



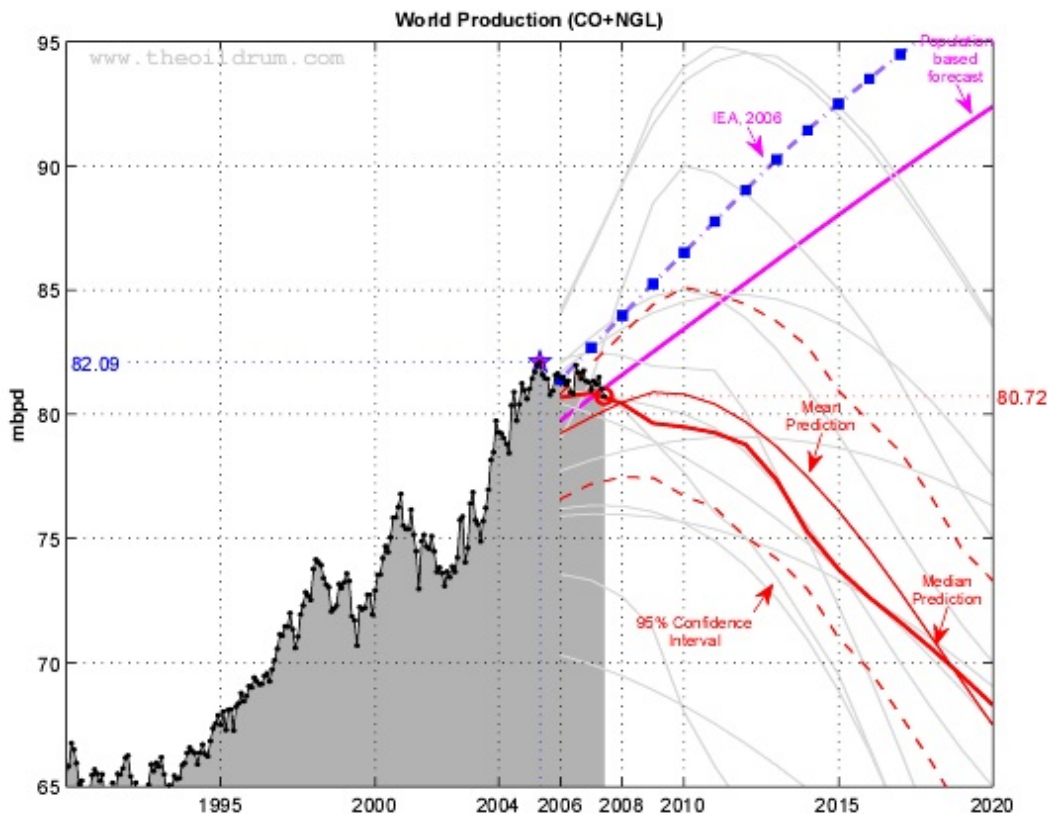
Peak Oil Update - September 2007: Production Forecasts and EIA Oil Production Numbers

Posted by [Sam Foucher](#) on September 22, 2007 - 10:15am

Topic: [Supply/Production](#)

Tags: [ali morteza samsam bakhtiari](#), [bp](#), [chris skrebowski](#), [eia](#), [logistic](#), [loglets](#), [m. king hubbert](#), [oil](#), [rembrandt koppelaar](#), [robelius](#), [update](#) [[list all tags](#)]

An update on the latest production numbers from the EIA along with graphs/charts of different oil production forecasts.



