

Supply and Production in World Energy Markets: Trends and Prospects

Politics of Development and Security in Africa's Oil States Conference
by Monica Enfield

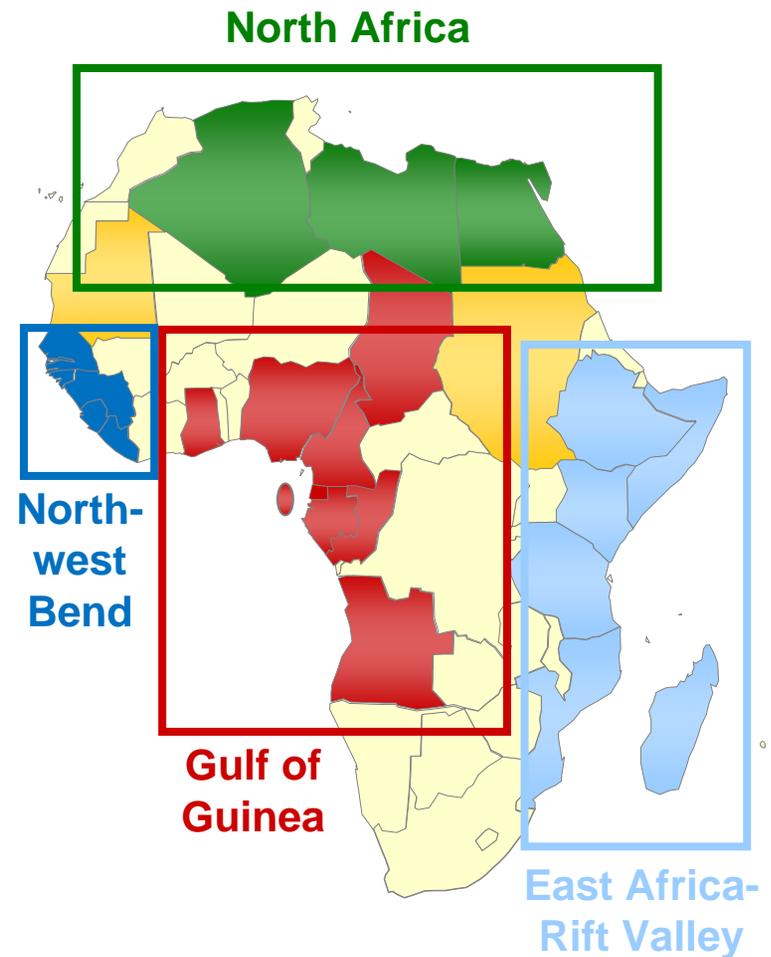
2 April 2009



Sub-Saharan Africa and Global Energy Markets

- Global Supplier to Key Markets
- New Source Production
- Investment Center for Western IOCs and Asian NOCs
- Frontier Exploration Outlook
- Upstream Challenges in Africa

