

Iraq's Ambition

What is the Role of Natural Gas?



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Key Points

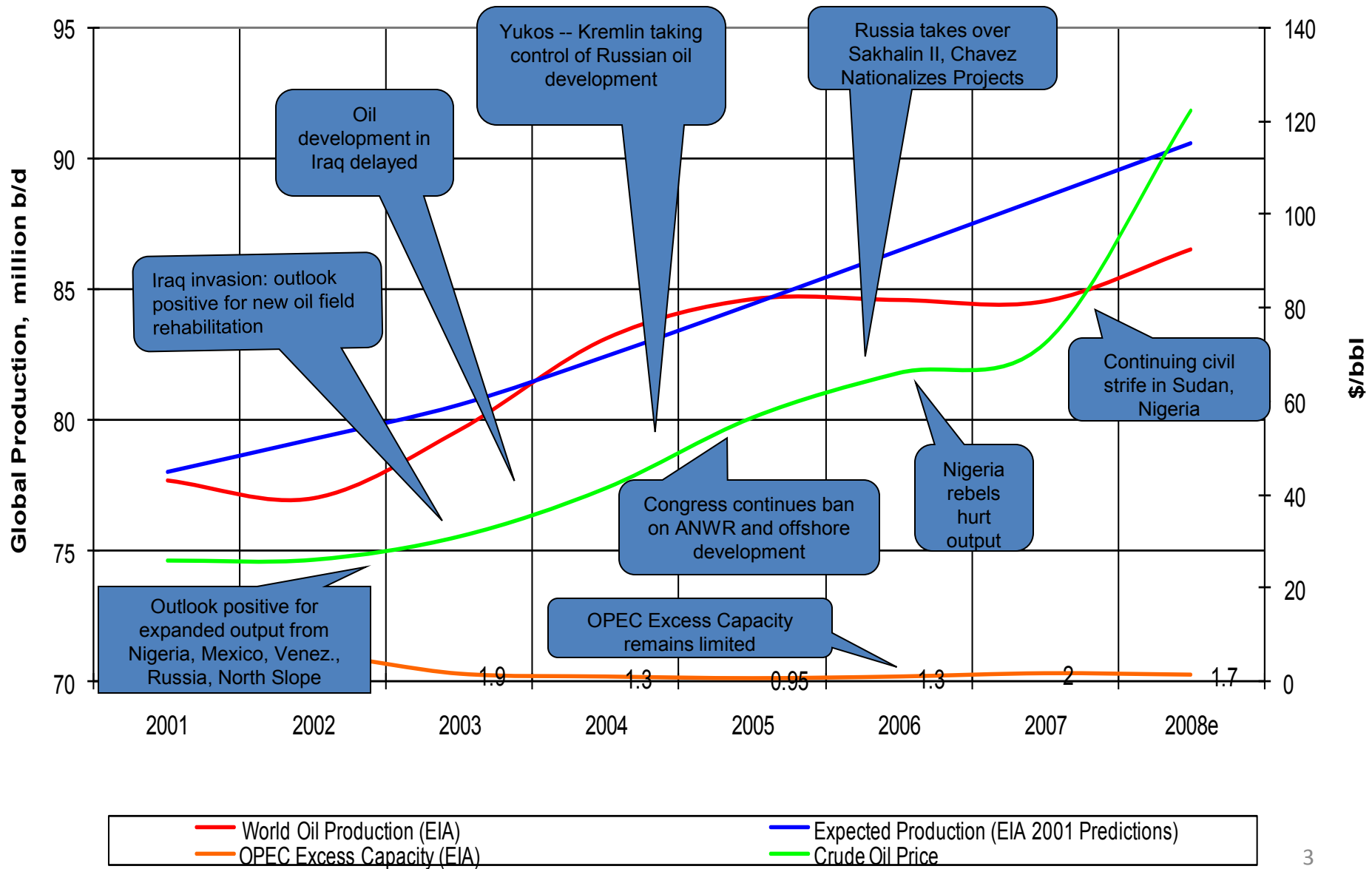
- Critical role of expectations in oil and gas markets
- Why forecasters should show humility
- Iraq's role as a game changer (oil vs. gas)
- What should be done with the natural gas?

