Gauging The Risks Of Peak Oil.
Will We Face Limits To Growth?

ASPO World Conference

October 18, 2007

Houston, Texas

By
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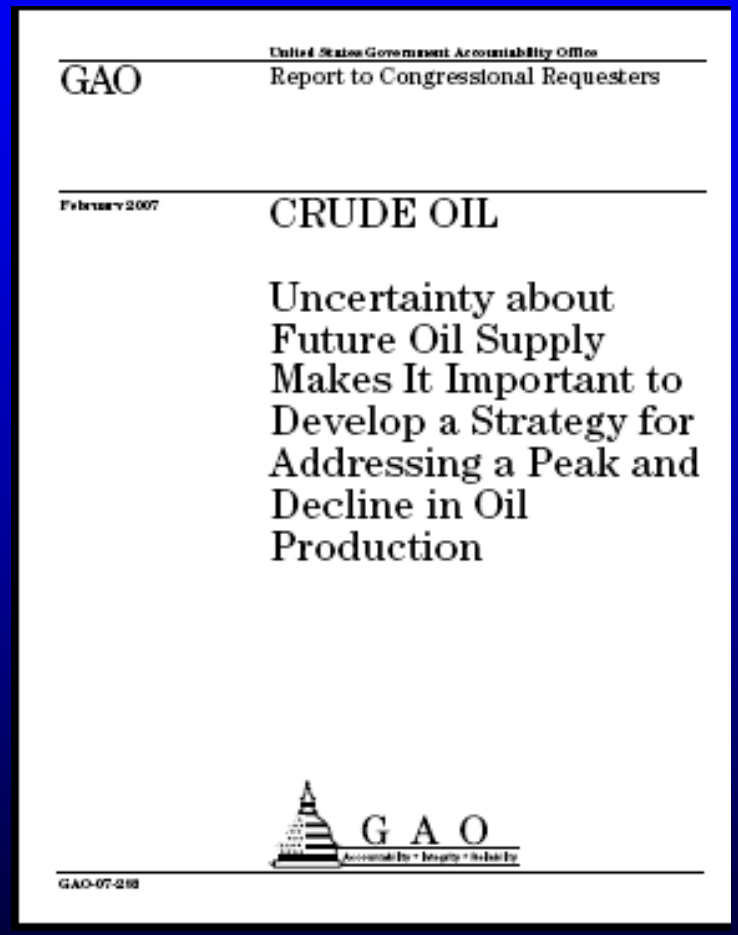
Chairman
Simmons & Company International

Debate Between Optimists And Pessimists Persists

- The “Peak Oil” debate is intensifying.
- Growth in number of attendees at ASPO conferences.
- Number of Peak Oil Google hits: 3.1 million.
- Number of Global Warming hits: 80.5 million.
- Spate of new Peak Oil “studies”:
  - NPC’s *Facing Hard Truths*
  - GAO Crude Oil Report
  - CERA’s rebuttal: *Finding the Critical Numbers: What are the Real Decline Rates of Global Production*


United States Government Accountability Office

GAO

Report to Congressional Requesters

February 2007

CRUDE OIL

Uncertainty about Future Oil Supply Makes It Important to Develop a Strategy for Addressing a Peak and Decline in Oil Production

GAO

GAO-07-283

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NPC's *Facing Hard Truths* Peak Oil Summary

- Energy Secretary Bodman asked the NPC to undertake a "Peak Oil" assessment.
- Instead, group of ≈1,500 created a 256+ page report.
  http://www.npchardtruthsreport.org/download.php
- Peak Oil discussion:
  Only 19 paragraphs
  (pages 127 – 130).

Key Information: The Peak Oil Debate

Concerns about the reliability of production forecasts and estimates of recoverable oil resources raise questions about future oil supply and deliverability. These concerns are strongly expressed in peak oil forecasts in which (1) oil production does not grow significantly beyond current levels and (2) an inevitable decline in oil production is increasingly near at hand. Views about oil supply tend to diverge after 2015, with peak oil forecasts providing the lower bound. These forecasts generally consider oil supply independently of demand and point to supply shortfalls. Such views contrast with forecasts and economic models that expect market forces to provide incentives for developing global hydrocarbon and other resources to meet energy needs through at least 2030.

Forecasts that see an imminent peak in oil production use several indicators to support their case, including: historical peaks in production for individual countries; extrapolations of the production cycle from individual wells to fields, basins, and the world; and the historical dominance of large reservoirs in supplying the world's oil. These historical indicators for production of conventional oil are countered by expectations for new discoveries, enhanced recovery techniques, advancing technology for producing oil from unconventional sources, and reassessments and revisions of known resources. The economic and investment climate, as well as access to resources, will also affect the production base.

For further discussion of peak oil forecasts and related issues, please see Chapter 2, "Energy Supply," in this report.

Supply Data Points To Many Danger Signs

- All-time crude output set May 2005.
- Dwindling new oil discoveries.
- Accelerating decline rates.
- Rising output of heavy sour oils, shrinking output of light sweet crude.
- All no problem if demand does not grow.

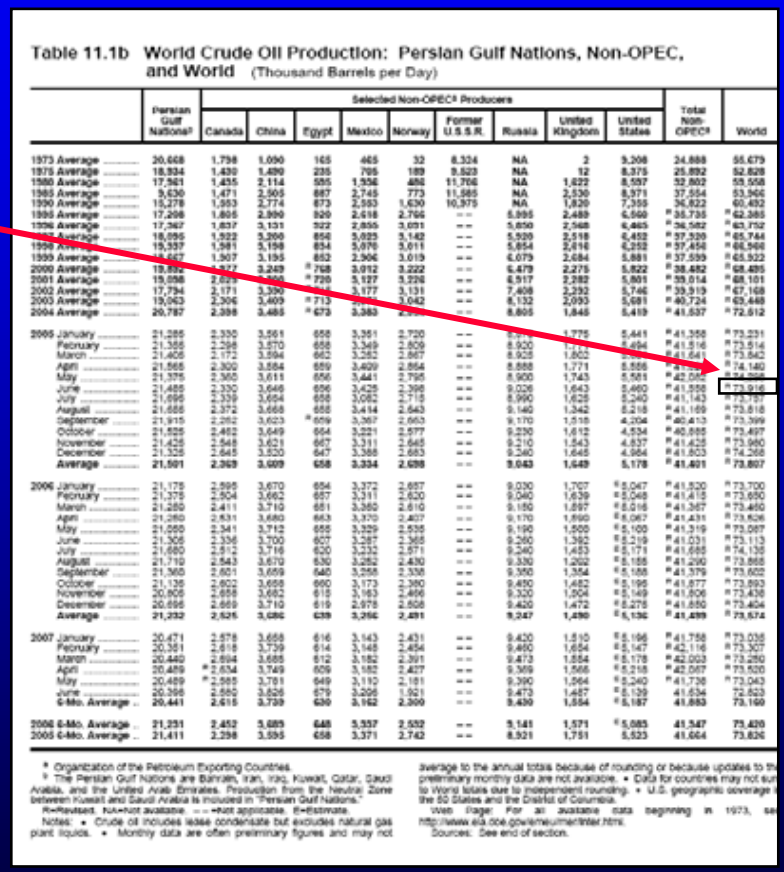

Table 11.1b World Crude Oil Production: Persian Gulf Nations, Non-OPEC, and World (Thousand Barrels per Day)