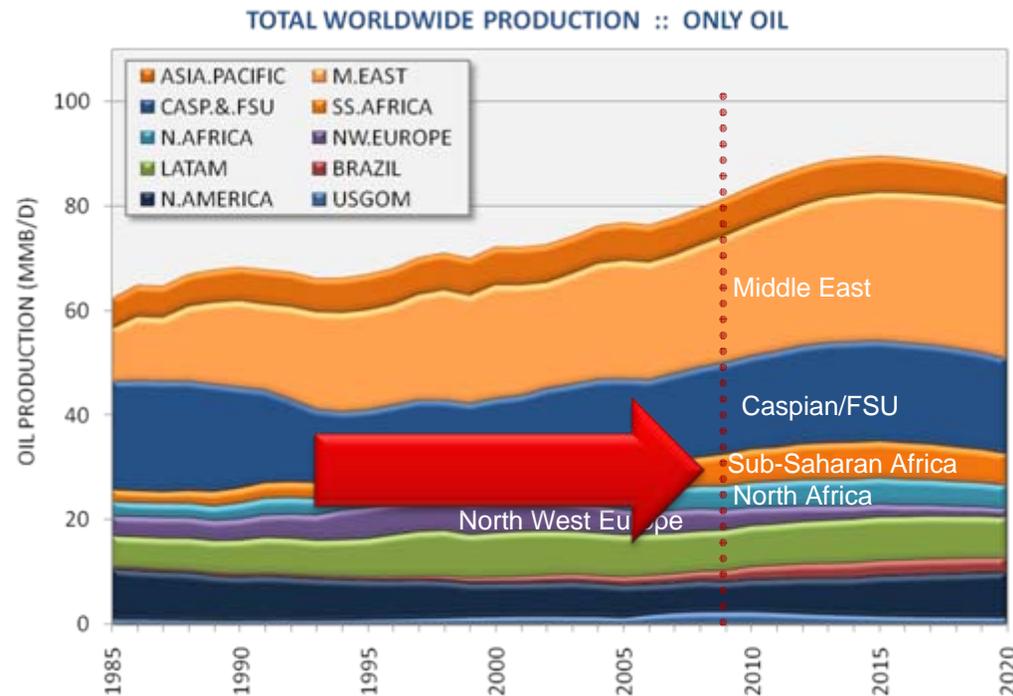
African Oil/Gas Producers



Africa in the Context of Global Energy

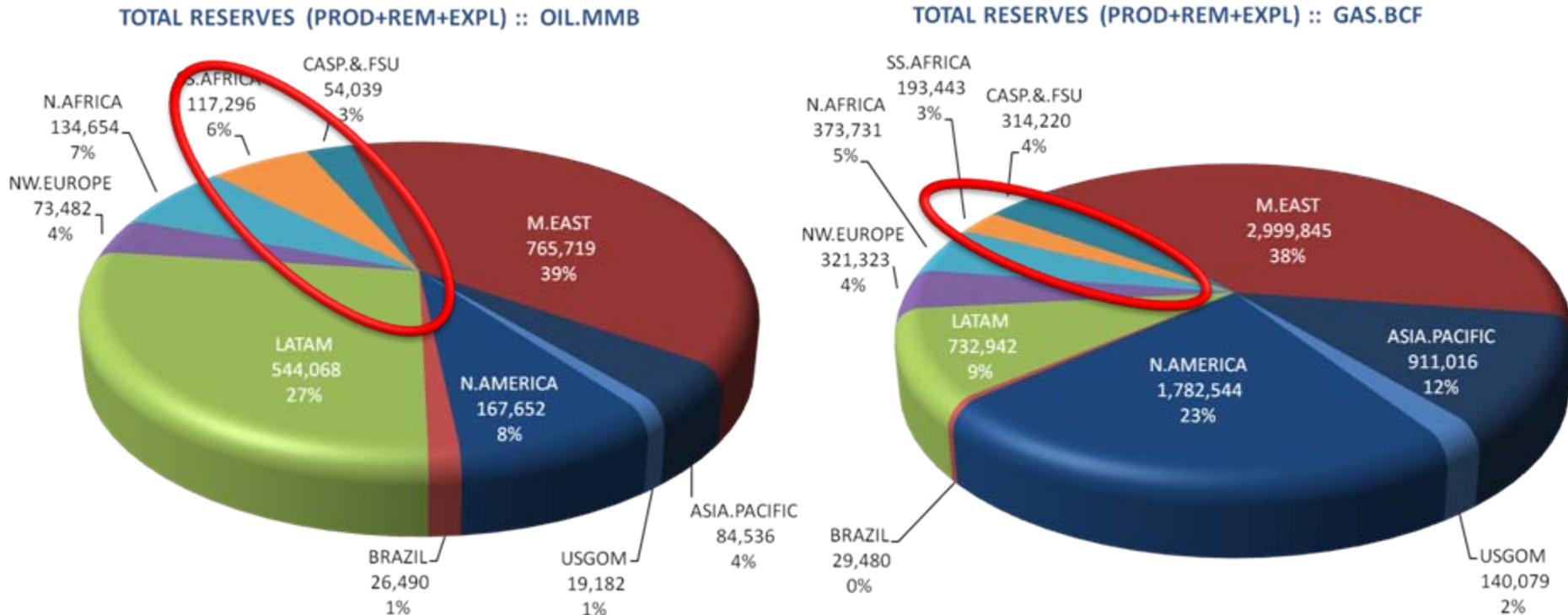
- Africa is a **strategic component** of the global oil market.
- Although smaller than the Middle East with regard to proven oil reserves and crude oil production, Sub-Saharan Africa is important because:
 - It **supplies key markets** (North America, Europe, Asia) with high quality crude oil
 - Its production helps **offset declines** in mature oil provinces (such as the North Sea)
 - It represents the **last “land grab”** for oil company investment and reserve replacement

PFC Energy P50 Liquids Supply Forecast



Africa in the Context of Global Energy

- According to PFC Energy's P50 Liquids Supply model, Sub-Saharan Africa holds 6% of total oil reserves, and 3% of total gas reserves.

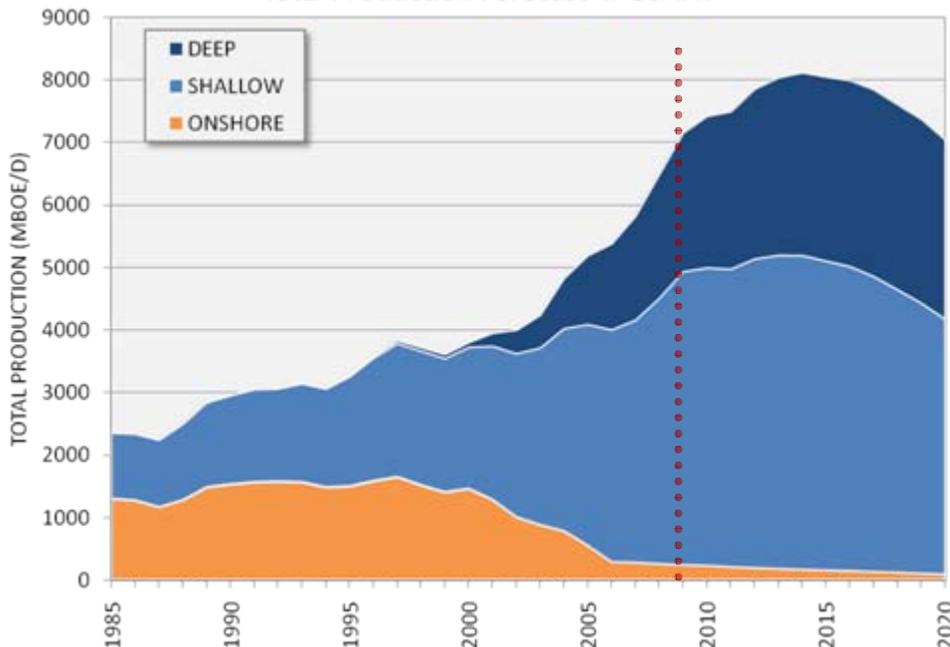


Sub-Saharan Africa Production Forecast

- Sub-Saharan Africa will increase production, from current 5.8 million to 7.1 million boe/d by 2015.
- Future growth in the Sub-Saharan African region will come from offshore activity, comprising more than 95% of regional production.
- Nigeria and Angola will comprise almost 85% of total offshore production, with significant contribution of other countries as Equatorial Guinea, Gabon, and Congo Brazzaville.