A Series of Unfortunate Events Leading to New Expectations

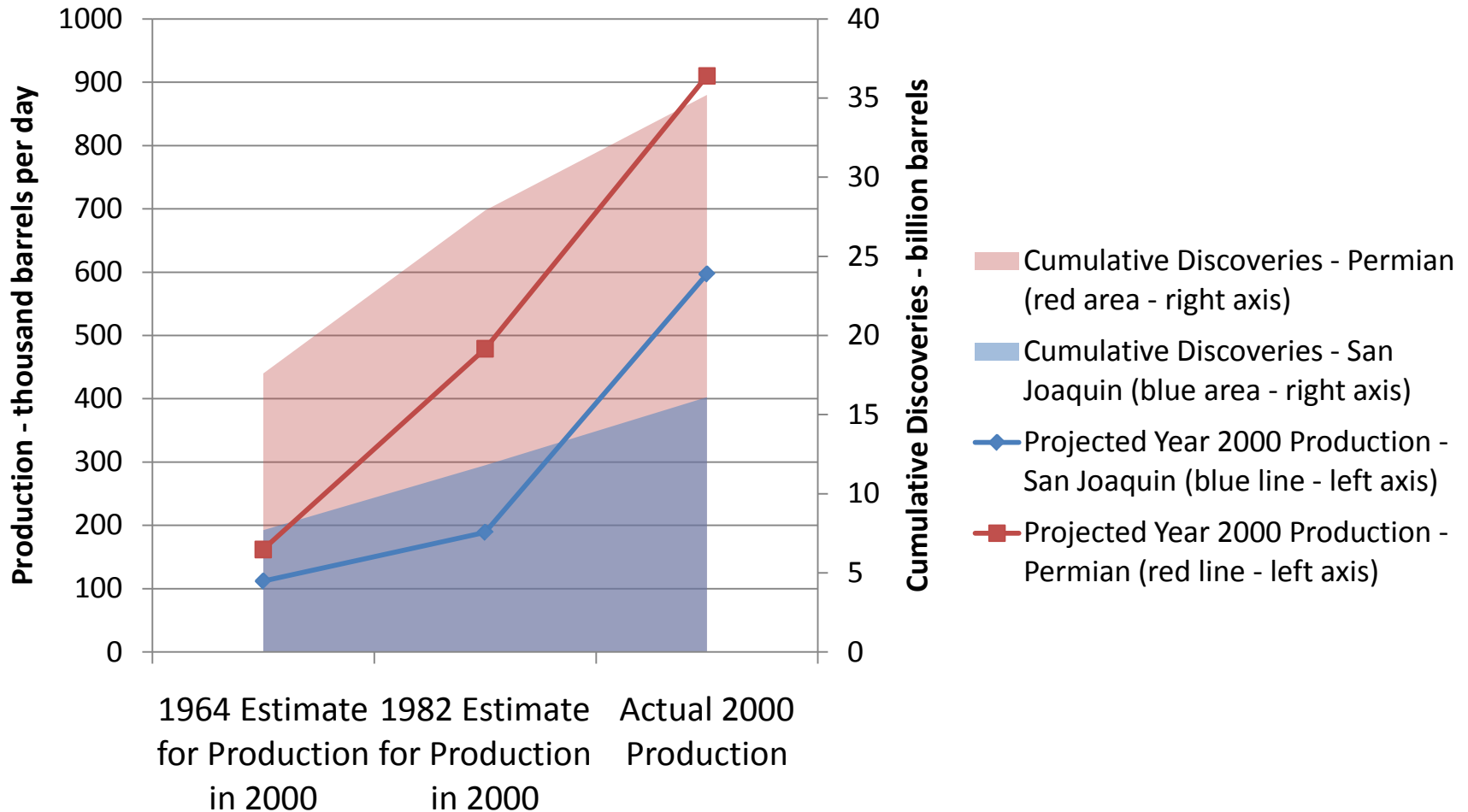
Positive Expectations