	Persian Gulf Nations[1]	Selected Non-OPEC[2] Producers								Total Non-OPEC[2]	World
		Canada	China	Egypt	Mexico	Norway	Former U.S.S.R.	Russia	United Kingdom	United States		
1973 Average	20,668	1,758	1,090	165	465	32	8,334	NA	2	9,208	34,888	55,679
1975 Average	18,934	1,430	1,490	235	705	189	9,523	NA	12	8,375	25,892	52,828
1980 Average	17,561	1,455	2,114	595	1,556	486	11,706	NA	1,622	8,597	52,802	55,558
1985 Average	9,630	1,471	2,505	887	2,745	773	11,585	NA	2,530	8,971	37,554	53,966
1990 Average	15,278	1,553	2,774	873	2,553	1,630	10,975	NA	1,826	7,355	34,822	60,482
1995 Average	17,298	1,805	2,990	920	2,618	2,766	--	5,895	2,489	6,560	r 36,736	r 62,365
1996 Average	17,367	1,837	3,131	922	2,855	3,051	--	5,850	2,568	6,465	r 36,582	r 63,732
1997 Average	18,095	1,922	3,200	856	3,023	3,142	--	5,920	2,518	6,452	r 37,520	r 65,744
1998 Average	19,337	1,981	3,156	854	3,076	3,011	--	5,854	2,616	6,253	r 37,456	r 66,940
1999 Average	19,447	1,907	3,193	853	2,966	3,019	--	6,079	2,684	5,891	r 37,599	r 65,923
2000 Average	19,882	1,927	3,249	r 758	3,012	3,222	--	6,479	2,275	5,822	r 38,482	r 68,405
2001 Average	19,058	2,073	3,306	r 726	3,127	3,226	--	6,517	2,282	5,801	r 39,014	r 68,101
2002 Average	17,794	2,171	3,390	r	3,177	3,131	--	7,408	2,292	5,746	r 39,919	r 67,168
2003 Average	19,063	2,306	3,469	r 713	3,042	3,042	--	8,132	2,093	5,681	r 40,724	r 69,448
2004 Average	20,787	2,398	3,485	r 673	3,383	2,999	--	8,803	1,846	5,419	r 41,537	r 72,612
2005 January	21,286	2,330	3,561	658	3,351	2,720	--	8,911	1,775	5,441	r 41,358	r 73,231
February	21,368	2,298	3,570	656	3,349	2,809	--	8,920	1,803	5,494	r 41,516	r 73,514
March	21,406	2,172	3,594	662	3,383	2,877	--	8,928	1,823	5,641	r 41,641	r 75,840
April	21,565	2,302	3,584	659	3,409	2,864	--	8,888	1,771	5,586	r 41,671	r 74,140
May	21,375	2,360	3,611	656	3,441	2,795	--	8,908	1,743	5,581	r 42,068	r 74,895
June	21,488	2,330	3,646	656	3,428	2,398	--	9,026	1,643	5,460	r 41,558	r 73,916
July	21,666	2,372	3,664	658	3,082	2,713	--	8,990	1,628	5,240	r 41,143	r 73,810
August	21,668	2,372	3,668	658	3,414	2,643	--	9,146	1,342	5,218	r 41,169	r 73,818
September	21,915	2,282	3,623	r 659	3,367	2,663	--	9,170	1,515	4,204	r 40,413	r 73,399
October	21,555	2,462	3,649	664	3,221	2,577	--	9,230	1,612	4,534	r 40,885	r 73,497
November	21,425	2,548	3,621	667	3,311	2,645	--	9,310	1,643	4,637	r 41,425	r 73,980
December	21,425	2,548	3,530	647	3,288	2,663	--	9,240	1,649	4,984	r 41,503	r 74,268
Average	21,501	2,369	3,609	658	3,334	2,699	--	9,043	1,649	5,178	r 41,401	r 73,807
2006 January	21,178	2,595	3,670	654	3,372	2,687	--	9,030	1,707	r 5,047	r 41,520	r 73,700
February	21,278	2,504	3,663	657	3,311	2,630	--	9,040	1,639	r 5,048	r 41,418	r 73,650
March	21,250	2,411	3,710	661	3,360	2,610	--	9,150	1,697	r 5,016	r 41,567	r 73,480
April	21,260	2,531	3,680	663	3,370	2,407	--	9,170	1,690	r 5,067	r 41,431	r 73,626
May	21,050	2,341	3,712	655	3,329	2,536	--	9,190	1,500	r 5,100	r 41,319	r 73,087
June	21,306	2,336	3,700	600	3,287	2,366	--	9,260	1,382	r 5,219	r 41,031	r 73,113
July	21,660	2,312	3,716	620	3,323	2,371	--	9,340	1,433	r 5,171	r 41,668	r 74,136
August	21,710	2,543	3,670	630	3,282	2,430	--	9,330	1,202	r 5,188	r 41,290	r 73,868
September	21,560	2,601	3,659	640	3,268	2,338	--	9,350	1,354	r 5,188	r 41,379	r 73,602
October	21,126	2,602	3,658	660	3,173	2,380	--	9,450	1,682	r 5,195	r 41,677	r 73,893
November	20,858	2,658	3,663	618	3,163	2,495	--	9,330	1,604	r 5,154	r 41,504	r 73,438
December	20,695	2,669	3,710	619	2,978	2,508	--	9,420	1,472	r 5,275	r 41,550	r 73,404
Average	21,232	2,525	3,686	639	3,266	2,491	--	9,247	1,490	r 5,130	r 41,499	r 73,674
2007 January	20,471	2,678	3,668	616	3,143	2,431	--	9,420	1,510	r 5,196	r 41,758	r 73,036
February	20,351	2,618	3,739	614	3,148	2,454	--	9,460	1,642	r 5,167	r 42,116	r 73,307
March	20,440	2,694	3,685	612	3,182	2,391	--	9,473	1,554	r 5,178	r 42,003	r 73,250
April	20,489	r 2,634	3,749	609	3,182	2,427	--	9,369	1,566	r 5,218	r 42,067	r 73,520
May	20,489	r 2,585	3,781	649	3,132	2,181	--	9,390	1,564	r 5,240	r 41,736	r 73,043
June	20,396	2,580	3,824	679	3,206	2,321	--	9,473	1,487	r 5,139	41,634	72,823
6-Mo. Average	20,441	2,618	3,739	620	3,162	2,369	--	9,430	1,554	r 5,187	41,883	73,169
2006 6-Mo. Average	21,231	2,452	3,685	648	3,337	2,532	--	9,141	1,571	r 5,085	41,347	73,420
2005 6-Mo. Average	21,411	2,298	3,595	658	3,371	2,742	--	8,921	1,751	5,523	41,664	73,826

r=Revised. NA=Not available. --=Not applicable. E=Estimate.

Notes: • Crude oil includes lease condensate but excludes natural gas plant liquids. • Monthly data are often preliminary figures and may not average to the annual totals because of rounding or because updates to the preliminary monthly data are not available. • Data for countries may not sum to World totals due to independent rounding. • U.S. geographic coverage is the 50 States and the District of Columbia.

Web Page: For all available data beginning in 1973, see http://www.eia.doe.gov/emeu/mer/intler.html.

Sources: See end of section.

[1] Organization of the Petroleum Exporting Countries.

[2] The Persian Gulf Nations are Bahrain, Iran, Iraq, Kuwait, Qatar, Saudi Arabia, and the United Arab Emirates. Production from the Neutral Zone between Kuwait and Saudi Arabia is included in "Persian Gulf Nations."

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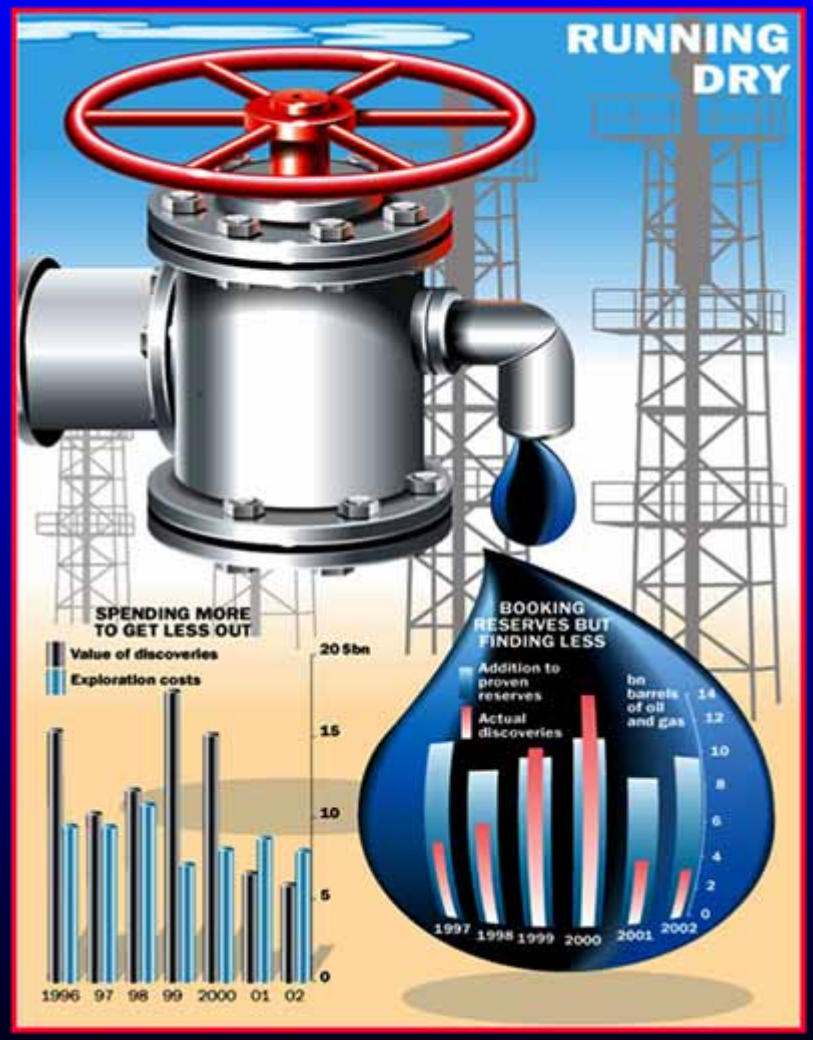
Yet, Oil Demand Still Seems Insatiable

- Steady growth despite soaring oil prices.
- Big risk that demand will soon outpace supply if growth continues.

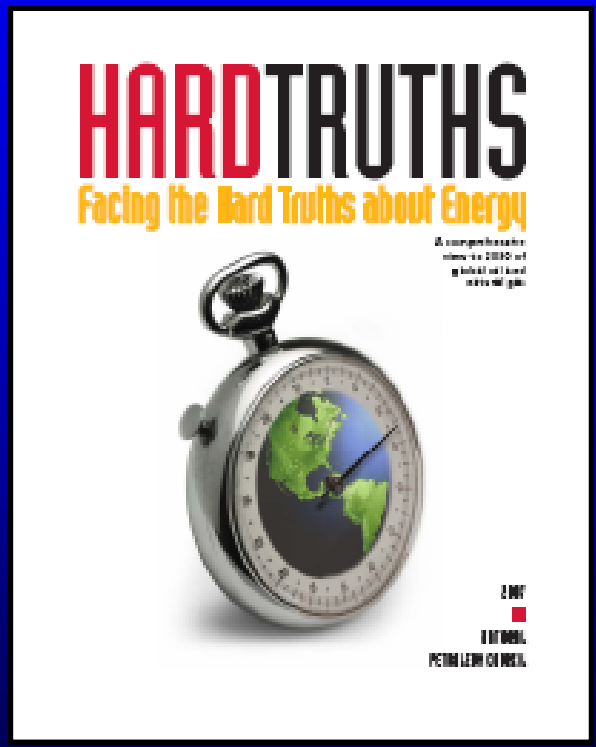
Optimists Scoff At Peak Oil Risk

- Their views are built on several theses:
  - Ample reserve endowment (90 -100 years of current use)
  - Proven reserves can grow through:
    - Reserve appreciation
    - Yet-to-be discovered new oil
  - Advancing technologies will recover more oil in place.
  - Technologies will unlock vast unconventional oil sources.