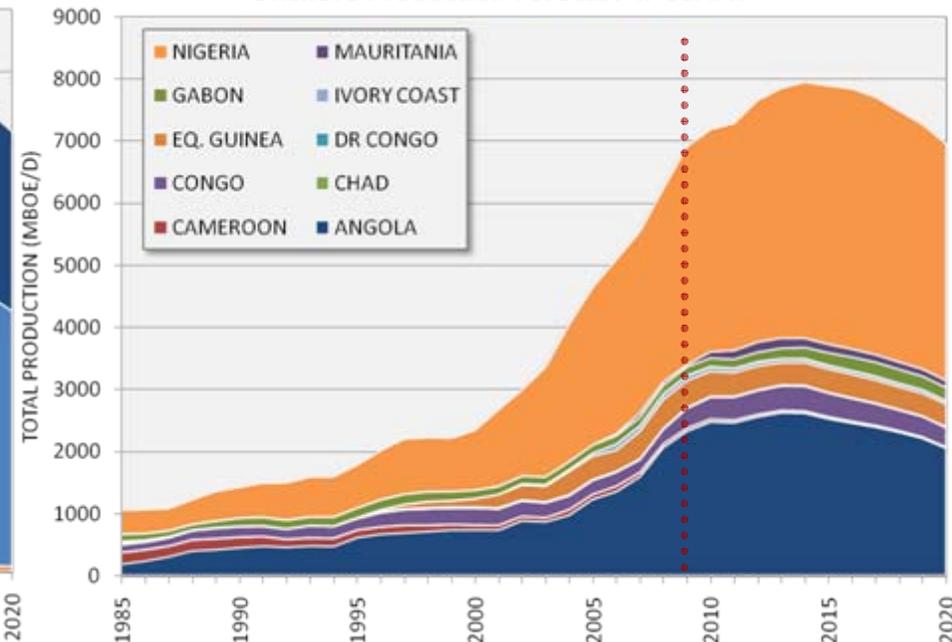
PFC Energy P50 Liquids Supply Forecast

Total Production Forecast :: SSAFR

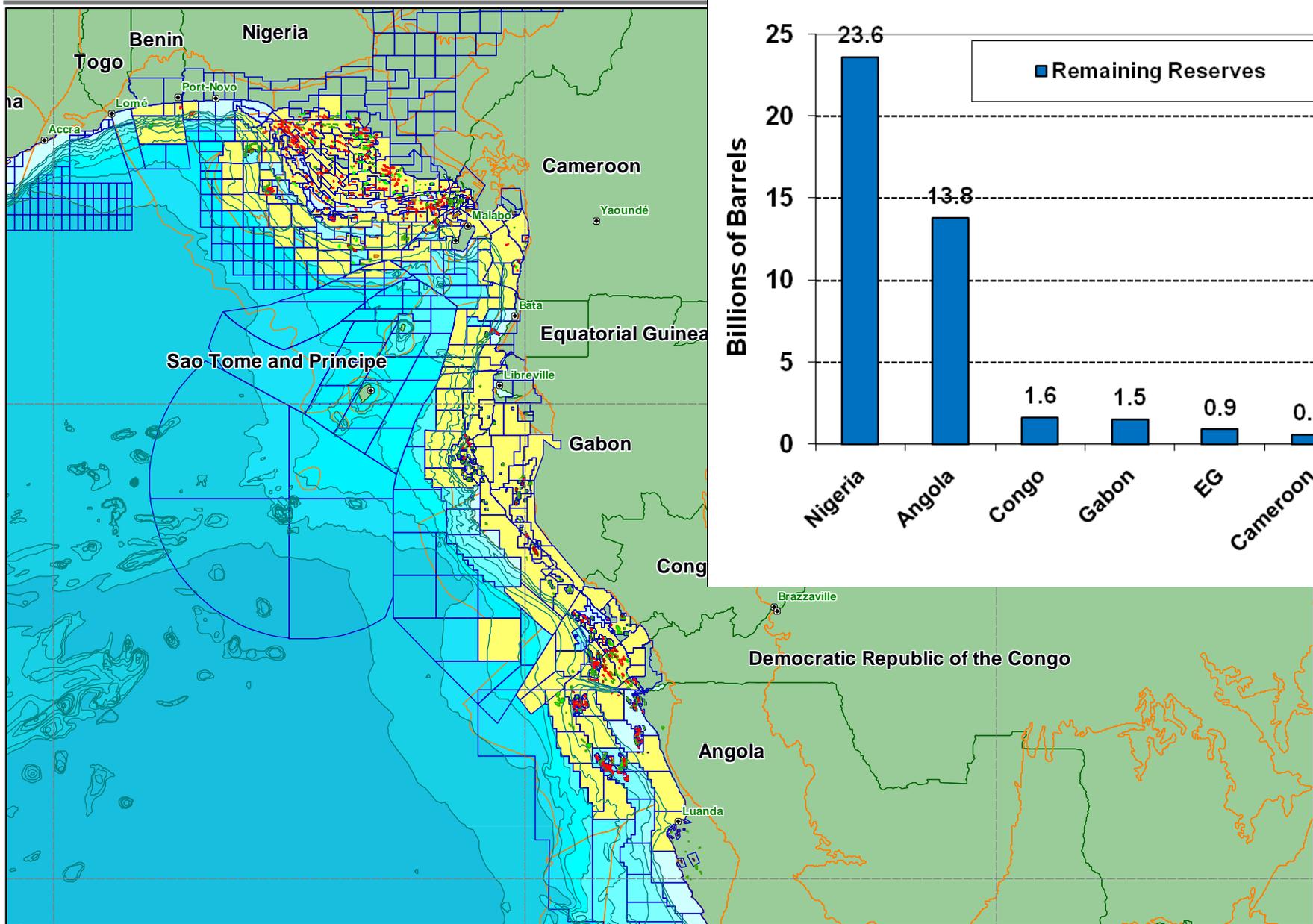


PFC Energy P50 Liquids Supply Forecast

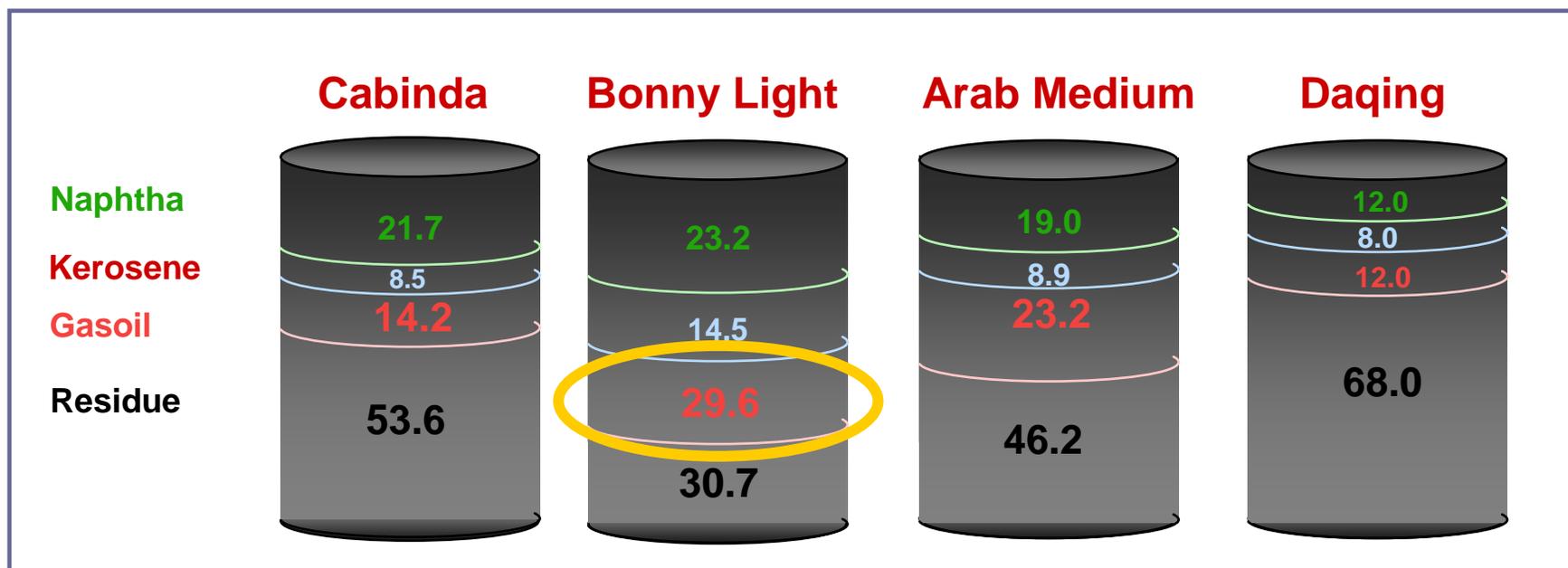
Offshore Production Forecast :: SSAFR



Remaining Reserves are Dominated by Nigeria and Angola



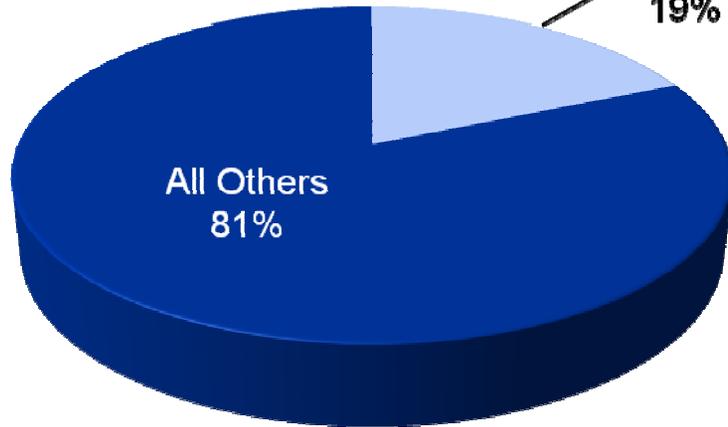
African Crude Favored By Refiners



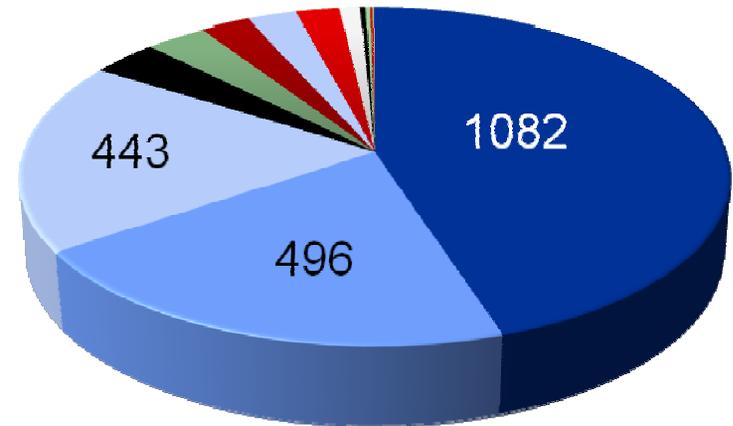