Expectations Shift

Negative Expectations



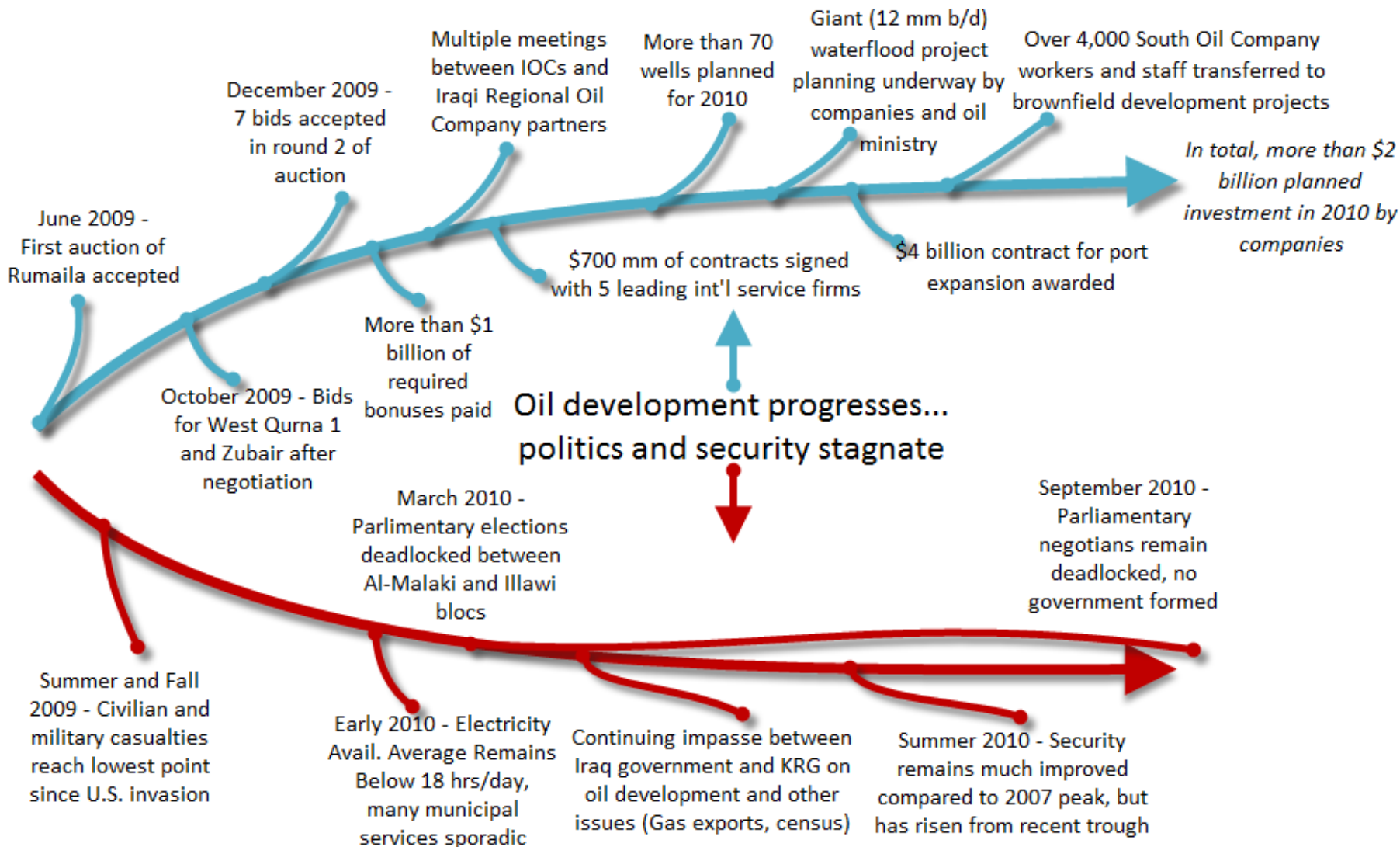
Forecasting and Humility (Hubbert's Limitations)