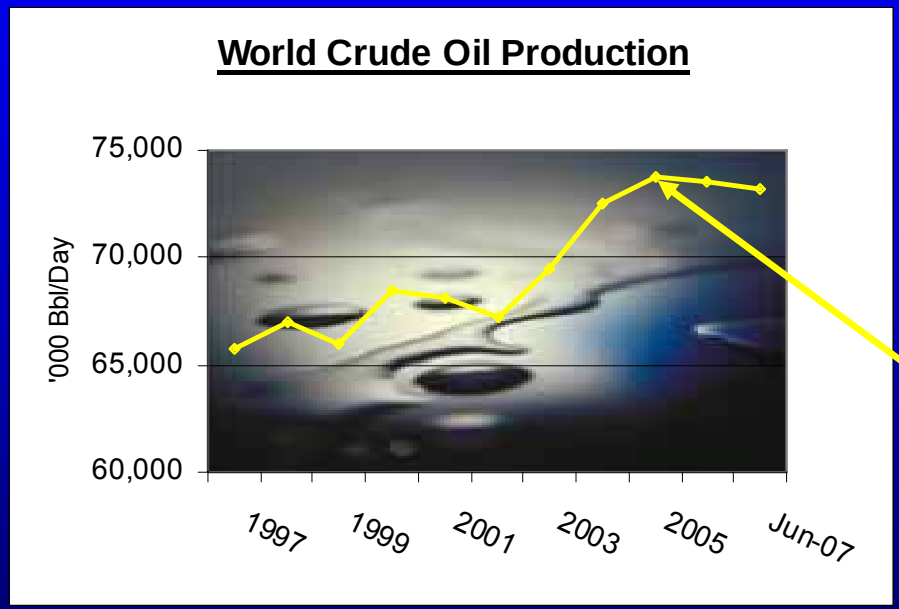


Optimists' Caveat Is "Above Ground" Risks

- Will enough capital be spent when it should?
- Will access be made available when it should?
- Will R&D advances continue as they should?
- Will skilled people make the right decisions?



Could Peak Oil Now Be Past Tense?



- In 78 months of global crude production (1997 – June 2007), only 4 months saw crude output exceed 74 MMB/Day
- April 2005 74,140
- May 2005 74,298*
- Dec. 2005 74,768
- July 2006 74,076

* All-time record crude production (thus far)!

Source: EIA International Petroleum, September 2007

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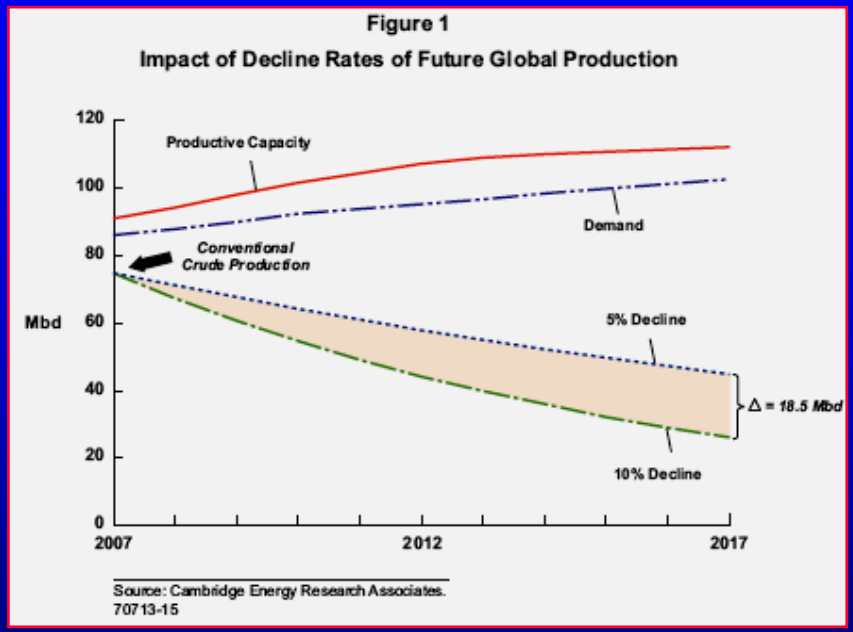
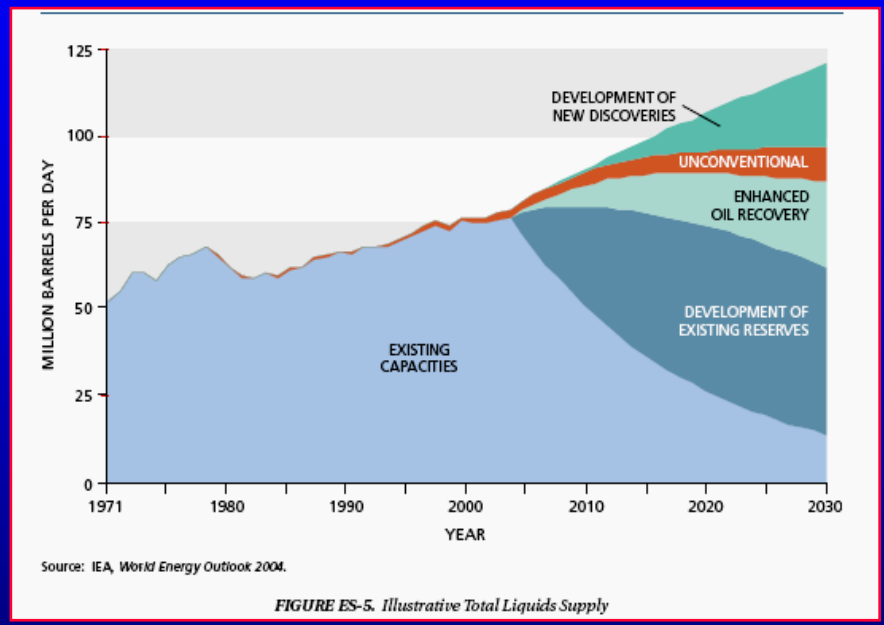
Decline Rates Are Steep Treadmill

- Scarcity of solid decline rate data created "Fog of War."
- Some "authorities" still argue decline rates are low and manageable:
  - CERA recently estimated average global declines of only 4.5% per annum
  - Other authorities estimate 8%
  - Some worry that 10 – 12% might be in store
- Can the world cope with even a 4.5% per annum decline?

The Decline Rate Nightmare





- CERA's modest 5% decline still requires adding 60 MMB/D in 10 years.
- NPC estimates (6.8% decline) require adding over 100 MMB/D in 23 years.

Crude Supply Not Getting The Job Done

HOW WE FILL "THE GAP"

Year	Global Petroleum Consumption	Crude Oil Supply	"Gap"	(%)
	---------- Million Barrels/day ----------			
1973	57.237	55.679	1.558	(3%)
1995	70.067	62.333	7.734	(11%)
2000	76.660	68.369	8.291	(11%)
2005	83.636	73.791	9.845	(12%)
2006	84.433	73.546	10.887	(13%)
2007*	85.494	73.160	12.334	(14%)

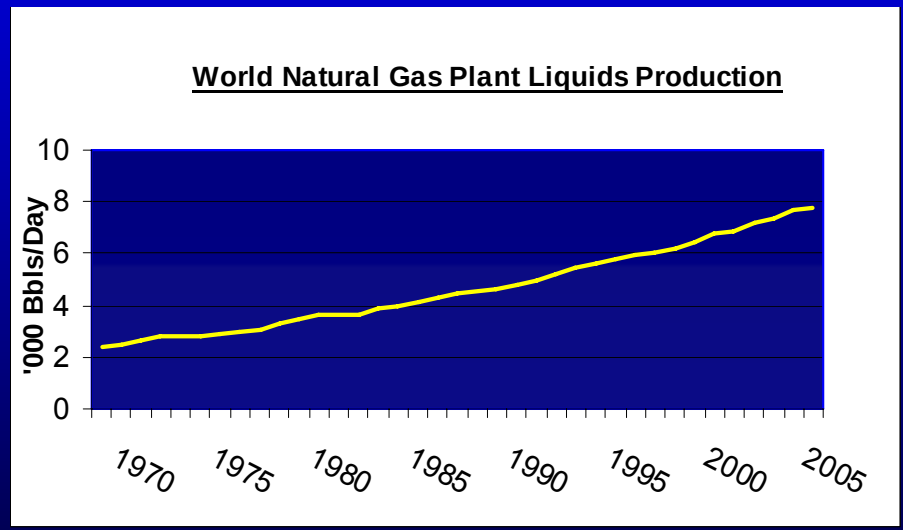
* First six months

"GAP" = Natural gas liquids, refinery processing gains, inventory liquidation and tiny amount of synthetic crude/biofuel

Source: EIA

Natural Gas Liquids' Mysterious Growth

- Often NGL growth occurs after crude oil begins a steady decline.
- Much of this growth comes from mature oilfields' expanding gas caps.
- These are not sources of sustainable growth.
- LNG projects also create by-product of NGL.
- It is "hard" to grow NGL volume by 1-2 MMB/D.
- Stealth growth in NGLs has masked declines in crude oil.



