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Canary In A Data Mine

June 21, 2007

For the past week or so, I've been delving deeply into data on the world's oil production, as part of some special side projects I will announce in the not-too-distant future.

What I have found has been, shall we say, less than encouraging. But crucially important information all the same.

So today, I'm going to attempt to summarize the big picture (as I see it) from a hard data perspective for a change.

First, I have to note straight off—as all good peak oil observers do—that all data is suspect. There are many reasons for this, such as political bending of the estimates, poor reporting, straight-up deception, and a lack of auditing. That's a big and complex topic all of its own and we'll have to save that for another day. But the data I'm presenting today comes from the usual agencies, mainly the EIA, the IEA, OPEC, and BP, and has been duly footnoted.

There is also the complication that the various petroleum data agencies count different things, which may include regular crude oil, condensates, natural gas liquids, natural gas plant liquids, and "heavy" oils including oil from tar sands, etc., which makes it nearly impossible to compare data from different sources. Some count all of the above including biofuels as "all liquids." We'll try to keep those things straight.

Because this is an enormous topic for a short article, I'm going to summarize, and I won't spend much time justifying the assertions.

Now, with all that out of the way, let's look at the big picture.

Demand

Worldwide demand is relentless, and has been increasing at an average rate of about 1.7% for the last ten years straight, or about 1.3 million barrels per day (mbpd) of new demand every year.ⁱ

The IEA recently estimated that this year the world will need 1.7 million barrels a day more oil than it did last year, for a global oil demand of 86.1 million barrels a day.

"It seems difficult to escape the conclusion that the oil market will be tight in the second half [of the year]," the agency said in its June 2007 monthly oil market report.ⁱⁱ

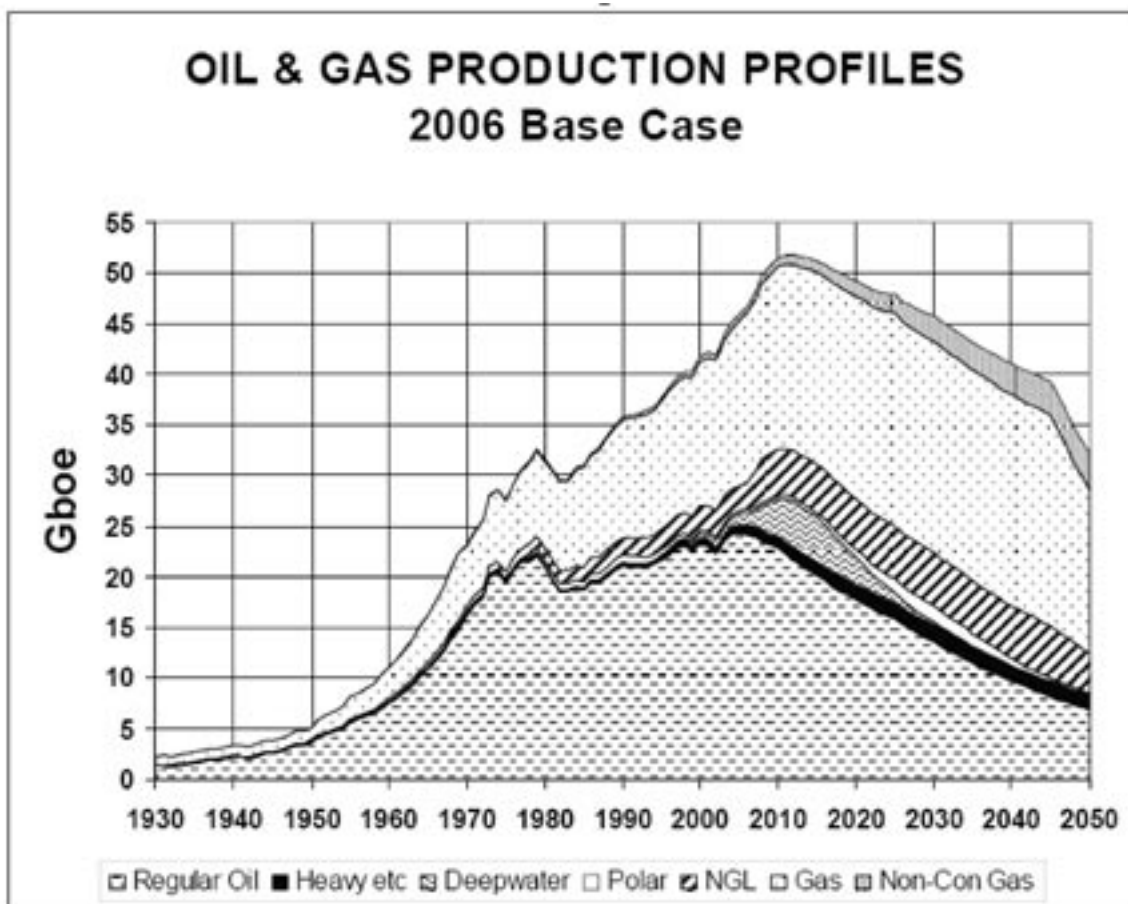
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The Peak