Source: EPRINC Study

A Decoupling of Politics and Oilfields Development

Although oil development is in an early stage it is moving forward, same cannot be said for politics and security



Gas Reserves and Location

Estimated Gas Reserves (Tcf)

Akkas	5.6*
Mansuriyah	4.5*
Kashm al-Ahmar	2.2
Siba	1.5*
Tel Gazal	0.2

*Gas in place

Oil Fields with Associated Gas

West Qurna	13.7
Majnoon	11.8
Rumaila	9.8
Zubair	2.9
Nasiriyah	2.6
Total	43.2



Source: Oil Ministry, Energy Intelligence

Iraqi Gas

- Development of the Siba and Mansouriya gas fields has been initiated in Bagdad, but the Akkaz development has not been signed. They all await ratification by the cabinet which has yet to be formed.
- Total plateau production for three fields is 820 mn cfd, the anticipated was 685 mmcf/d
- Maximum total gas in place of 11.6 tcf, 7.4 is proven reserves, this implies a 63.8% recovery factor. 900 mmcf/d max daily production would give fields a life of 22.5 years.
- 700 mmcf/d of associated gas is flared in Iraq each day

Provincial Opposition and Electricity Concerns

- There is strong opposition by provincial governments for the Akkaz field bidding.
- Electricity is a major issue within Iraq leading to unrest, security concerns, instability, and infrastructure stagnation.
- Iraq puts out just 4-5 hours of electricity each day from the national grid. While there is 50% more electricity generation than before the invasion of Iraq in 2003, the electricity is spread throughout the country rather than giving it all to Iraq.
- Energy consumption has doubled in the last 7 years.

Key Gas Contract Features ?

- Allow companies to export 50 percent
- Costs are recoverable
- Iraqi government agreed to take or pay take it or pay 100 percent of gas production
- No signature bonus
- Commitment for TTSF (Training, Technology, and Scholarship Fund)— very important
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- Conversion factor for barrel of oil equivalent reduced from 8,000 to 6,000 cu ft. (*EPRINC Calculations are 5.75 for value estimate*).
- Remuneration fee 90% of scoring formula and remuneration fee and cost recovery paid with 25% plateau target needed to be reached within 3 years.