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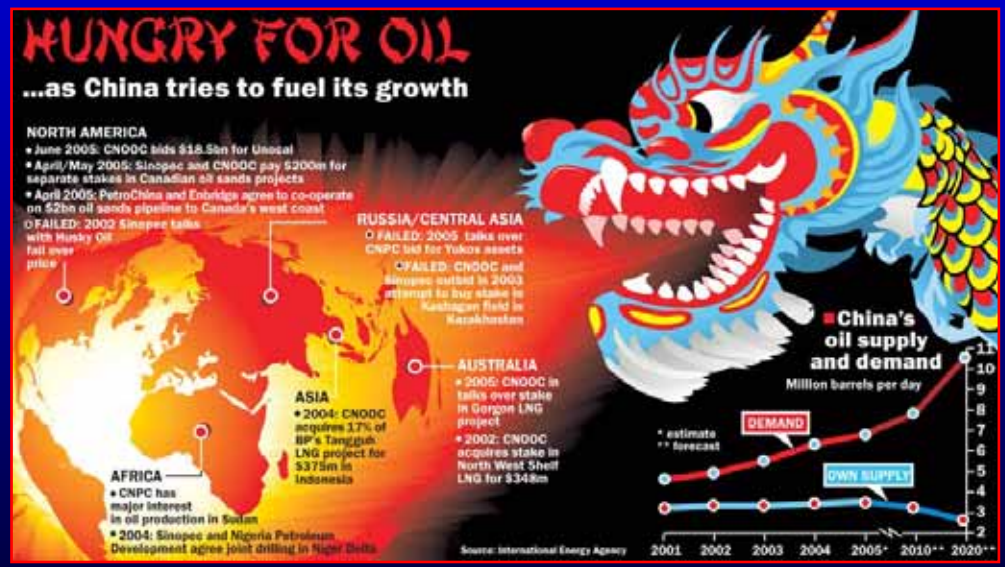
Is Oil Demand The Biggest "Above Ground" Risk?

- Conventional wisdom has consistently questioned sustained oil demand growth.
- Many oil observers were certain global demand had peaked between 1990 – 1994.
- Once demand broke through 70 MMB/D, it had no further ceiling:
  - Asian 'Flu barely stopped the train
  - 9/11 had little impact
  - Several warm winters simply slowed down fast-paced growth
- Was it "China" that everybody missed?
- Can oil demand growth ever stop?

Is Growth In Oil Demand Sustainable?

- Most economists fret about continuation of growth (while they also presume supply about to surge.)
- Many think high prices will kill further growth.
- Many question sustainability of China's growth.
- Others point to stagnant/falling demand in Germany and Japan.



20th Century's Most Enduring Event: Growth In Oil Demand

1900:	Oil use was primarily for lighting and vaseline
1920 oil demand:	1,523,000 bbls/day (1)
1950 oil demand:	10,418,000 bbls/day (1)
1980 oil demand:	59,316,000 bbls/day (1)
2000 oil demand:	76.5 million bbls/day (1)
2006 oil demand:	84.5 million bbls/day (1)

1920 – 2006 average compound annual growth = 4.8%

(1) Source: DeGolyer & McNaughton

Recent Rise In World Oil Demand Happening Everywhere

Year		OECD	China	Other Asia	Latin America	Middle East	FSU	Other	Total
		---------- Million Barrels/Day ----------							
1992		42.90	2.60	4.90	3.70	3.90	6.90	2.70	67.60
1995		44.90	3.30	6.10	4.30	4.30	4.40	2.80	76.10
2000		47.90	4.60	7.60	4.80	4.90	3.70	3.00	76.50
2005		49.70	6.70	8.80	5.10	6.00	3.80	3.60	83.70
2006		49.20	7.20	8.90	5.30	6.30	4.00	3.60	84.50
2007	(E)	49.50	7.60	9.10	5.50	6.60	3.90	3.80	86.00
2008	(E)	50.30	8.00	9.40	5.60	6.90	4.00	4.00	88.20
Change 1992-2006		6.30	4.60	4.00	1.60	2.40	-2.90	0.90	16.90
Change 2005-2008		0.60	1.30	0.60	0.50	0.90	0.20	0.40	4.50

Source: IEA

Oil Demand Outside OECD Is Growing Everywhere

- Driven by rapid population growth.
- Far more vehicles.
- Improving economies.

Improving Economies	2001	2006	Change	Percent
	---------- Million Barrels/Day ----------			
Egpyt	0.54	0.63	+.09	+17%
South Africa	0.45	0.51	+.06	+13%
Nigeria	0.25	0.29	+.04	+16%
Argentina	0.44	0.5	+.06	+14%
Venezuela	0.57	0.66	+.09	+16%
India	2.29	2.58	+.29	+13%
Indonesic	1.13	1.32	+.19	+17%
Singapore	0.67	0.85	+.18	+27%
China	4.67	6.69	+1.43	+43%
Saudi Arabia	1.65	1.99	+ .34	0.21
Total Non-OECD	29.15	33.95	+ 4.8	+16%

3.1% per annum

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OECD Oil Demand Has Been A Mixed Bag (Many Moving Parts)

Selected Country Sample	2001	2006	Change	Percent
	---------- Million Barrels/Day ----------			
USA	19.97	21.03	+1.06	+5%
Canada	2.06	2.23	+.17	+8%
Austria	0.26	0.3	+.04	+15%
France	2.05	1.96	(0.09)	-4%
Germany	2.81	2.66	(0.15)	-5%
Netherlands	0.89	1.01	+.12	+13%
Spain	1.49	1.59	+.10	+7%
UK	1.74	1.83	+.09	+5%
Japan	5.39	5.16	(0.23)	-4%
Australia	0.87	0.92	+.05	+6%
Total OECD	47.90	49.22	+1.32	+3%

Where Recent Projected Oil Growth Comes From

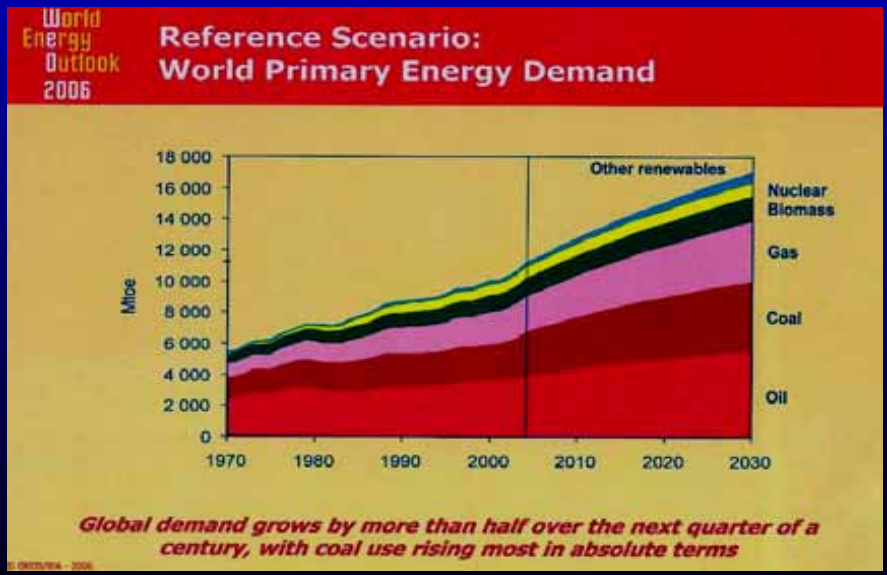
	4thQ 2006	4thQ 2008	Growth
	--- Million Barrels/Day ---		
OECD	49.70	51.00	1.3
FSU/Eastern Europe	5.10	5.30	0.2
China	7.20	8.10	0.9
Other Asia	8.90	9.40	0.5
Latin America	5.40	5.70	0.3
Middle East	6.30	6.80	0.5
Africa	2.90	3.20	0.3
Total Demand	85.50	89.50	4.2

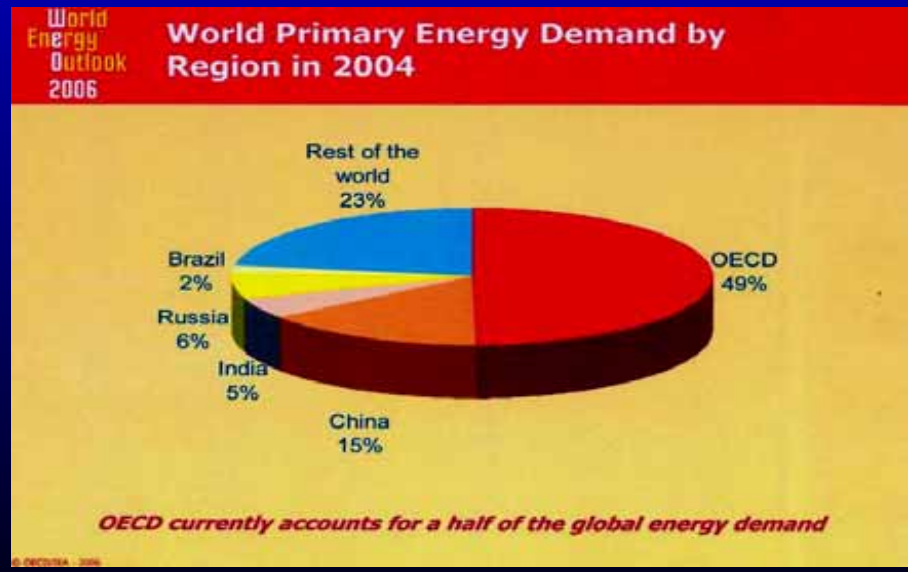
Cumulative increase = 90% of U.S. oil output