World oil production (EIA Monthly) for crude oil + NGL. The median forecast is calculated from 13 models that are predicting a peak before 2020 (Bakhtiarti, Smith, Staniford, Loglets, Shock model, GBM, ASPO-[70,58,45], Robelius Low/High, HSM). 95% of the predictions sees a production peak between 2008 and 2010 at 77.5 - 85.0 mbpd (The 95% confidence interval is computed using a bootstrap technique). [Click to Enlarge.](#)

Executive Summary:

1. Broad revision (from 1980 to 2004) by the EIA this month but not significant in amplitude.
2. Monthly production peaks are unchanged:

1. *All Liquids*: the peak is still July 2006 at 85.54 mbpd (↑ 0.11 mbpd), the year to date average production in 2007 (6 months) is 84.28 mbpd (↑ 0.02 mbpd), down 0.07 mbpd from 2006 for the same period.
 2. *Crude Oil + NGL*: the peak date remains May 2005 at 82.09 mbpd (↑ 0.01 mbpd), the year to date average production for 2007 (6 months) is 81.20 mbpd (↓ 0.04 mbpd), down 0.06 mbpd from 2006.
 3. *Crude Oil + Condensate*: the peak date remains May 2005 at 74.30 mbpd (↑ 0.15 mbpd), the year to date average production for 2007 (6 months) is 73.23 mbpd (↑ 0.14 mbpd), down 0.25 mbpd from 2006.
 4. *NGPL*: the peak date is still February 2007 at 8.03 mbpd (↓ 0.21 mbpd), the year to date average production for 2007 (6 months) is 7.97 mbpd (↓ 0.18 mbpd), up 0.19 mbpd from 2006.
3. **Decline in crude oil + condensate continues**: June 2007 estimate for crude oil + condensate is 72.82 mbpd compared to 73.11 mbpd one year ago and 73.92 mbpd two years ago.
4. **Average forecast**: the average forecast for crude oil + NGL based on 13 different projections (Figure above) is showing a kind of production plateau around 81 +/- 4 mbpd with a decline after 2010 +/- 1 year.

Notations:

- *mbpd*= Million of barrels per day
- *Gb*= Billion of barrels (10^9)
- *Tb*= Trillion of barrels (10^{12})
- *NGPL*= Natural Gas Plant Liquids
- *CO*= Crude Oil + lease condensate
- *NGL*= Natural Gas Liquids (lease condensate + NGPL)
- *URR*= Ultimate Recoverable Resource

EIA Last Update (June)

Data sources for the production numbers:

- Production data from BP [Statistical Review of World Energy 2006](#) (Crude oil + NGL).
- [EIA data](#) (monthly and annual productions up to February 2007) for crude oil and lease condensate (noted CO) on which I added the NGPL production (noted CO+NGL).

The All liquids peak is still July 2006 at 85.54 mbpd, the year to date average production value in 2007 (6 months) is down from 2006 for all the categories except for NGPL. The peak date for Crude Oil + Cond. remains May 2005 at 74.30 mbpd (see Table I below).