Iraqi Gas Field Awards

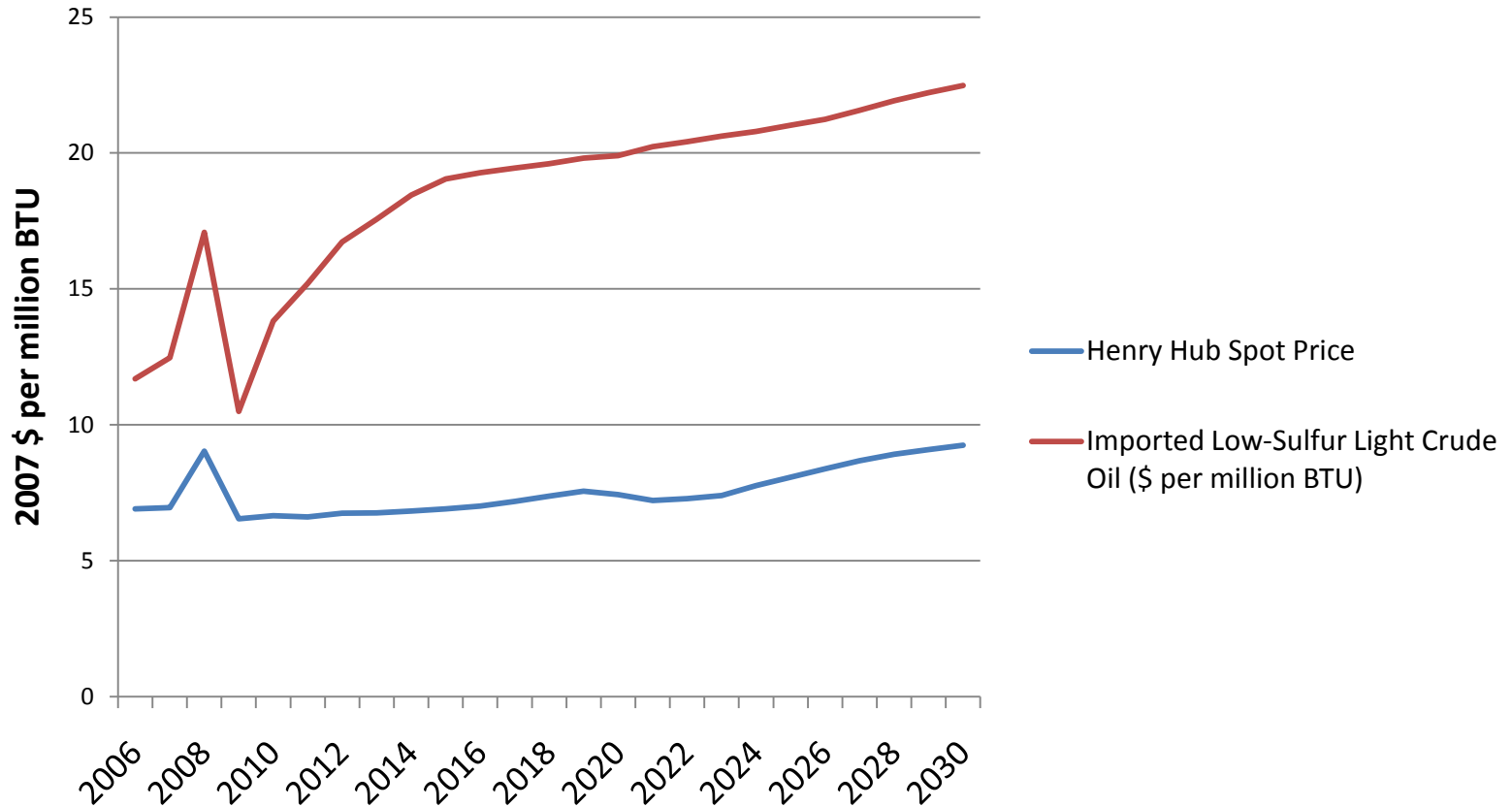
	Bid Consortium (Participation %)	Winner	Renumeration Fee (\$/mcf)	Plateau Production Target (mmcf/d)	Plateau Period (Years)
Akkaz	Kogas/KMG (50/50)	Kogas/KMG	\$0.95	400	13
	Total/TPAO (50/50)		\$3.30	375	
Mansouriya	TPAO/KE/Kogas (50/30/20)	TPAO/KE/Kogas	\$1.22	320	13
Siba	KE/TPAO (60/40)	KE/TPAO	\$1.30	100	9
	KMG (100)		\$2.78	65	

Source: MEES November 8, 2010

What are the best options for Iraqi natural gas? (some preliminary observations)