Source: IEA

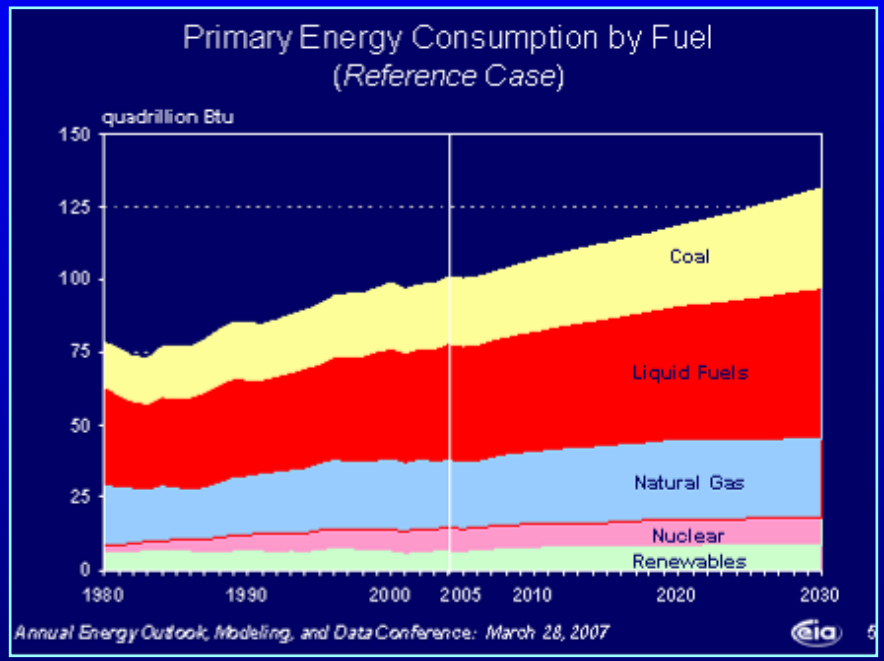
All Serious Demand Forecasts Assume Continued Growth

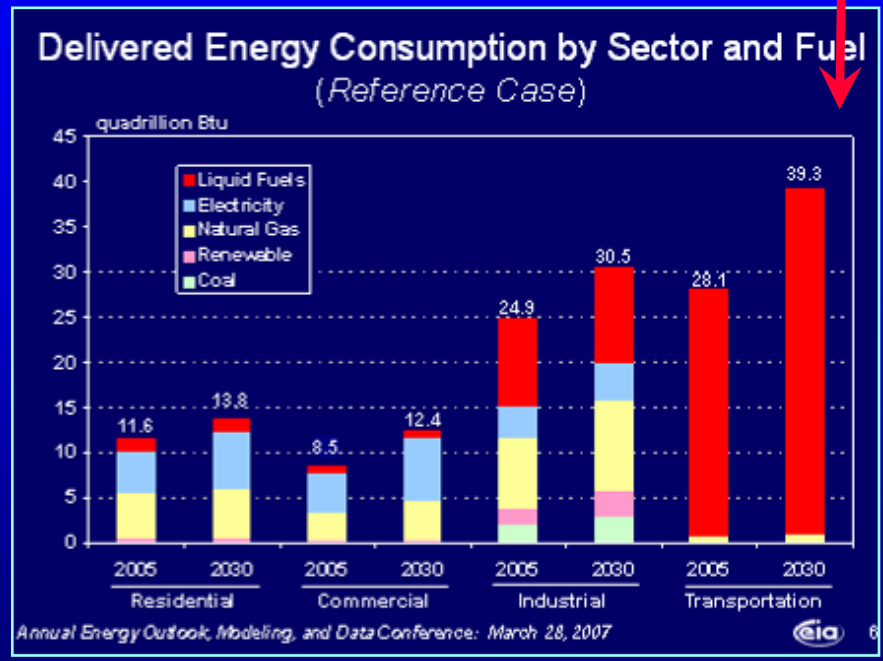
- National and international agencies' projections for future oil demand by 2020-2030 at no less than 115 MMB/D.
- Some agencies have demand as high as 130 MMB/D.
- No model assumes China even gets close to Mexico's current per capita oil use.





Transportation is V-8 Engine Propelling Oil Growth





Are 6.4 billion people too many?

Are 894 million vehicles enough?

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Why Transportation Energy Growth Is Difficult To Stop

- World now producing 50 million vehicles per year.
- Global vehicle registration almost 900 million.
- Global population is 6.5 billion:

	Population	No. of Vehicles	Vehicles per 1,000 people
	---------- In Millions ----------		
North America	437	280	641
Western Europe	532	252	472
OECD Pacific	200	92	462
OECD Total	1,169	624	534
FSU/Eastern Europe	341	62	182
Developing Economies - China	1,314	23	18
Rest of the World	3,579	184	51

Source: OPEC's World Oil Outlook, 2007 (2004 Data)

Creating “Mobility” Uses More Oil

	Added Oil Needed
If FSU/EE's vehicle use rises to Western Europe's	+11 MMB/D
If China's vehicle use rises to FSU/EE level	+26 MMB/D
If "Rest of World's" vehicle use rises to FSU level	+24 MMB/D
Total Impact	61 MMB/D

Could even one of these changes be supplied?

Oil Demand Is Not Likely To Slow Down Or Decline

- Oil demand is fickle and:
  - It can slow temporarily (year over year)
  - It can slow in certain parts of the world
  - Weather can dampen demand growth
- But, fundamental growth engine is unstoppable.
- Big question: Can supply keep pace?
  - Supply does not know demand
  - Growing supply takes relentless effort
  - Time to develop new discoveries – 6 to 10 years
  - Declines start soon after production begins

If Demand Growth Could Be Supplied, It Will Require Vast E&P Spending

- Assuming resources are available, meeting demand targets still tough challenge.
- Drilling activity needs to soar, which requires new rigs.
- Industry infrastructure needs rapid expansion.
- Current infrastructure needs rebuilding at same time.
- People scarcity needs fast resolution.
- Massive spending needs to happen ASAP.

Can any of this be accomplished?

Meanwhile, How Secure Is Our Current Supply?

- How fast are most producing fields currently declining?
- Are these decline rates stable or accelerating?
- How robust is the deepwater play?
- Will any new frontiers be found? When?
- Will trend of dwindling size of new finds continue?
- Are most mature super-giant fields now in decline?

North Sea Decline Curves

(From Saga Petroleum Report)

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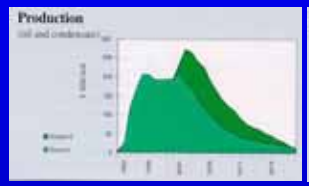

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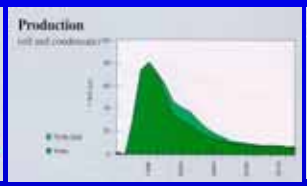

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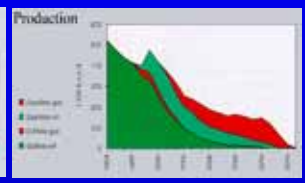
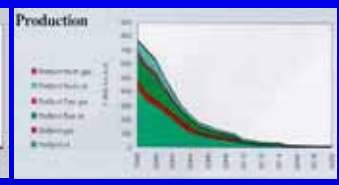


Statfjord Field



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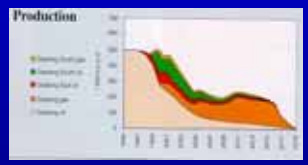

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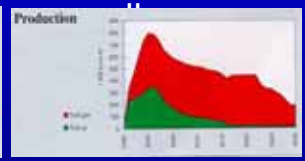

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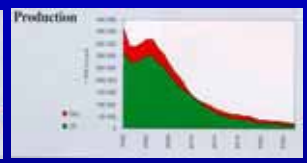

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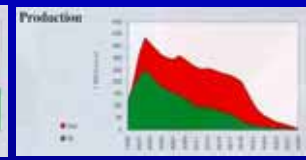

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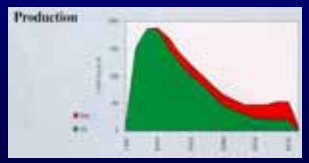

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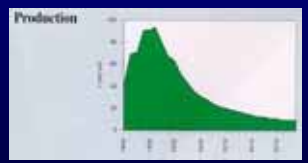
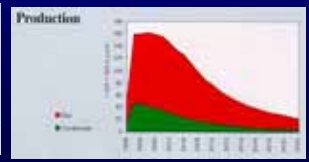
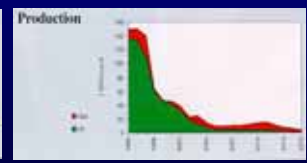