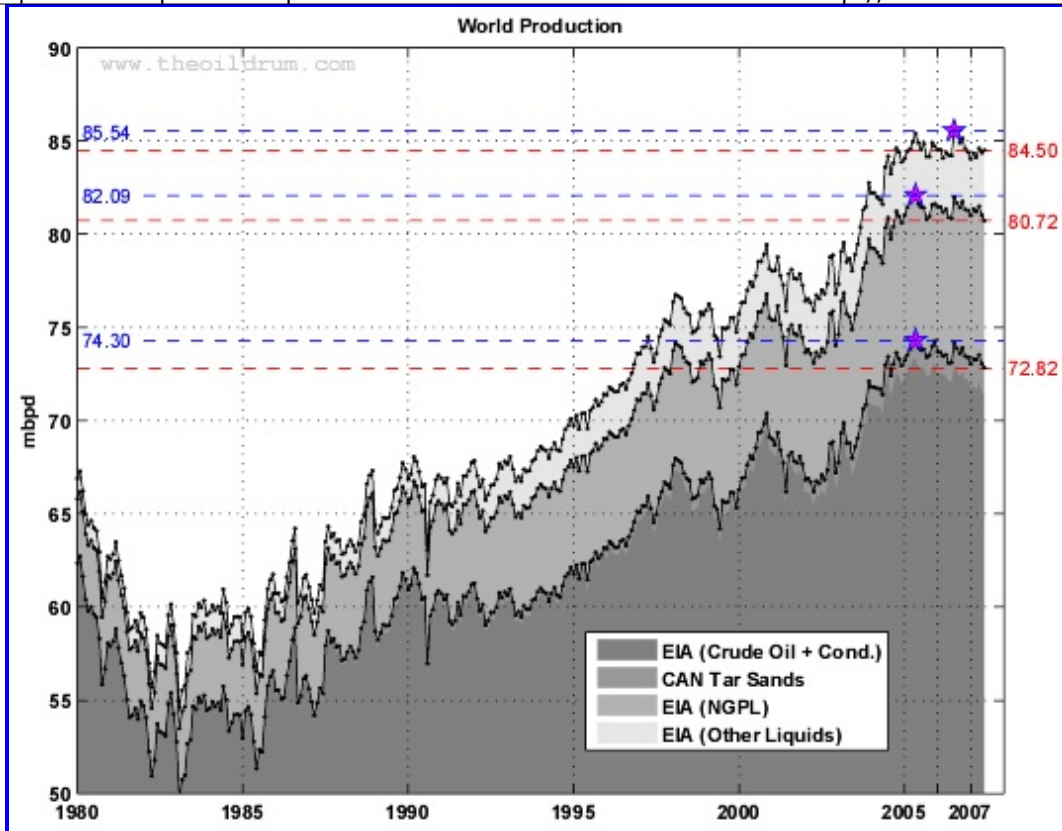


Fig 1.- World production (EIA data). Blue lines and pentagrams are indicating monthly maximum. Monthly data for CO from the EIA. Annual data for NGPL and Other Liquids from 1980 to 2001 have been upsampled to get monthly estimates. Click to Enlarge.

Category	June 2007	June 2006	12 MA ¹	2007 (6 Months)	2006 (6 Months)	Share	Peak Date	Peak Value
All Liquids	84.50	84.21	84.65	84.28	84.35	100.00%	2006-07	85.54
Crude Oil + NGL	80.72	80.83	81.34	81.20	81.26	95.52%	2005-05	82.09
Other Liquids	3.78	3.38	3.30	3.08	3.08	4.48%	2007-06	3.78
NGPL	7.89	7.72	7.90	7.97	7.78	9.34%	2007-02	8.03
Crude Oil + Condensate	72.82	73.11	73.44	73.23	73.48	86.18%	2005-05	74.30
Canadian Tar Sands ²	1.47	0.99	1.31	1.42	1.06	1.74%	2007-03	1.57

Table I - Production estimate (in millions of barrels per day (mbpd)) up to June 2007 taken from the EIA website (*International Petroleum Monthly*). ¹Moving Average on the last 12 months.

Revision Pattern

There was a big revision this month for almost the monthly estimates:

Important Changes This Month

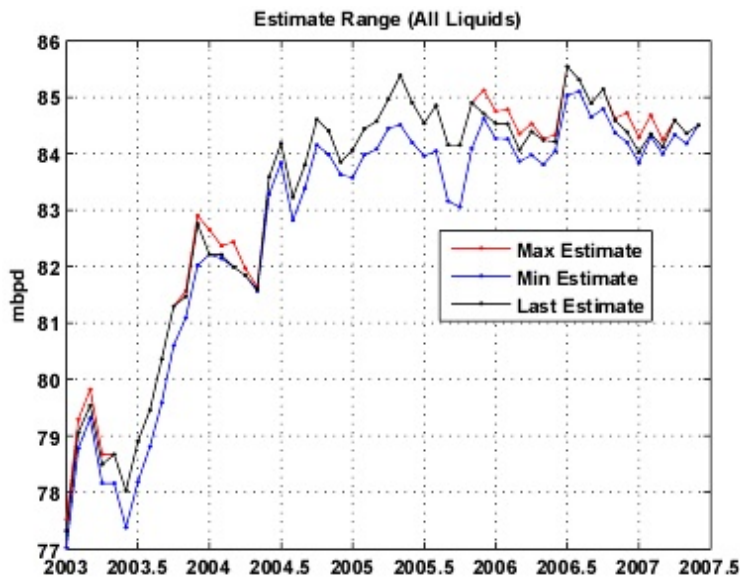
In this release of the *International Petroleum Monthly* there are two major changes:

(1) Petroleum demand data for OECD countries, other than the United States and the U.S. Territories, have been revised for 1990-1994 based on the International Energy Agency's (IEA) annual review of historical OECD petroleum data, the results of which were released in the August 10, 2007 version of the IEA's Monthly Oil Data Service. Revised data are shown in bold italic font.