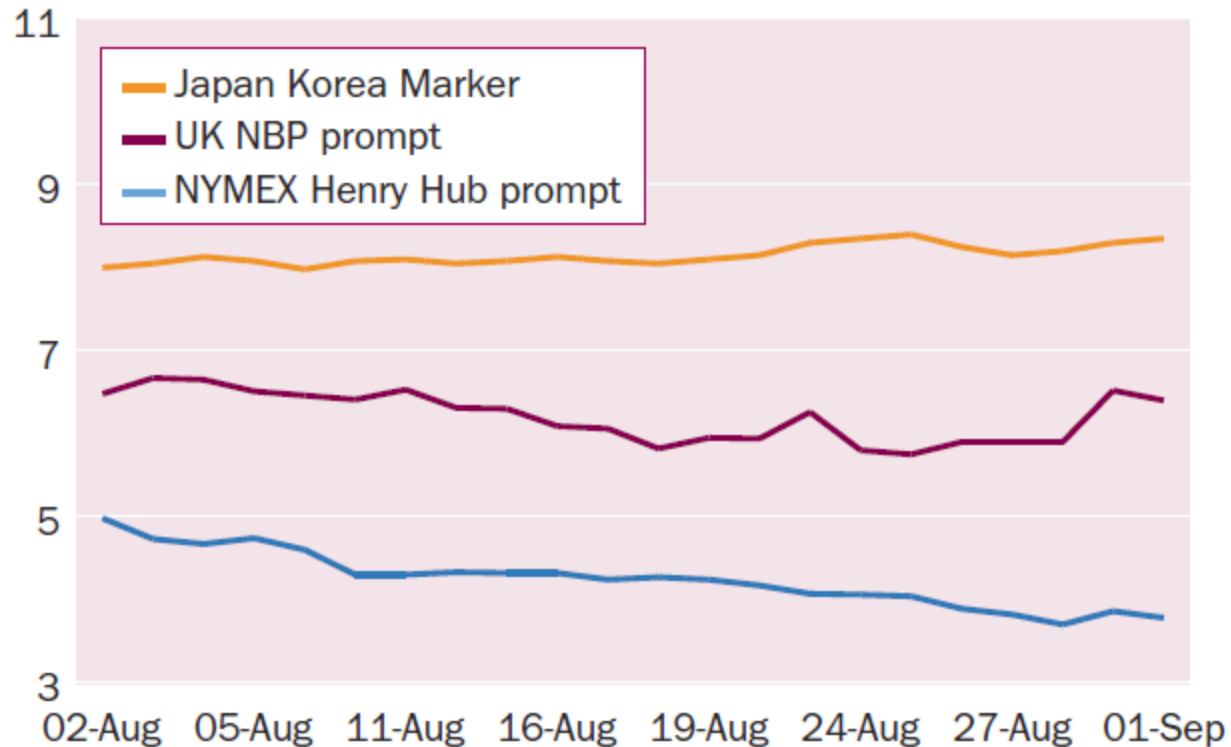
- Power generation, industrial, and residential**
- Re-injection**
- GTL**
- Regional pipeline sales**
- LNG**
- Long haul pipeline sales (Nabucco)**

Natural Gas and Crude Oil Prices Through 2030



Source: EIA Annual Energy Outlook 2009

Japan Korea Marker Remains Well Above US and UK Spot Prices



Source: Platts

Natural Gas Offers Lower Busbar Cost Escalation Risk (cents per kwh)

Coal

Coal Supercritical: 10.554

Coal Integrated Gasification Combined Cycle (IGCC): 11.481

Coal IGCC with Carbon Capture & Storage (IGCC with CCS): 17.317

Alternatives

Biogas: 8.552

Wind: 8.910

Gas Combined Cycle: 9.382 (assumes \$5.50 to \$6.50/MMBtu for gas)