The most recent model by the Association for the Study of Peak Oil (ASPO) puts the ultimately recoverable total of "all liquids" at 2550 billion barrels, giving world production a peak date of 2011, with 1102 billion barrels produced to date and 1448 billion barrels to go. They reckon that the peak of "regular oil" was 2005.ⁱⁱⁱ

Here is their estimate in chart form:



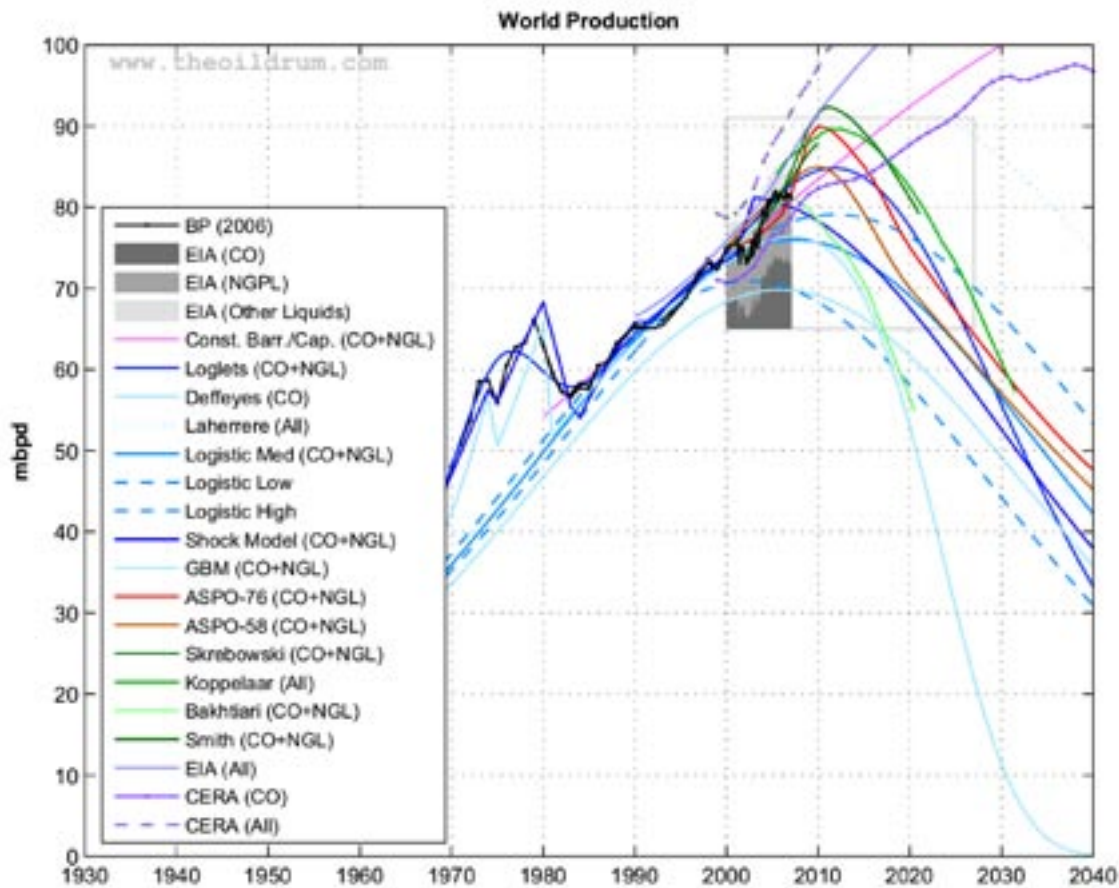
World Oil Production (All Liquids) - ASPO 2006 Base Case^{iv}