- West African crude contains sizeable amounts of gasoil – half of recent global demand growth has been for distillates (diesel, kerosene, heating oil).
- Compared to domestic grades such as Daqing, Nigerian and Angolan barrels offer far less residue when processed. The same is true for most West African producers.
- Bonny Light plays an important part as an emergency crude in the United States; Hurricane Katrina import spikes.

African Oil Imports to the United States

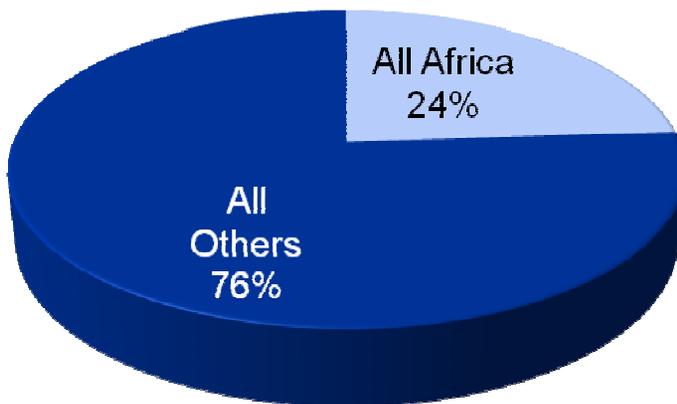
US Oil Imports, 2007
Sub-Saharan Africa 19%