Geothermal: 10.182

Hydroelectric: 10.527

Concentrating solar thermal (CSP): 12.653

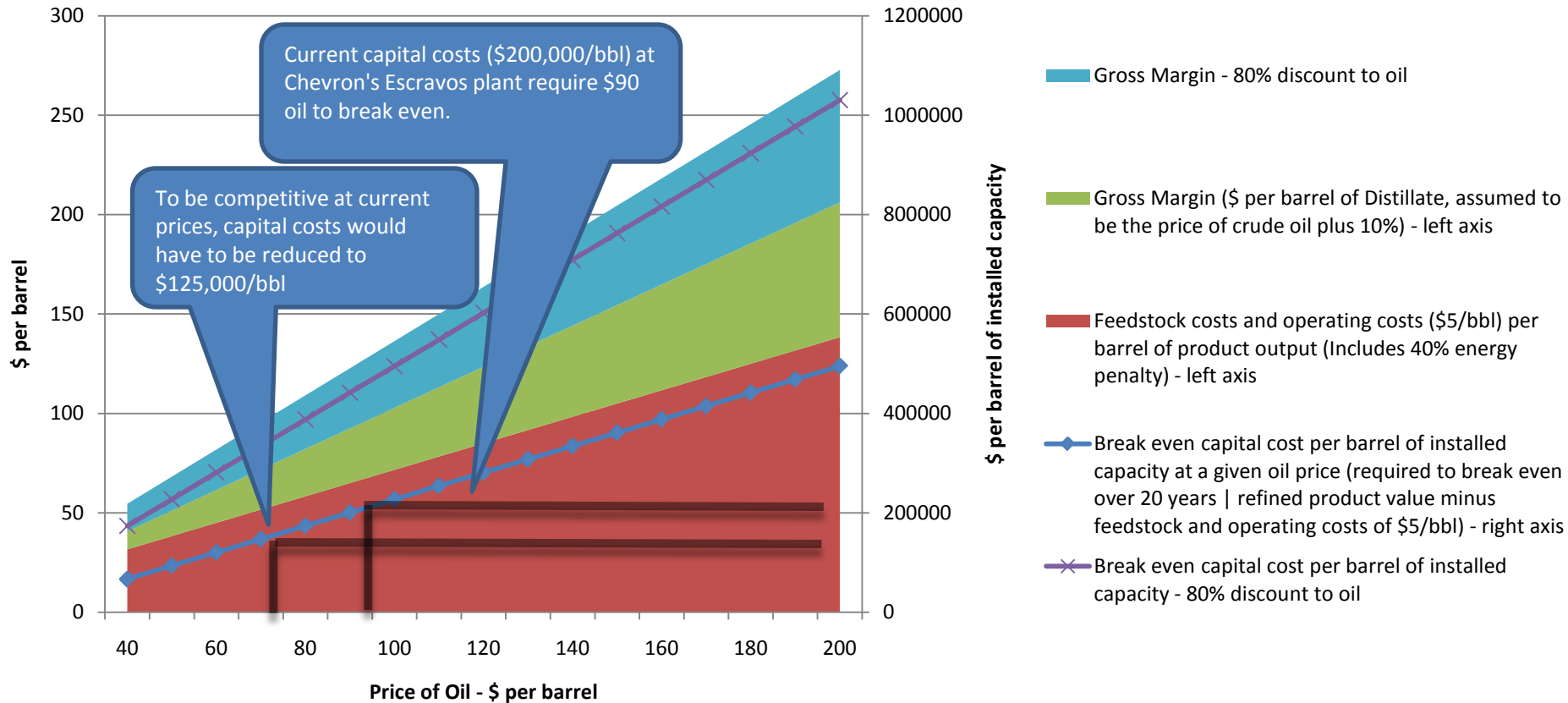
Nuclear: 15.316

Biomass: 16.485

Note: Busbar means the price of the power leaving the plant. All capital, fuel, and operating costs are taken into account in busbar costs.

Source: *California Energy Commission, "Comparative Costs of California Central Station Electricity Generation Technologies," CEC Staff Report, June 2007*

Capital Costs and the Gas Crude Spread*



*EPRINC preliminary estimates

Nabucco Prospects

Nabucco is contingent upon securing supplies from either Azeri gas and/or Iraqi gas - Expect 10 bcm from Iraq and 8 bcm from Shah Deniz – yet both supplies are far from certain at the moment.

Nabucco would require a supply agreement from Shah Deniz phase II in Azerbaijan. But such supplies face competition from other pipelines and from the Russian government, which has been working to maintain control over Central Asian gas.

Other option is Iraq, but is not likely to be highest value for gas output

The Nabucco consortium has recently called Iraq the most likely supplier because of Russia's influence over Central Asia (pipe dream)