My guess is that their guess is the best guess. I guess. (Trust me when I tell you that that's about as good as it gets in this sphere.)

Taking a look at some other estimates, a recent study by oil industry analyst "Khebab" on the peak oil forum The Oil Drum compared 19 projections by well-known peak oil analysts:

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World oil production (Crude oil + NGL) and various forecasts (1940-2050)^v

While the estimates vary, there is a fairly good locus of consensus around the 2009-2012 time frame among geologists and oil industry analysts (economists and government data-keepers tend to have much more optimistic predictions).

And it appears that the top 10 oil producers—all mature oil provinces accounting for 62% of world production—have managed to eke out only a small increase from 2005-6.

Suffice to say, the peak is either already in the past or “soon enough,” because the actions we need to take in response to peak are the same whether the peak is last year or four years hence.

For a closer look at the data, see the table at the end of this article.

Exports

Another way of looking at the production picture is exports, because what we in the U.S. really care about is not overall production, but the availability of the two-thirds of our lifeblood which is imported.

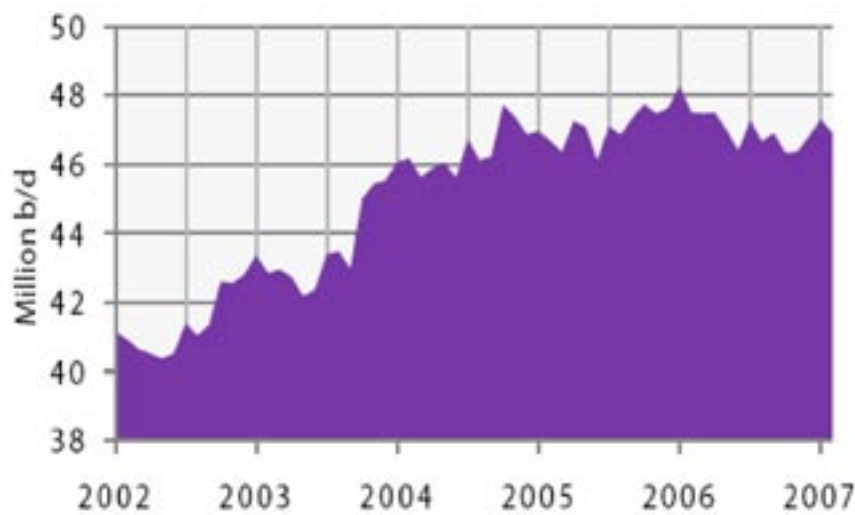
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A June 2007 study^{vi} by Rembrandt Koppelaar of ASPO-Netherlands looked at just the global oil exports from 2002-2007. He concluded:

- 1) "Total world exports of all fuel liquids have been on a plateau since the end of 2004, and declined slightly in the last year, despite production increases.
- 2) Liquids exports from non-OPEC countries as a whole have declined since the beginning of 2004.
- 3) OPEC liquids exports increased until the end of 2005, followed by a short plateau after which a slow decline set in, mainly due to declining production in Saudi Arabia."

Here is his chart of global exports:



World Liquids exports January 2002 - February 2007^{vii}

So, while global liquids production increased by 1 mbpd from 2005 to 2006, the amount exported was flat. Koppelaar believes this is because as producer countries grow up and continue to industrialize, they consume more of their own production, and are unable to increase exports.

