway
- Uzbekistan
- Gabon
- UK
- Syria
- Papua New Guinea
- Pakistan
- Egypt
- Other Europe
- Cameroon
- Dem Rep Congo
- Peru
- Tunisia
- Indonesia
- Romania
- USA

**Countries in Decline**

- USA
- Romania
- Indonesia
- Tunisia
- Peru
- Dem Rep Congo
- Cameroon
- Ecuador
- Indonesia
- Australia
- New Zealand
- Oman
- Norway
- Uzbekistan
- Gabon
- UK
- Syria
- Papua New Guinea
- Pakistan
- Egypt
- Other Europe
- Cameroon
- Dem Rep Congo
- Peru
- Tunisia
- Indonesia
- Romania
- USA

**Duration of Plateau**

**Onset of Plateau**

**Onset of Decline**

*Source: PFC Energy Global Liquids Supply Forecast*
A Huge New Play

- **Really extensive shale resource**
  - USGS estimated OOIP of 414 bbo
  - Very low permeability (<5% recovery)

- **Accelerating development**
  - Started in 2000 with Elm Coulee field in Montana, but shifted to N. Dakota
  - Intensive development from 2005-1H 2008
  - Squeezed into unprofitability by collapse of oil prices
  - Window of profitability has re-opened as costs have plummeted
In the Bakken, Initial Month Production Per Well Has Doubled Since 2000

- Well productivity has grown materially
- Driver of real growth is ability raise both activity and the portion of wells in top productivity categories
  - Learning spreads
  - Experience grows, meaning fewer mistakes

![Graph showing the evolution of initial well production in Bakken](image-url)
Tight Shale Promises Incremental Gains – But Gas Shale Seemed Incremental, Until The Numbers Added Up
You Can Make Money: International Independents Delivered More Value

- Average return for companies with operations in North Africa, Middle East and Central Asia: 41%
- Average return for companies focused on North America: 13%

Source: PFC Energy Upstream Competition Service
But Need To Assess Risk, Which Has Many Different Ingredients

Source: PFC Energy Petroleum Risk Manager
Conclusions

- There are always international opportunities for companies that bring real expertise—but if they were easy, someone would already have done them.
- Independents can thrive in the gap between the ambitions and capabilities of NOCs with technically challenging portfolios.
- There are international opportunities to export US tight (oil and gas) reservoir technology.
- International E&P is not easy, but the breadth and depth of international opportunities can be very large—even those that appear “incremental” to the global players, at least initially.
- Companies that work to understand the real risks and manage these can be very successful.
- For companies with a comparative advantage funding is increasingly available.
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Main regional offices:

**Asia**
PFC Energy, Kuala Lumpur
Level 27, UBN Tower #21
10 Jalan P. Ramlee
50250 Kuala Lumpur, Malaysia
Tel (60 3) 2172-3400
Fax (60 3) 2072-3599

PFC Energy, China
Kerry Center N-1137
1 Guanghua Road
Chaoyang District
Beijing 100020, China
Tel (86 10) 6599-7937
Fax (86 10) 6530-5093

**Middle East**
PFC Energy, Bahrain
Bahrain Financial Harbor (BFH)
East Tower
5th Floor
P.O. Box 11118
Manama - Bahrain
Tel (973) 7705 8880

**North America**
PFC Energy, Washington D.C.
1300 Connecticut Avenue, N.W.
Suite 800
Washington, DC 20036, USA
Tel (1 202) 872-1199
Fax (1 202) 872-1219

PFC Energy, Houston
4545 Post Oak Place, Suite 312
Houston, Texas 77027-3110, USA
Tel (1 713) 622-4447
Fax (1 713) 622-4448

**Europe**
PFC Energy, France
19 rue du Général Foy
75008 Paris, France
Tel (33 1) 4770-2900
Fax (33 1) 4770-5905

PFC Energy International, Lausanne
19, Boulevard de la Forêt
1009 Pully, Switzerland
Tel (41 21) 721-1440
Fax: (41 21) 721-1444

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