US Imports from Africa, 2007 (mb/d)



US Oil Imports, 2007

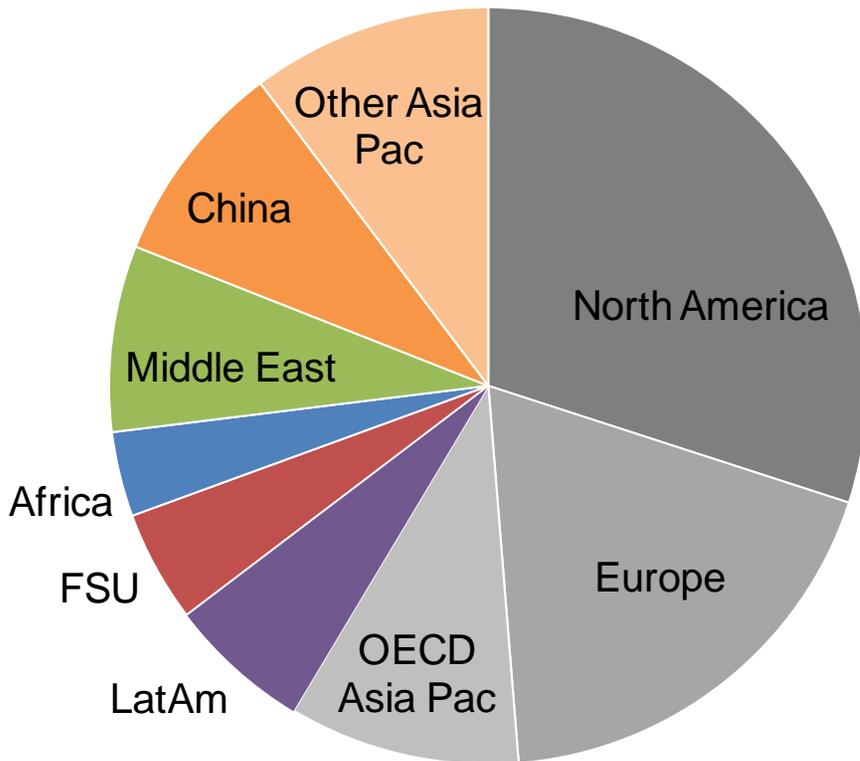


- | | | |
|-----------------------|---------------------|--------------|
| ■ Nigeria | ■ Angola | ■ Algeria |
| ■ Libya | ■ Chad | ■ Gabon |
| ■ Congo (Brazzaville) | ■ Equatorial Guinea | ■ Cameroon |
| ■ South Africa | ■ Tunisia | ■ Mauritania |

- The United States imports 19% of its oil from Sub-Saharan Africa
- Nigeria, followed by Angola, are the largest exporters from Sub-Saharan Africa