(2) Petroleum production data for 1980-2005 have been revised to match data in the recently released [Petroleum Production Time Series Tables](#) of the *International Energy Annual 2005*. Revised data are shown in bold italic font..

World petroleum production data for the month of June 2007 and the Second Quarter of 2007; and OECD country petroleum demand, imports, and stocks data for the month of May 2007 have been added.

There was also a mistake in the May production from Canada that briefly went up by almost 1 mbpd! Overall, we can see that production for crude oil and condensate has been revised up around May 2005 and June 2006 but revised down for the first quarter of 2006 and 2007. NGPL production has been revised down for almost all the months since 2003. However, the cumulated amount of revisions do not exceed 0.5 mbpd.



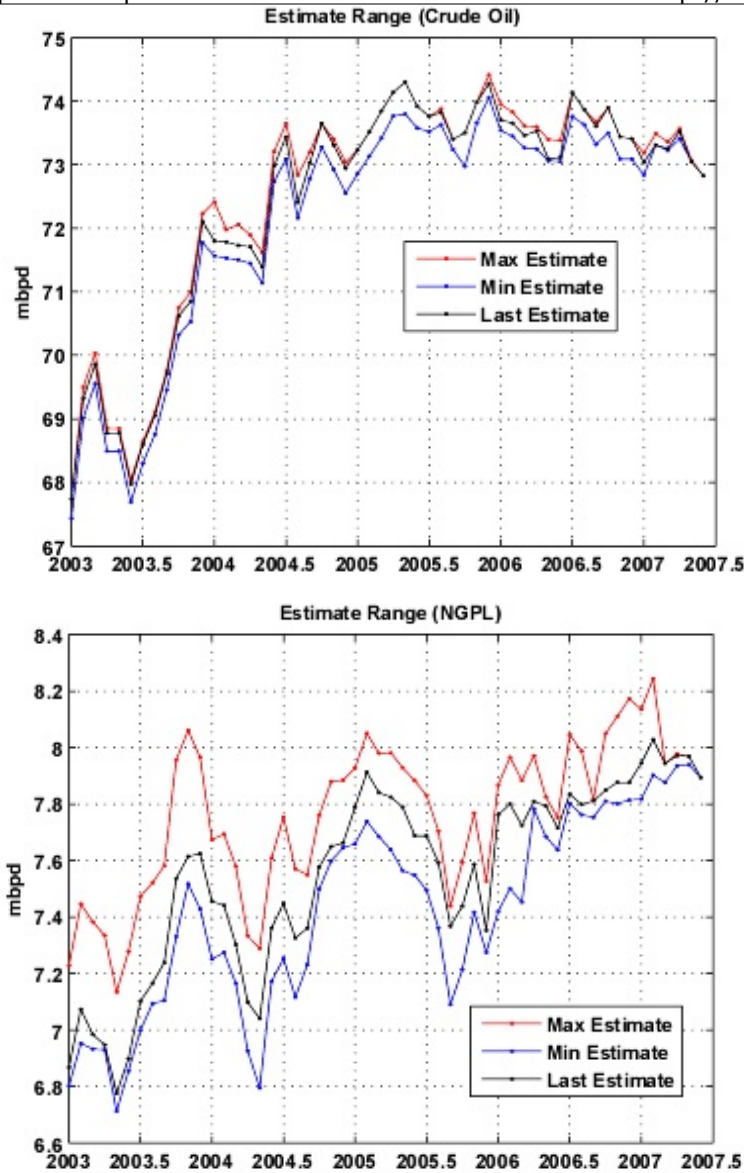


Fig 2.- Range of previous monthly revisions for All Liquids (top), crude oil + condensate (middle) and NGPL (bottom). Click to Enlarge.