Then where could those additional exports that we need so desperately come from?

OPEC In Control

Unfortunately, supply from all non-OPEC producers has been stagnant for about six years now, and current projections say that it will likely peak some time over the next three years, perhaps even now.^{viii}

And yet, the EIA, IEA, and OPEC all expect an increase of anywhere from a half-million to one million barrels a day in non-OPEC supply this year!

That's a big disconnect between reality and expectation. And as any good investor knows, that spells "opportunity."

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That leaves OPEC as the last great hope. Consequently, the data-gatherers have issued some rather shrill calls recently for them to increase production:

“OPEC must increase oil production by more than a million barrels per day if a rise in prices is to be avoided in the coming months, the Energy Information Administration said.”^{ix}

“OPEC needs to raise its crude oil output in the coming months to ensure an adequate supply, the head of the International Energy Agency said.”^x

But OPEC has declined: “OPEC notes oil markets remain well supplied and market fundamentals do not require any additional supply from the Organization at this time ... A combination of current high inventory levels and increasing OPEC spare capacity, which is expected to reach around 15% in the second half of this year, means there are adequate supplies available to cope with any upward revisions to oil demand forecasts.”^{xi}

So there!

There are just a couple of problems with OPEC’s perspective.

First, nobody believes there is much actual spare production capacity outside of Saudi Arabia. The rest of the OPEC producers pretty much have their taps wide-open. (Kuwait might have a little spare capacity, but probably nothing significant in the big picture.)

Second, not many believe that Saudi Arabia actually has 15% spare capacity.

Third, of the 11 OPEC nations (prior to Angola’s joining, just recently), only one has increased its production since September 2005, and that was a tiny 30,000 barrel per day bump for Libya. All the others have declined, for a total decline of 2 million barrels per day. That may be due to voluntary production cuts in accordance with OPEC’s agreements...or it may be involuntary.

Fourth, OPEC exports have also been declining in recent years:

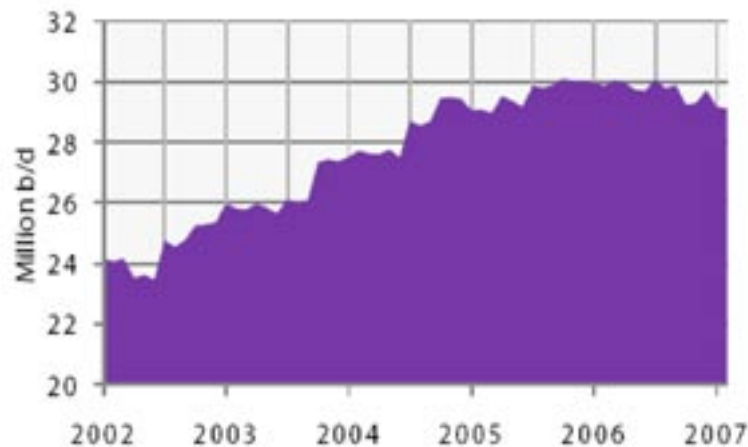


Figure 15 OPEC Liquids exports Jan. 2002 - Feb. 2007^{xiii}

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Whether OPEC doesn't increase its exports because it can't—due to factors such as geological limits, security problems, lack of capacity, and increased domestic demand—or because it won't—because it's better for their long-term profitability—or all of the above, we cannot know. And they're certainly not telling.

But there is another possibility, elegantly argued by Dave Cohen in a recent article, "A paradigm shift." He suggests that what's really going on here is that OPEC producers (particularly Saudi Arabia) have realized that they are back in control of the world market, since non-OPEC is pumping flat-out, and that they really don't need to try to keep oil prices any lower than they are now.