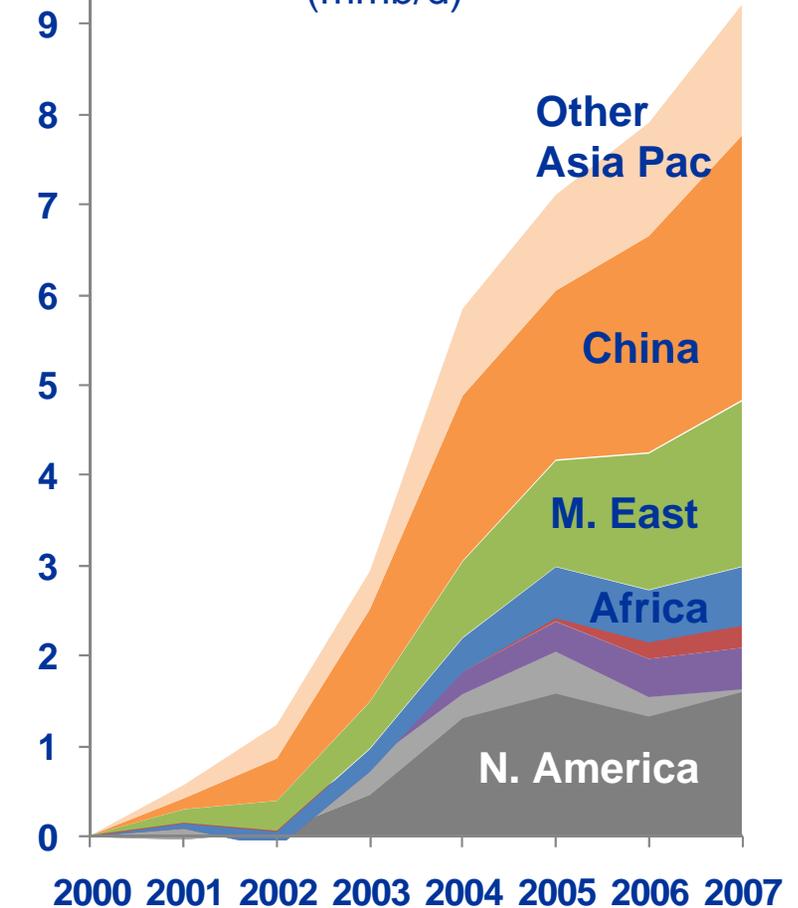
African Crude Supplies Key Demand Centers

World Product Consumption 2007



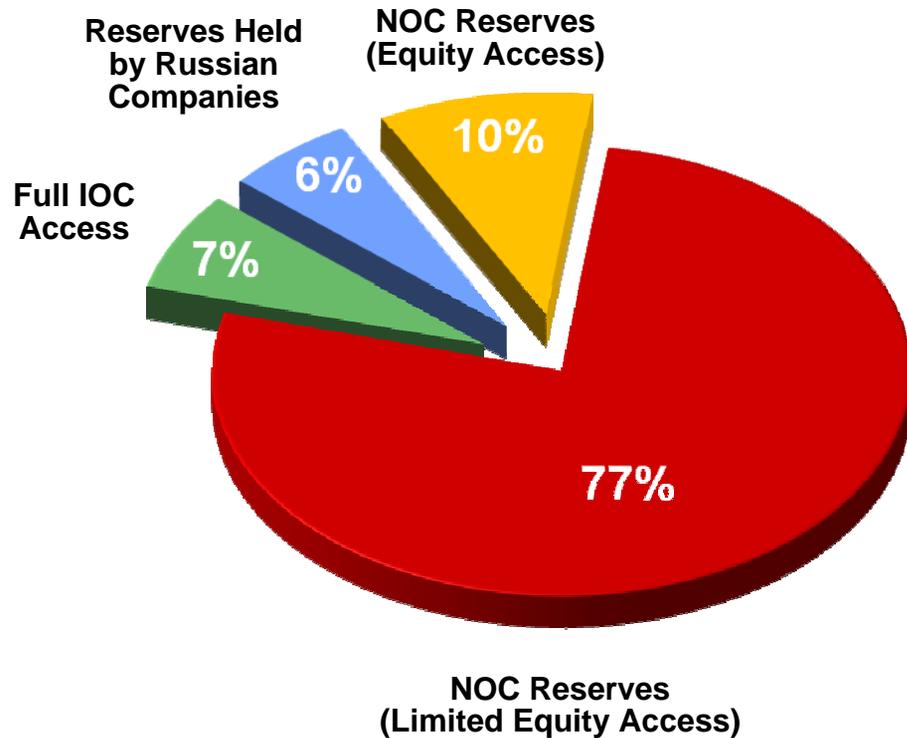
Source: PFC Energy Market Intelligence Service

Growth since 2000 (mmb/d)