The cumulative change in production estimates are shown on Figure 3. The 2005 annual production for all liquids has been revised up by 0.5 mbpd since initial estimate.

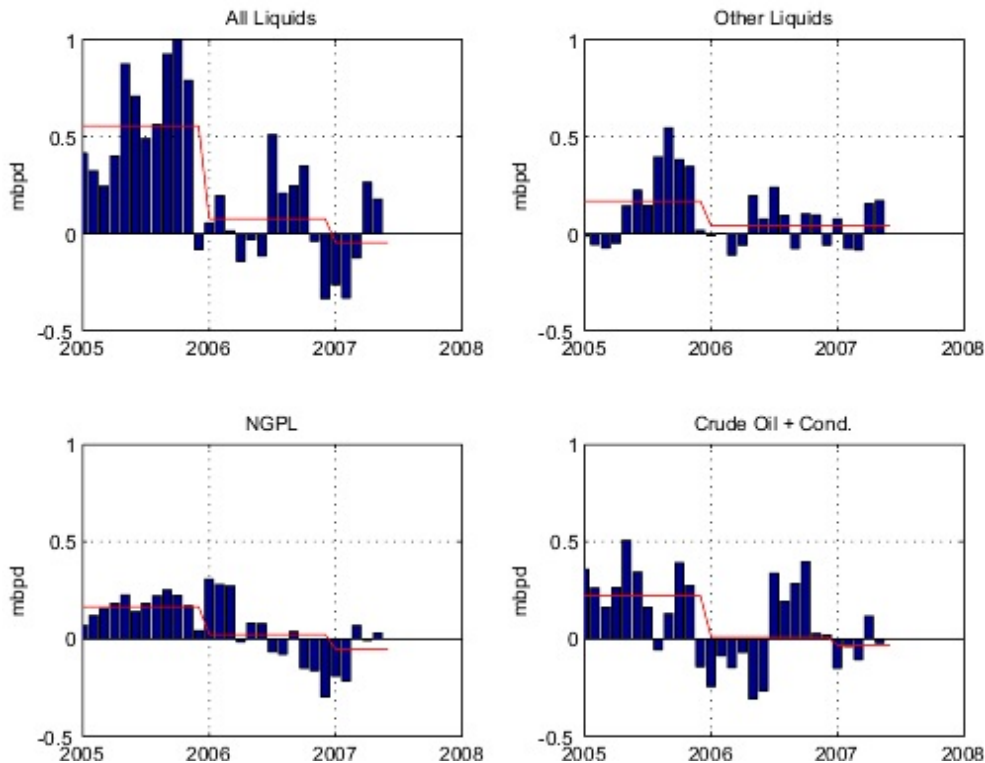


Fig 3.- Cumulative change in production numbers since first estimates are issued for each month. Click to Enlarge.

Business as Usual

- EIA's [International Energy Outlook 2006](#), reference case (Table E4, World Oil Production by Region and Country, Reference Case).
- IEA total liquid demand forecast for 2006 and 2007 ([Table1.xls](#)).
- [IEA World Energy Outlook 2006](#) : forecasts for All liquids, CO+NGL and Crude Oil (Table 3.2, p. 94).
- [IEA World Energy Outlook 2005](#) : forecast for All liquids (Table 3.5).
- [IEA World Energy Outlook 2004](#) : forecast for All liquids (Table 2.4).
- A simple demographic model based on the observation that the oil produced per capita has been roughly constant for the last 26 years around 4.4496 barrels/capita/year (Crude Oil + NGL). The world population forecast employed is the [UN 2004 Revision Population Database](#) (medium variant).
- CERA forecasts for conventional oil (Crude Oil + Condensate?) and all liquids, believed to be productive capacities (i.e. actual production + spare capacity). The numbers have been derived from Figure 1 in Dave's [response to CERA](#).