Britannia

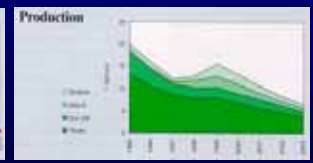


Gryphon

Miller



Thistle
With Satellites



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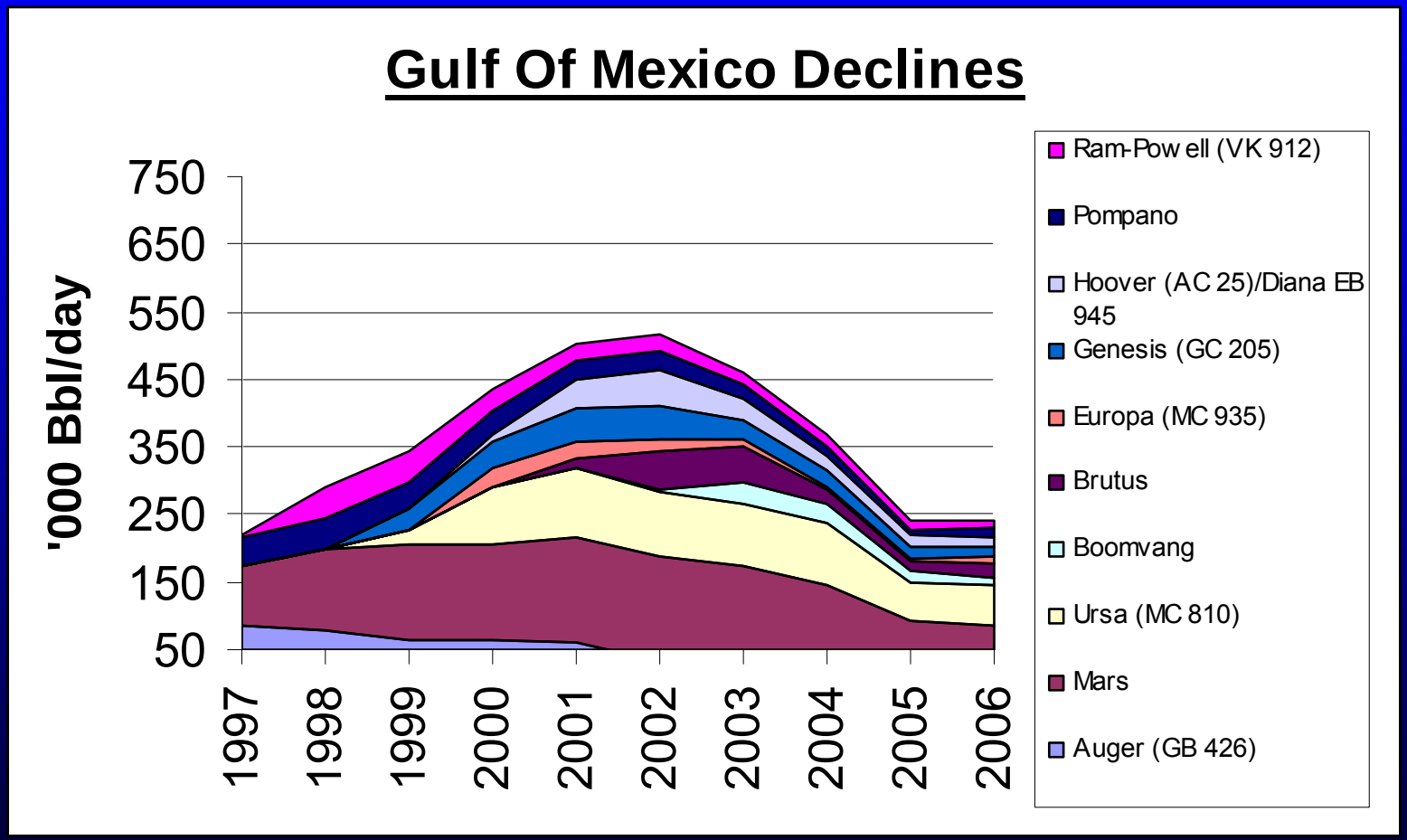
Gulf Of Mexico Deepwater Fields Also Declining



Too Many Countries Are Now In Decline

- 78 countries produce world's 72.5 MMB/D crude oil.
- 43 countries' production declined from 2005 – 2006*:
  - Average country decline rate was 6.7%
- 35 countries grew oil output in 2006 vs. 2005*:
  - Average country growth was 6.8%

Demographics of these numbers are troubling.
Too many countries now in decline.

*Oil & Gas Journal – Worldwide Production
December 18, 2006

Reported New Oil Field Discoveries Since 2000 "Skimpy"

- Oil and Gas Journal publishes annual oil production summary.
  - Reports over 4,000 oil fields in production outside USA and Russia
  - Discovery date always listed
  - Field production in OPEC countries unreported
- From 2000 on, only 42 fields listed in database:
  - None are large fields
  - Largest produced 27,000 BBL/Day in 2006
  - Norway – 0
  - Angola – 1
  - Brazil – 1
  - U.K. – 6 tiny fields
  - Nigeria – 3
  - Colombia - 2

Fields Discovered	1990-1994	1995-1999	2000 - 2005
Angola	9	6	1
Australia	10	6	6
Brazil	20	11	1
Canada		0	
Colombia	21	7	2
Eduador	13	2	1
Egypt	14	24	1
Indonesia	12	14	1
Iran			
Malaysia	1		2
Mexico	1		
Nigeria	3	1	2
Norway	2	3	
Oman	11	7	
Thailand	3	4	
Trinidad & Tobago	4	3	2
U.K.	19	14	6
Total	143	102	25

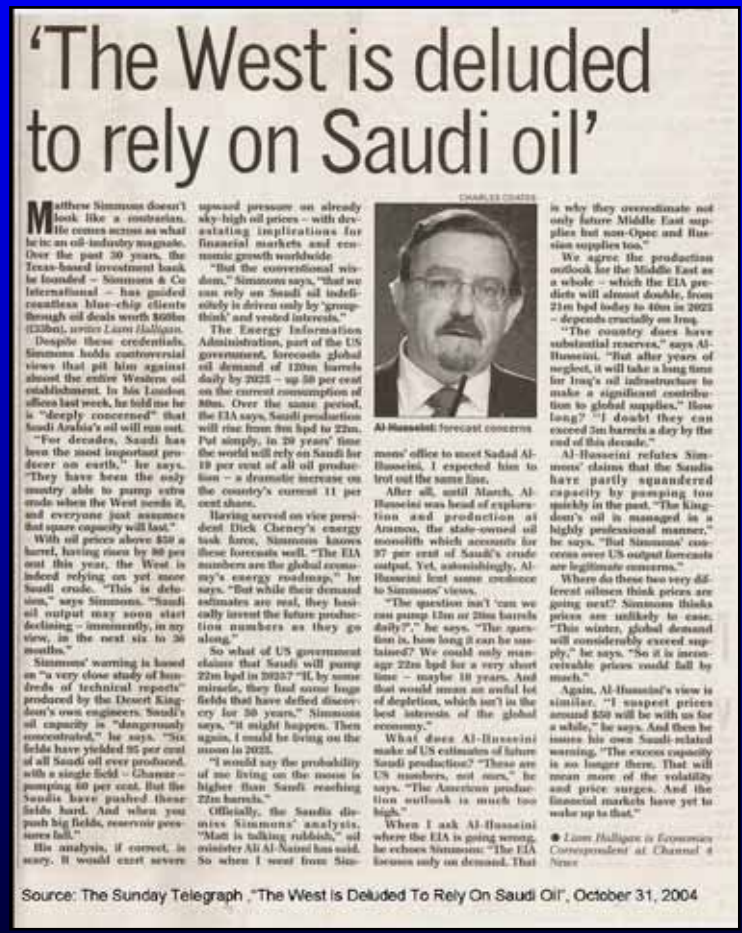
Snapshot Of Key Oil Producers' Shrinking Discoveries

- 78 countries produce world's 72.5 MMB/D crude oil.
- 43 countries' production declined from 2005 – 2006*:
  - Average country decline rate was 6.7%
- 35 countries grew oil output in 2006 vs. 2005*:
  - Average country growth was 6.8%

Source: Oil & Gas Journal – December 18, 2006

Does The World Really Have A "Safe" Supply Cushion

- Conventional wisdom assumes global spare oil capacity is 2 – 4 MMB/D.
- Most of this is presumed to be Saudi Arabia's 11.3 MMB/D:
  - Current Saudi production assumed to be 8.6 MMB/D
  - Planned expansion/rehabilitation of old fields' wells increase Saudi capacity to 12.5 MMB/D in 2009
- Is all this real? How much is crude oil vs. NGLs?
- How fast are the "mature fields" now declining?
- How are Saudi Aramco's new projects (2004 – 2006) performing?



'The West is deluded to rely on Saudi oil'

Matthew Simmons doesn't look like a contrarian. He comes across as what he is: an oil-industry magnate. Over the past 30 years, the Texas-based investment bank he founded – Simmons & Co International – has guided countless blue-chip clients through oil deals worth $60bn (£33bn), writes Liam Halligan.

Despite these credentials, Simmons holds controversial views that pit him against almost the entire Western oil establishment. In his London office last week, he told me he is "deeply concerned" that Saudi Arabia's oil will run out.

"For decades, Saudi has been the most important producer on earth," he says. "They have been the only country able to pump extra crude when the West needs it, and everyone just assumes that spare capacity will last."

With oil prices above $50 a barrel, having risen by 80 per cent this year, the West is indeed relying on yet more Saudi crude. "This is delusion," says Simmons. "Saudi oil output may soon start declining – imminently, in my view, in the next six to 36 months."

Simmons' warning is based on "a very close study of hundreds of technical reports" produced by the Desert Kingdom's own engineers. Saudi's oil capacity is "dangerously concentrated," he says. "Six fields have yielded 95 per cent of all Saudi oil ever produced, with a single field – Ghawar – pumping 60 per cent. But the Saudis have pushed these fields hard. And when you push big fields, reservoir pressures fall."

His analysis, if correct, is scary. It would exert severe upward pressure on already sky-high oil prices – with devastating implications for financial markets and economic growth worldwide.

"But the conventional wisdom," Simmons says, "that we can rely on Saudi oil indefinitely is driven only by 'group-think' and vested interests."

The Energy Information Administration, part of the US government, forecasts global oil demand of 120m barrels daily by 2025 – up 50 per cent on the current consumption of 80m. Over the same period, the EIA says, Saudi production will rise from 9m bpd to 22m. Put simply, in 20 years' time the world will rely on Saudi for 19 per cent of all oil production – a dramatic increase on the country's current 11 per cent share.

Having served on vice president Dick Cheney's energy task force, Simmons knows these forecasts well. "The EIA numbers are the global economy's energy roadmap," he says. "But while their demand estimates are real, they basically invent the future production numbers as they go along."

So what of US government claims that Saudi will pump 22m bpd in 2025? "It, by some miracle, they find some huge fields that have defied discovery for 50 years," Simmons says, "it might happen. Then again, I could be living on the moon in 2025.

"I would say the probability of me living on the moon is higher than Saudi reaching 22m barrels."

Officially, the Saudis dismiss Simmons' analysis. "Matt is talking rubbish," oil minister Ali Al-Naimi has said. So when I went from Simmons' office to meet Sadad Al-Husseini, I expected him to trot out the same line.

CHARLES COATES

Al-Husseini: forecast concerns

After all, until March, Al-Husseini was head of exploration and production at Aramco, the state-owned oil monolith which accounts for 87 per cent of Saudi's crude output. Yet, astonishingly, Al-Husseini lent some credence to Simmons' views.