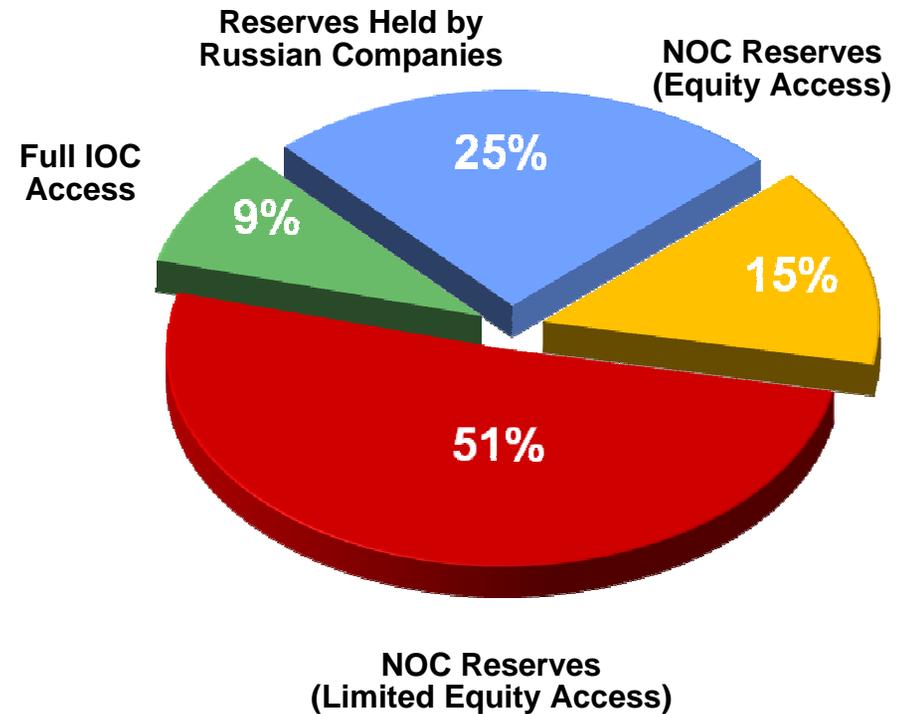
IOC Investment in an NOC-Constrained World

Oil, 2009



Total: 1,238 bnboe

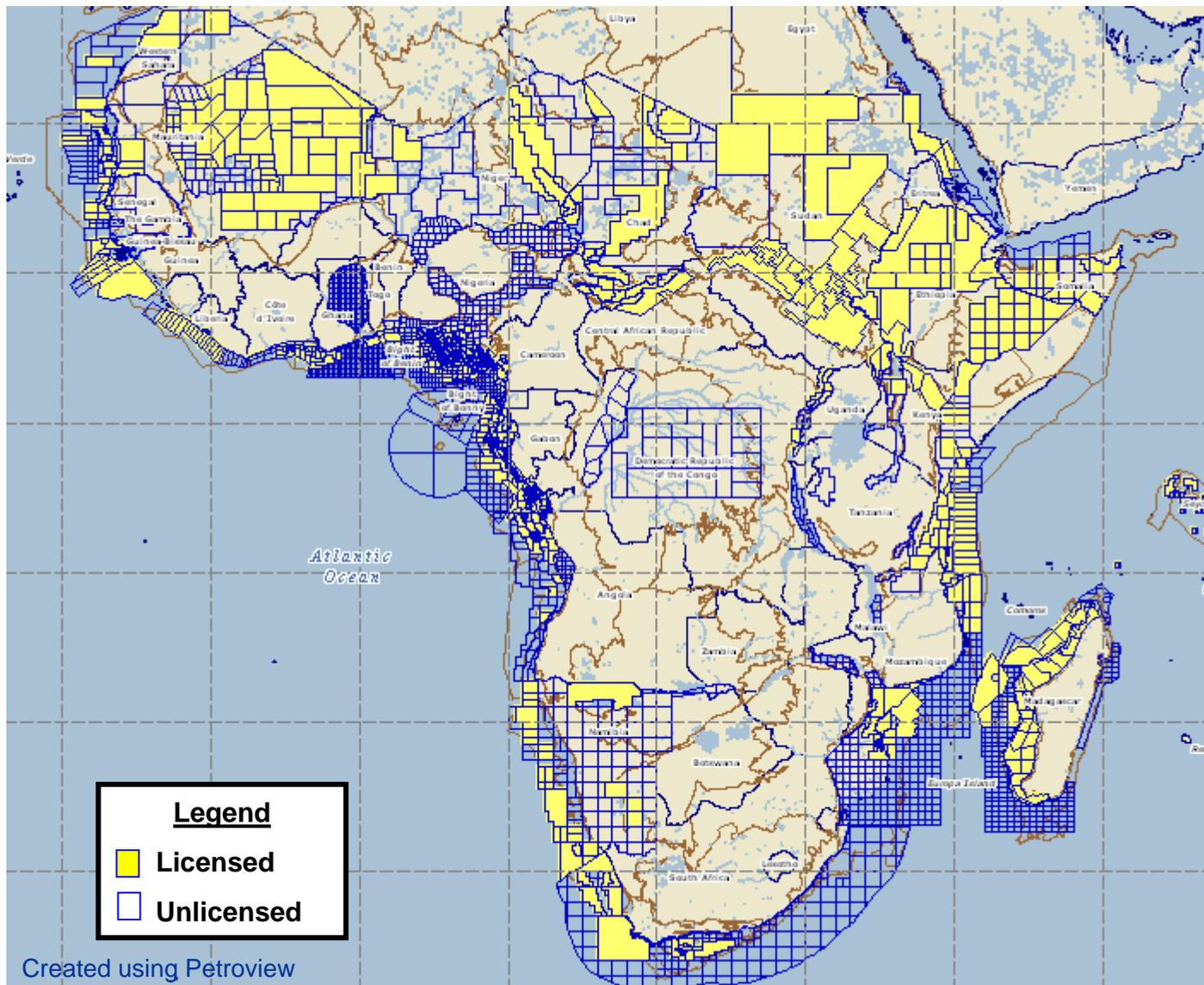
Gas, 2009



Total: 1,041 bnboe

Africa Open for Business...