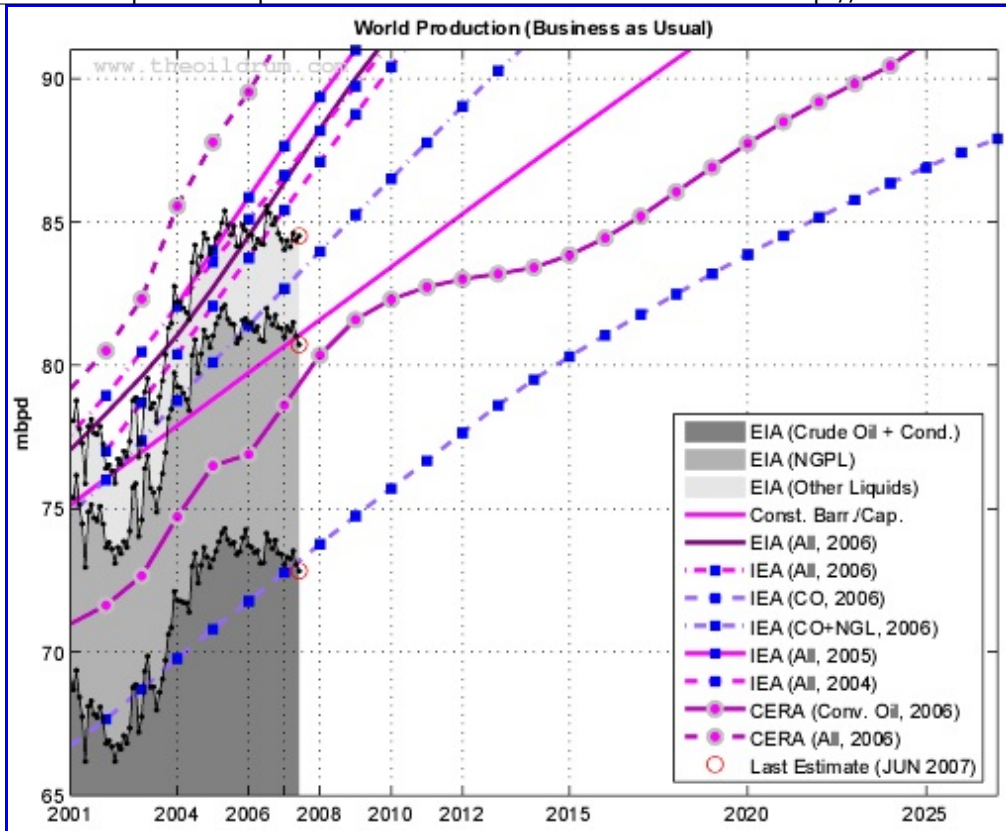


Fig 4.- Production forecasts assuming no visible peak. Click to Enlarge.

PeakOilers: Bottom-Up Analysis

- Chris Skrebowski's megaprojects database (see discussion [here](#)).
- The ASPO forecast from April newsletter (#76): I took the production numbers for 2000, 2005, 2010, 2015 and 2050 and then interpolated the data (spline) for the missing years. I added the previous forecast issued one year and two years ago (newsletter #58 and #46 respectively). There was no revision since August 2006.
- Rembrandt H. E. M. Koppelaar ([Oil Supply Analysis 2006 - 2007](#)): "Between 2006 and 2010 nearly 25 mbpd of new production is expected to come on-stream leading to a production (all liquids) level of 93-94 mbpd (91 mbpd for CO+NGL) in 2010 with the incorporation of a decline rate of 4% over present day production".
- Koppelaar [Oil Production Outlook 2005-2040 - Foundation Peak Oil Netherlands \(November 2005 Edition\)](#).
- The [WOCAP model](#) from Samsam Bakhtiari (2003). The forecast is for crude oil plus NGL.
- Forecast by Michael Smith (Energy Institute) for CO+NGL, the data have been taken from this [chart](#) in this [presentation](#) (pdf).
- PhD thesis of [Frederik Robelius](#) (2007): *Giant Oil Fields - The Highway to Oil: Giant Oil Fields and their Importance for Future Oil Production*. The forecasts (low and high) are derived from this [chart](#).
- Forecast by TOD's contributor [Ace](#), details can be found in this [post](#).