"The question isn't 'can we ever pump 15m or 20m barrels daily?,'" he says. "The question is, how long it can be sustained? We could only manage 22m bpd for a very short time – maybe 10 years. And that would mean an awful lot of depletion, which isn't in the best interests of the global economy."

What does Al-Husseini make of US estimates of future Saudi production? "These are US numbers, not ours," he says. "The American production outlook is much too high."

When I ask Al-Husseini where the EIA is going wrong, he echoes Simmons: "The EIA focuses only on demand. That is why they overestimate not only future Middle East supplies but non-Opec and Russian supplies too."

We agree the production outlook for the Middle East as a whole – which the EIA predicts will almost double, from 21m bpd today to 40m in 2025 – depends crucially on Iraq.

"The country does have substantial reserves," says Al-Husseini. "But after years of neglect, it will take a long time for Iraq's oil infrastructure to make a significant contribution to global supplies." How long? "I doubt they can exceed 3m barrels a day by the end of this decade."

Al-Husseini refutes Simmons' claims that the Saudis have partly squandered capacity by pumping too quickly in the past. "The Kingdom's oil is managed in a highly professional manner," he says. "But Simmons' concerns over US output forecasts are legitimate concerns."

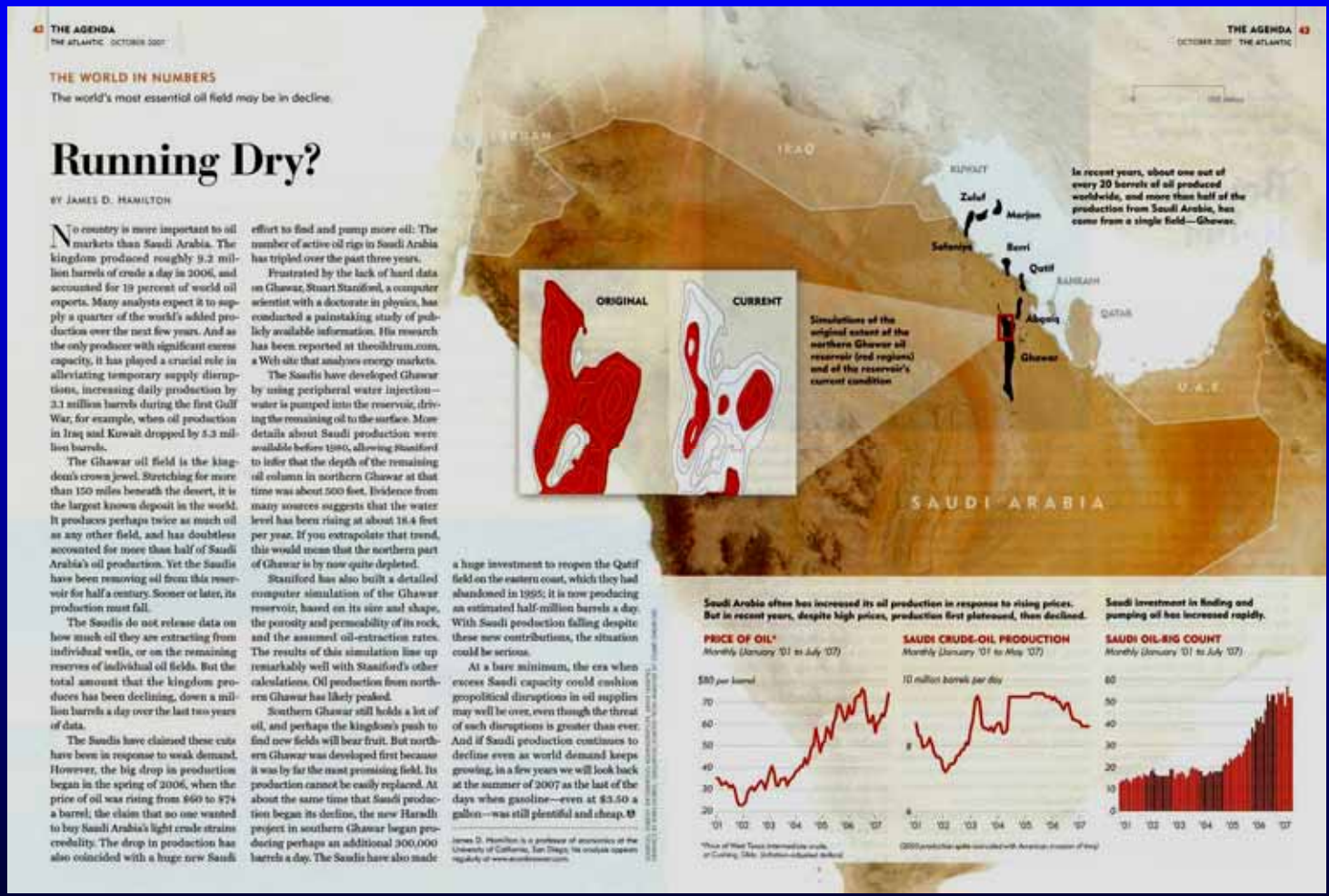
Where do these two very different oilmen think prices are going next? Simmons thinks prices are unlikely to ease. "This winter, global demand will considerably exceed supply," he says. "So it is inconceivable prices could fall by much."

Again, Al-Husseini's view is similar. "I suspect prices around $50 will be with us for a while," he says. And then he issues his own Saudi-related warning. "The excess capacity is no longer there. That will mean more of the volatility and price surges. And the financial markets have yet to wake up to that."

● Liam Halligan is Economics Correspondent at Channel 4 News

Source: The Sunday Telegraph ,"The West is Deluded To Rely On Saudi Oil", October 31, 2004

Ghawar – Running Dry?



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THE ATLANTIC OCTOBER 2007

THE WORLD IN NUMBERS

The world's most essential oil field may be in decline.

Running Dry?

BY JAMES D. HAMILTON

No country is more important to oil markets than Saudi Arabia. The kingdom produced roughly 9.2 million barrels of crude a day in 2006, and accounted for 13 percent of world oil exports. Many analysts expect it to supply a quarter of the world's added production over the next few years. And as the only producer with significant excess capacity, it has played a crucial role in alleviating temporary supply disruptions, increasing daily production by 3.1 million barrels during the first Gulf War, for example, when oil production in Iraq and Kuwait dropped by 5.3 million barrels.

The Ghawar oil field is the kingdom's crown jewel. Stretching for more than 150 miles beneath the desert, it is the largest known deposit in the world. It produces perhaps twice as much oil as any other field, and has doubtless accounted for more than half of Saudi Arabia's oil production. Yet the Saudis have been removing oil from this reservoir for half a century. Sooner or later, its production must fall.

The Saudis do not release data on how much oil they are extracting from individual wells, or on the remaining reserves of individual oil fields. But the total amount that the kingdom produces has been declining, down a million barrels a day over the last two years of data.

The Saudis have claimed these cuts have been in response to weak demand. However, the big drop in production began in the spring of 2006, when the price of oil was rising from $60 to $74 a barrel; the claim that no one wanted to buy Saudi Arabia's light crude strains credulity. The drop in production has also coincided with a huge new Saudi effort to find and pump more oil: The number of active oil rigs in Saudi Arabia has tripled over the past three years.

Frustrated by the lack of hard data on Ghawar, Stuart Staniford, a computer scientist with a doctorate in physics, has conducted a painstaking study of publicly available information. His research has been reported at theoildrum.com, a Web site that analyzes energy markets.

The Saudis have developed Ghawar by using peripheral water injection—water is pumped into the reservoir, driving the remaining oil to the surface. More details about Saudi production were available before 1980, allowing Staniford to infer that the depth of the remaining oil column in northern Ghawar at that time was about 500 feet. Evidence from many sources suggests that the water level has been rising at about 18.4 feet per year. If you extrapolate that trend, this would mean that the northern part of Ghawar is by now quite depleted.

Staniford has also built a detailed computer simulation of the Ghawar reservoir, based on its size and shape, the porosity and permeability of its rock, and the assumed oil-extraction rates. The results of this simulation line up remarkably well with Staniford's other calculations. Oil production from northern Ghawar has likely peaked.

Southern Ghawar still holds a lot of oil, and perhaps the kingdom's push to find new fields will bear fruit. But northern Ghawar was developed first because it was by far the most promising field. Its production cannot be easily replaced. At about the same time that Saudi production began its decline, the new Haradh project in southern Ghawar began producing perhaps an additional 300,000 barrels a day. The Saudis have also made a huge investment to reopen the Qatif field on the eastern coast, which they had abandoned in 1995; it is now producing an estimated half-million barrels a day. With Saudi production falling despite these new contributions, the situation could be serious.

At a bare minimum, the era when excess Saudi capacity could cushion geopolitical disruptions in oil supplies may well be over, even though the threat of such disruptions is greater than ever. And if Saudi production continues to decline even as world demand keeps growing, in a few years we will look back at the summer of 2007 as the last of the days when gasoline—even at $3.50 a gallon—was still plentiful and cheap.

James D. Hamilton is a professor of economics at the University of California, San Diego. His analysis appears regularly at www.econbrowser.com.

IRAN
IRAQ
KUWAIT
Zuluf
Marjan
Safaniya
Berri
Qatif
BAHRAIN
QATAR
Abqaiq
Ghawar
U.A.E.
SAUDI ARABIA

In recent years, about one out of every 20 barrels of oil produced worldwide, and more than half of the production from Saudi Arabia, has come from a single field—Ghawar.

ORIGINAL
CURRENT

Simulations of the original extent of the northern Ghawar oil reservoir (red regions) and of the reservoir's current condition

Saudi Arabia often has increased its oil production in response to rising prices. But in recent years, despite high prices, production first plateaued, then declined.