- Since the 1990's, African countries have been largely open to foreign investment, particularly with regard to the deepwater offshore region.
- Almost every country with a coast has parceled off acreage for licensing.
- For several IOCs, Sub-Saharan Africa constitutes a critical portion of the global portfolio.



Company Positions in Sub-Saharan Africa

Company	% of Global Portfolio
ExxonMobil	18%
TOTAL	24%
Shell	12%
ENI	21%
Chevron	13%
BP	3%
StatoilHydro	8%
Marathon	19%
Hess	11%



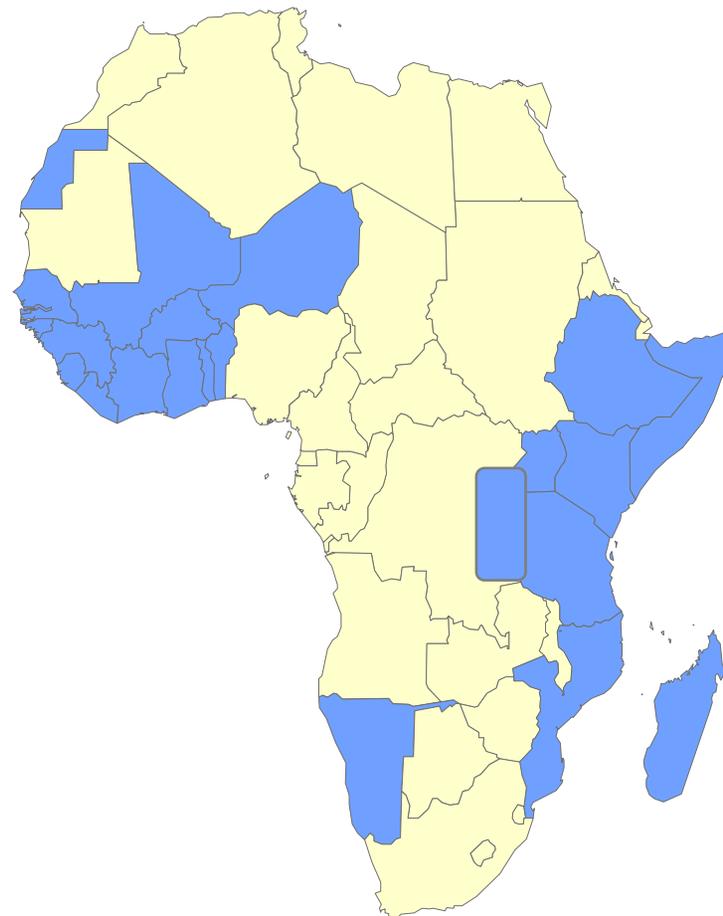
Bonga FPSO



Kizomba A TLP

- Frontier E&P is taking place along the Northwest Bend and East Africa Rift Valley.
- Companies include supermajors, such as ExxonMobil, to minnows such as Kosmos. Asian and Russian NOCs are also prominent investors.
- Likely production increases from Ghana, Mozambique and Tanzania.

Active Frontier E&P in Africa



- Asian governments can address energy security through:
 1. Increasing domestic energy production
 2. Reducing consumption
 3. **Increasing imports** from the global energy market
 4. **Increasing equity barrels** through international investment

Africa Plays a Role in Both Providing Exports and Equity Barrels

National Oil Company	Key Producing Assets	Africa as % of Production
CNPC (China)	Sudan, Algeria	7% total; 40% int'l
Sinopec (China)	Sudan, Algeria	3% total; 23% int'l
CNOOC (China)	Nigeria	10% total; 50% int'l
PETRONAS (Malaysia)	Sudan, Mauritania, Chad	24% total; 76% int'l
ONGC (India)	Sudan	7% total; 54% int'l

Sub-Saharan Africa will continue to be a strategic component of global energy security, but there will be challenges ahead:

- **Global Financial Crisis and Credit Crunch for Operators**
 - The current global financial crisis is impacting Sub-Saharan Africa due to lower export commodity prices and lower levels of investment globally. For the hydrocarbon sector, this is likely to result in project delays as operators and contractors face potential capital constraints.
- **Is Deepwater in a Cycle or Near a Peak?**
 - As new discovery sizes fall and companies develop their portfolio faster than they find new large fields, there is a predictable peak to the current investment and production growth cycle in the period 2010-2014; will exploration success continue?
- **Can Asia Deliver African Equity Barrels**
 - Flow of foreign investment into Africa could reverse if home governments see too few results from their NOCs. This reversal could have a large impact on the political stability of many African regimes.
- **Political Instability is Impacting Decisions**
 - Violence in the Niger Delta is now the greatest challenge to future oil and gas investments and the most likely area where supply disruptions will occur. Instability in frontier countries could impact future investment and project development plans, as well.



Strategic Advisors in Global Energy

PFC Energy consultants are present in the following locations:

- ▶ **Bahrain**
- ▶ Beijing
- ▶ Brussels
- ▶ Buenos Aires
- ▶ Calgary
- ▶ **Houston**
- ▶ **Kuala Lumpur**
- ▶ **Lausanne**
- ▶ London
- ▶ Mumbai
- ▶ New York
- ▶ **Paris**
- ▶ San Francisco
- ▶ **Washington, D.C.**

Main regional offices are shown in blue.

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