They have also realized that they'll make far more profit by selling refined products than by selling crude, and their investment in future projects reflects that. He explains:

Based on the outlook of growing demand for their oil and gas, by 2011 the countries of the Middle East will invest some \$94 billion in their oil and gas upstream sectors, more than half of which will go to expand oil production capacity. This is in addition to more than \$240 billion of investment in the mid and downstream oil and gas chains and petrochemicals... Of the \$70 billion Saudi Arabia is investing by 2012, only \$18 billion is for upstream expansions.^{xiv}

The rest is for finished products like gasoline, chemicals and plastics. And that really makes perfect sense for them: why let foreign companies reap the refining profit, and why ship crude around the world when shipping refined products costs less?

That approximate \$350 billion that Middle East producers are preparing to invest in oil production and processing would seem to suggest that they have high confidence in its future.

However, these additional investments, upstream or downstream, won't be coming online before next year, and some may take four years or more.

In the meantime, it looks like we're going to have to finally learn to live within our energy budgets, rather than assuming there will always be more when we need it.

Perhaps Matthew Simmons summarized the situation best, in the new Irish documentary, *Future Shock: End of the Oil Age*:

As I look, every month, at the best data we have, which is fuzzy data, it is getting harder and harder to imagine that we could actually grow crude oil supply another three or four or five million barrels a day. You've got every OPEC producer basically now flat out. They all claim they have spare capacity, but when oil prices got to be almost \$80 a barrel, not a single one of them were increasing their production. Saudi Arabia said they have two million barrels a day, or two and a half million barrels a day of shut-in supply, [but] their imports to the member countries of the IEA have been flat to declining the last five years. If they had spare capacity they would have sold into a rising market! Venezuela's oil is in decline, Nigeria's oil is in decline, Indonesia is now becoming an oil importer, Iran's oil industry is in shambles, so from

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a prudent planning standpoint, I think we should assume we have peaked. And if I'm wrong, I bet I'm wrong by two or three years, but why quibble over two or three years?

Matthew Simmons Interview in Future Shock: End of the Oil Age^{xv}

It doesn't matter if the timing is a bit off, nor does it matter if the peak is due to above-ground or below-ground factors. Peak is still peak. If Saudi Arabia technically could open the tap a little more right now, and possibly shave a few bucks off a barrel of crude, but they choose not to and so create the peak deliberately, isn't it still the peak? And if by doing so they save some oil for a later day when it will surely be worth more, can anybody blame them?

In a piece of personal correspondence to ASPO-USA, former Saudi Arabian exploration and production head Sadad Al-Husseini made the following statement:

There has been a paradigm shift in the energy world whereby oil producers are no longer inclined to rapidly exhaust their resource for the sake of accelerating the misuse of a precious and finite commodity. This sentiment prevails inside and outside of OPEC countries but has yet to be appreciated among the major energy consuming countries of the world.^{xvi}

Well, it looks like we're about to learn to appreciate it—right quick-like.

So the upshot is this: There is clearly a yawning gap opening between production and demand in 2007 for those of us who depend on imports, possibly as much as a 2% gap.

It looks to me like the loss of export capacity will prove to be the canary in the data mine. It doesn't really matter if the peak is technically a few years off if we can't satisfy our ever-growing thirst.

Until the world can build more complex refining capacity—such as the aforementioned investments in downstream capacity in the Middle East—we may expect gasoline prices to continue to rise along with the tightness of the light sweet crude market.

The days of \$60 oil and \$2.50 gasoline may be gone forever.

But those who understand the market's complexities—such as you, dear reader—won't even feel that pain, because they'll be reaping stunning profits from the shortage. I continue to recommend investing in the large independent American heavy sour crude refiners, Valero and Tesoro, at least until foreign refining capacity comes online. Likewise, anybody who builds refining and chemical plants is going to have a full book of business (As Cohen notes, GE just sold their petrochemicals division to Saudi Basic Industries for \$11.6 billion, commenting, a la The Graduate, "The Kingdom's future is plastics." After GE, who's ripe for acquisition?) And there's no doubt that offshore drillers like Transocean and Diamond Offshore will continue to do a land-office business.

So that's my read of the situation right now. I openly express my gratitude to all the contributors at ASPO and The Oil Drum for their excellent analytical work. They're the best, and it's always a privilege

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to stand on their shoulders.