PRICE OF OIL*
Monthly (January '01 to July '07)
$80 per barrel
70
60
50
40
30
20
'01 '02 '03 '04 '05 '06 '07

SAUDI CRUDE-OIL PRODUCTION
Monthly (January '01 to May '07)
10 million barrels per day
9
8
'01 '02 '03 '04 '05 '06 '07

*Price of West Texas Intermediate crude, at Cushing, Okla. Inflation-adjusted dollars.

Saudi investment in finding and pumping oil has increased rapidly.

SAUDI OIL-RIG COUNT
Monthly (January '01 to July '07)
60
50
40
30
20
10
0
'01 '02 '03 '04 '05 '06 '07

Source: The Atlantic, October 2007

Saudi Arabia's Candor Suggests "All Is Not Well"

- "No one wants our oil."
  Minister Naimi when oil prices reached $75/barrel.

- "Some of the increased output from $70 billion spent is to replace declines from our mature fields."
  Common quote in media over past 24 months.

- "It would be folly to plan on producing more than 12 MMB/D."
  Senior Saudi Aramco officials.

To meet all the long-term projected demand growth, Saudi Arabia oil output has to grow.

Evidence Suggests Saudi Arabia Struggling To Keep Oil Exports Flat

Exports To IEA Member Countries

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007 *
Saudi Light	2.63	2.63	2.56	2.26	1.96	2.10	2.83	2.78	2.82	2.82	2.67	2.70	2.57
Saudi Medium	0.87	1.00	1.26	1.08	1.01	1.04	1.05	0.97	1.18	1.14	1.20	1.13	0.93
Saudi Heavy	0.31	0.22	0.32	0.67	0.49	0.57	0.50	0.41	0.65	0.60	0.60	0.62	0.42
Total	3.81	3.85	4.14	4.01	3.46	3.71	4.38	4.16	4.65	4.56	4.47	4.45	3.92

IEA member countries' slippage from peak 2003 exports now 730,000 B/D.

How much due to shut-in supply vs. natural declines?

Source: IEA – Oil Market Report (October)
1st half 2007

Perhaps Good News Is Hiding Or Still "On Its Way"

- It is getting hard to find any good news on supply front.
- Recent "big discoveries" cannot find rigs to do further tests.
- Perhaps we had an unusually bad last few years.
- It certainly was not due to lack of spending or low prices:
  - E & P spending has soared in recent years
  - All high-quality rigs are now in use
- Unless good news "comes soon", we ran out the clock.

Coming Soon: Clash Between Rising Demand And Shrinking Supply…

- Unless demand growth slows (or begins decline).
- Unless crude oil slippage suddenly soars.
- Demand will outpace supply.
- How ample are winter inventories?
- How fast can stocks drop before we breach minimum operating levels?

These are the crucial questions the world faces:

- Sub-prime loan debacle
- Global Warming

} Small risks compared to demand and supply clash

Can Estimated Winter Oil Demand Be Met?

- IEA projects:
  - 4th Q-07 oil demand at 87.8 MMB/D
  - 1st Q-08 oil demand at 88.2 MMB/D
- Can crude production rise by 2.5 to 4.0 MMB/D?
- Growth in “other fuels” will not fill this gap.
- Can our global system tolerate 180 days of 2.5 MMB/D stock draw = 450 million barrels!

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Stress In Meeting 88 Million Barrels Per Day

- The simple math is cause for alarm:

	MMB/Day
If crude oil at:	73
NGL et al at:	12
Total Supply:	85
Stock Drop:	3

- What if demand is higher?
- What if crude supply continues to drop?

How tight can elastic be pulled before it snaps?

Another Insidious "Above Ground" Risk: Our System Is Too Old

- Oil and gas infrastructure is rusty and too old.
- Oil service and drilling rigs too old.
- Refineries, tank-farms and pipelines too old.
- Industry's work-force rapidly graying.

2005 Prudhoe Bay oil leak

Where Will Added Refinery Throughput Come From?

Year	World Crude Oil Refinery Nameplate Capacity	World Petroleum Use	"Cushion"
	---------- MMBL/Day ----------		
1970	47.1	46.8	0.2
1988	79.9	63.1	16.8
1990	75.0	66.6	8.4
2000	81.5	76.7	4.8
2007	85.3	83.6	1.7

- Port Arthur's Motiva Refinery scheduled to double output (+300,000 B/D over 5-years. Cost $7 billion.)
- Kuwait's proposed Al-Zour Refinery would add 615,000 B/D at cost of $14 - $16 million.

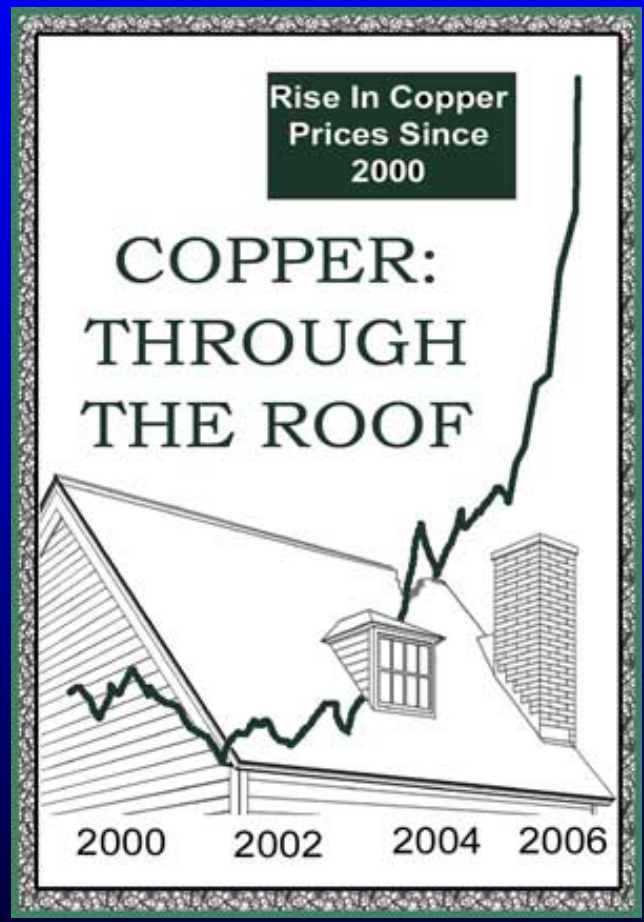
Can the oil system go into standby mode until this capacity gets built?

Oil And Gas Infrastructure Has To Be Rebuilt ASAP

- Even if wellhead output can grow, soon…
  - Infrastructure will start to shrink if not rebuilt
  - We need NOW:
    - Refineries
    - Pipelines
    - Drilling Rigs
    - Tank Farms
- Some are needed to support potential growth.
- Balance is to insure current flows continue.

Do We Have Raw Resources To Rebuild The Energy Complex?

- Iron ore prices have doubled.
- Copper prices have soared.
- Backlogs get longer each month.
- Project costs are doubling or tripling.
- Energy talent is scarce.



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What Happens When Demand Outpaces Supply?

- Energy demand is “fickle.”
- It does not have any link to available supply.
- When demand is higher than supply, inventories decline.
- Today, inventories are very low on day’s usage.
- Once minimum operating levels are breached, someone runs short.

When Oil Peaks, Demand Unlikely To Slow Down

- Peak Oil then becomes a “Pearl Harbor” event.
- Likelihood of occurrence rises with each passing month.

- Once shortages begin, users top-up tanks.
- This leads to classic “run on the bank.”
- The world has no accurate global fuel gauge, so predicting this event is impossible.

Does It Matter Why Chicago Burned Down?

- A fire destroyed Chicago in 1871.
- Rumor was that the fire was caused by Catherine O'Leary's cow kicking over a lantern in a barn.
- After the fact, did it really matter?
- If we "run out of useable petroleum," will it matter whether it was caused by above or below ground risks materializing?

Is It Too Late To Create An Early Warning Radar System?

- Had radar detected the Japanese air fleet, the U.S. naval fleet could have been saved.
- "We" (the world) can suddenly rise-up and demand energy data reform:
  - Field-by-field production for past 60 quarters
  - All imports of oil into OECD
  - Levy a $20/barrel transparency fine until producers comply
- This data will end the "Peak Oil Debate".

Is There Any Downside To Data Reform?

- World oil leaders show no interest in field-by-field data reform:
  - "It is our confidential data."
  - "We might suffer competitive disadvantage."
  - "We are as transparent as everyone else."
- Flying blind has extreme dangers.
- Once we crash, we will resent lack of data reform.
- We all win if reform is enacted.
- Everyone loses if no reform.

Will Peak Oil Surpass Global Warming As 21st Century's Greatest Challenge?

- Peak Oil, if imminent, will be a crisis in 2008 – 2012.
- Global warming, if real, will not become a crisis for another 50 – 100 years.
- If mitigating global warming risk is a high priority, why are only so few worrying about Peak Oil?

PEAK OIL could solve Global Warming by creating a resource war that ends the 21st Century.

Peak Oil Risk Is Genuine

- There is a chance oil will not peak soon.
- It might stay at undulating plateau for decades.
- But, all public data argues demand growth will not be met.
- The higher demand grows, the steeper oil will decline.
- Gauging the risk of Peak Oil being imminent is:
  - Far higher than our homes burning down
  - Far bigger immediate impact to “us” than Global Warming
- The risk might be ≈ 50%.
- It might be 75 – 90%.

It is time to take the Peak Oil risk seriously!

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Investment Bankers *to the* Energy Industry

For information and/or copies regarding this presentation, please contact us at (713) 236-9999 or aelmore@simmonsco-intl.com. This presentation will also be available on our website www.simmonsco-intl.com within seven business days.

2007 Houston World Oil Conference

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