Buckle up folks, \$100 oil could be headed your way before the end of the summer.

Until next time,

–Chris

i EIA, Total World Petroleum Consumption (2005)

ii http://www.busrep.co.za/index.php?from=rss_Business%20Report&fArticleId=3880752

iii https://aspo-ireland.org/newsletter/en/pdf/newsletter78_200706.pdf

iv https://aspo-ireland.org/newsletter/en/pdf/newsletter78_200706.pdf

v <http://www.theoil drum.com/node/2620>

vi <http://www.theoil drum.com/tag/oilwatch>

vii http://www.peakoil.nl/wp-content/uploads/2007/06/oilwatch_monthly_june_2007.pdf

viii http://www.aspo-global.org/newsletter/ASPOGlobal_Newsletter77.pdf

Groups which generally support this view include ExxonMobil, Chevron, OPEC, Cambridge Energy Research Associates, ASPO-Ireland, plus government agencies (IEA and US-EIA); all shared this view in October 2005 in Washington D.C.

ix <http://www.fxstreet.com/futures/news/article.aspx?StoryId=35d7ab6e-1f60-4b72-9585-3f14f9d1913b>

x http://www.busrep.co.za/index.php?from=rss_Business%20Report&fArticleId=3880752

xi <http://www.opec.org/opecna/Press%20Releases/2007/pr052007.htm>

xii <http://www.eia.doe.gov/emeu/ipsr/t12.xls>

xiii http://www.peakoil.nl/wp-content/uploads/2007/06/oilwatch_monthly_june_2007.pdf

xiv <http://www.theoil drum.com/node/2670#comment-203906>

xv Future Shock http://www.rte.ie/tv/futureshock/av_20070618.html

xvi <http://www.theoil drum.com/node/2670#comment-203906>

xvii Peak Oil Review, Vol. 2 No. 23, June 18, 2007 <http://www.aspo-usa.com/>

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Table: Top Oil Producers and Peak Production

† OPEC Member
 Black = Increasing
 Blue = Flat/Volatile
 Red = Decreasing

	Country	Peak Year	Peak Rate	Current Rate	Change '05-'06	Comments
			(Millions barrels/day)		(1000's barrels/day)	
1	Saudi Arabia †	na	11.50	10.9	(255)	Saudi says steep decline is voluntary cutback; we'll see.
2	Russia	1987	11 +/-	9.8	217	Russia re-peaks in 2-4 yrs; growth spurt almost over.
3	USA	1971	6.06	6.9	(24)	Gulf of Mex '06 comeback partially offset other declines.
4	Iran †	1974	3.8	4.3	75	Slow gains/flat; Iran won't repeak; nukes + nationalism.
5	Mexico	2004		3.7	(77)	Cantarell field in permanent decline.
6	China	na		3.7	57	China probably will peak and flatten within two years.
7	Canada	na		3.1	106	Canada's conventional oil peaked yrs ago; oilsands up
8	U.A.E. †	na		3.0	218	UAE talks increases; what's in their best interest?
9	Venezuela †	1970	3.6?	2.8	(103)	Resource nationalism poster child; Chavez-driven dip
10	Norway	2001	3.42	2.8	(191)	Norwegian North Sea steadily declining; -19% in five yrs
	TOP TEN: 62% of total			51.0	23	
11	Kuwait †	1972	3.28	2.70	61	Burghan Field, world's 2nd largest, has peaked.
12	Nigeria †	na		2.46	(120)	Nigeria = basketcase. Deepwater, violence both grow
13	Algeria †	na		2.02	(11)	Algeria has room to grow; cut for OPEC quota last yr
14	Iraq †	1979	3.48	2.00	166	Civil war hurtin infrastructure; can't bounce back fast
15	Libya †	1970	3.32	1.84	84	Libya can increase, but new peak unlikely.
16	Brazil	na		1.81	94	Still growing; excludes cane ethanol. Self-sufficient.
17	United Kingdom	1999	3.00	1.64	(173)	Production down 44% since '99. Prognosis: terminal.
18	Kazakhstan	na		1.43	70	Kazaks have tripled production over last decade.
19	Angola †	na		1.41	176	Angola rising star, has doubled over last decade.
20	Qatar †	na		1.13	107	Qatar doubled over last decade; large NGL gains cont.
	NEXT TEN (11-20): 23% of total			18.4	454	
21	Indonesia †	1977	1.69	1.07	(58)	OPEC member used to export; now net importer.
22	India	na		0.81	23	India flat near 800,000 bd. Imports rising.
23	Malaysia	2004?	0.79	0.75	(20)	Malaysia doubled since '85; now declining. On watch list
24	Oman	2001	0.96	0.74	(36)	Oman: 23% decline since 2001.
25	Argentina	1998	0.89	0.72	(9)	Argentina's steady decline continues.
26	Egypt	1993	0.95	0.68	(18)	Egypt yields new gas finds, but not much new oil.
27	Azerbaijan	na		0.65	202	Zooming up the chart; new pipeline allows big exports
28	Columbia	1999	0.84	0.56	4	Columbians still beset by narcoterror and rebels.
29	Ecuador	na		0.55	4	Only up 1% last two years. Internal politics volatile.
30	Australia	2000	0.81	0.54	(10)	A 2007 rebound is break in long decline trend.
	NEXT TEN (21-30): 9% of total			7.1	82	
31	Syria	1995	0.60	0.42	(41)	Syria down 28% since 2001, 9% drop last year alone.
32	Sudan	na		0.40	42	Sudanese violence persists; new OPEC member soon
33	Yemen	2001	0.47	0.39	(36)	Yemen halted decline, could be 1-yr reprieve
34	Vietnam	2004?	0.43	0.37	(31)	Vietnam suffered 2-yr decline of 14%. Trend?
35	Equatorial Guinea	na		0.36	2	E. Guinea producing for 13 yrs.; growth spurt over?
36	Denmark	2004	0.39	0.34	(35)	One-year decline of 9% in 2006.
37	Thailand	na		0.29	21	Thailand should still see modest growth.
38	Congo	1999	0.29	0.26	16	Congo's small two-year gain brings it back to plateau.
39	Gabon	1997	0.37	0.23	(2)	Gabon, former OPEC nation, flat spot during decline.
40	Brunei	1979	0.24	0.22	15	Brunei flat five years, then a little growth; new peak?
	NEXT TEN (31-40): 4% of total			3.28	(49)	Nations 31-40 total produce little more than Canada.
41	Trinidad & Tobago	1978	0.23	0.17	3	dipped 25% 1985-98. Recent uptrend
42	Turkmenistan	2003?	0.2	0.16	(29)	sudden 15% drop last year
43	Chad	na		0.15	(20)	producing only 3 yrs; geopolitical hiccup = one yr drop?
44	Uzbekistan	1992	0.19	0.13	(1)	could repeak, but unlikely; down 1/3 last 6 yrs
45	Peru	1983	0.20	0.12	5	Peru bounced back in 2005, 2006; watch for nationalism
46	Italy	na	0.12	0.11	(6)	near the bottom ranking, but new peak in 2005
47	Romania	1976	0.30	0.11	(9)	world's first oil wells drilled here in 1854
48	Tunisia	1984	0.12	0.07	(5)	only Tunisia cares about small decline
49	Cameroon	1988	0.18	0.06	5	only Cameroon cares about small increase
50	ALL THE REST	na		0.75		"Everybody else" trending down, too small to matter.
	NEXT TEN (41-50): 2% of total			1.83	1.83	Remaining nations produce same as Libya.
	TOTAL			81.66	511.83	

Data Source: British Petroleum, using 2006 data. Includes crude oil, shale oil, oil sands, and natural gas liquids (NGLs); excludes biomass.
 Comments and data aggregation by: Steve Andrews and Randy Udall, ASPO-USA
 Revised by Chris Nelder