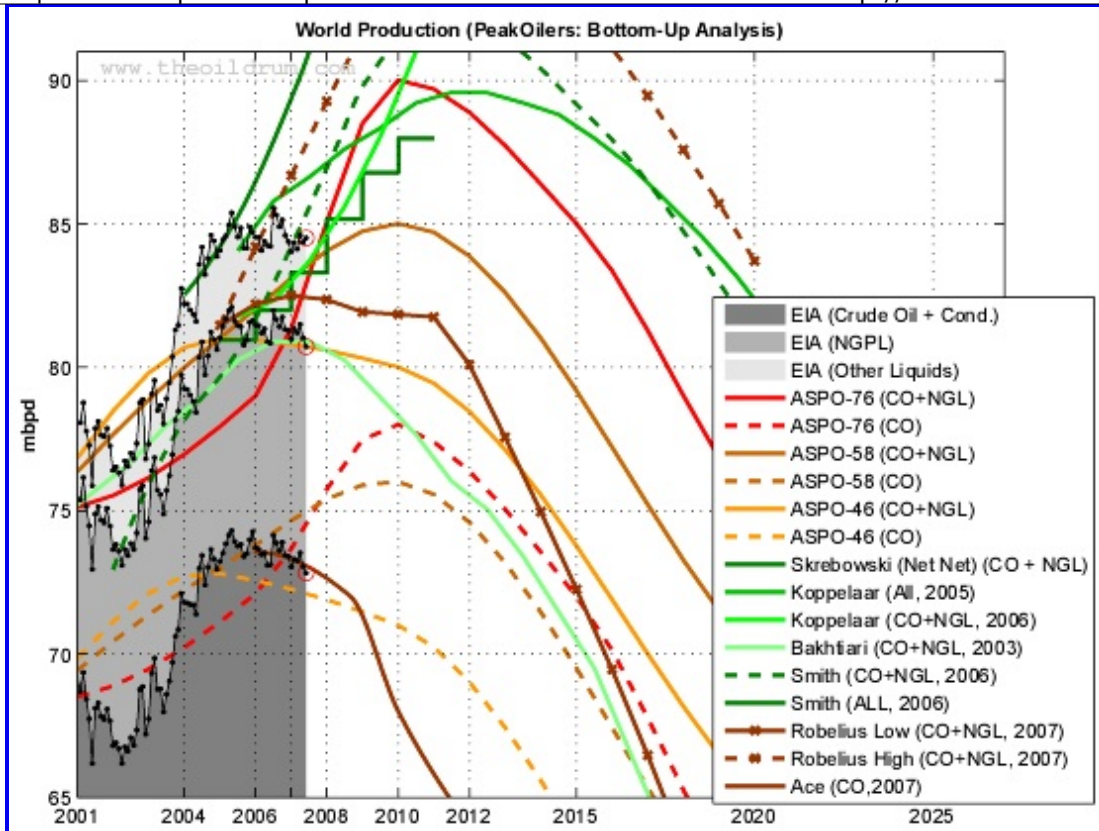


Fig 5.- Forecasts by PeakOilers based on bottom-up methodologies. [Click to Enlarge.](#)

PeakOilers: Curve Fitting

The following results are based on a linear or non-linear fit of a parametric curve (most often a Logistic curve) directly on the observed production profile:

- Professor Kenneth S. Deffeyes forecast ([Beyond Oil: The View From Hubbert's Peak](#)): Logistic curve fit applied on crude oil only (plus condensate) with URR= 2013 Gb and peak date around November 24th, 2005.
- Jean Lahèrre (2005): [Peak oil and other peaks, presentation to the CERN meeting, 2005.](#)
- Jean Lahèrre (2006): [When will oil production decline significantly? European Geosciences Union, Vienna, 2006.](#)
- Logistic curves derived from the application of Hubbert Linearization technique by Stuart Staniford (see this [post](#) for details).
- Results of the [Loglet analysis](#).
- The Generalized Bass Model (GBM) proposed by [Prof. Renato Guseo](#), I used his most recent paper ([GUSEO, R. et al. \(2006\). World Oil Depletion Models: Price Effects Compared with Strategic or Technological Interventions ; Technological Forecasting and Social Change, \(in press\).](#)). The GBM is a beautiful model that has been applied in finance and marketing science (see [here](#) for some background). The estimation in Guseo's article was based on BP data from 2004 (CO+NGL).
- The so-called shock model proposed by TOD's poster [WebHubbleTelescope](#). You can find a description of his approach on his blog [here](#) as well as a review on TOD. The current estimate was done in 2005 based on BP's data (CO+NGL).
- The Hybrid Shock Model is a variant of the shock model described [here](#). The forecast is based on EIA data (up to 2006) for crude oil + condensate, the ASPO backdated discovery

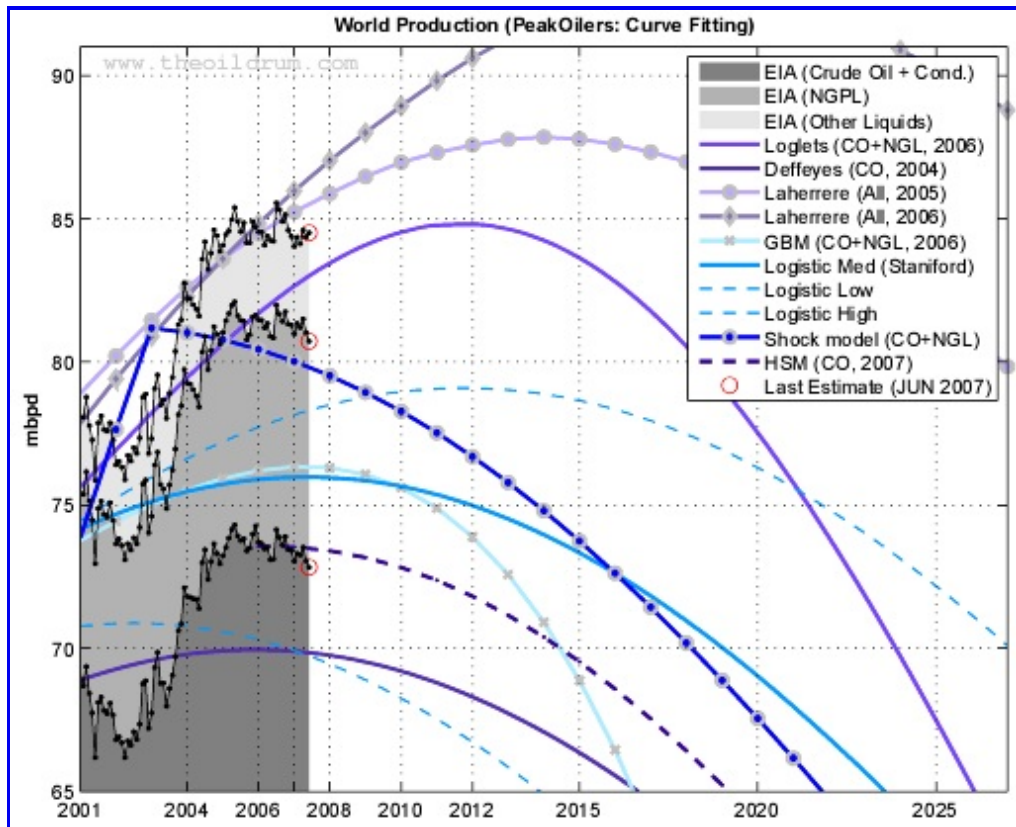


Fig 6.- Forecasts by PeakOilers using curve fitting methodologies. Click to Enlarge.

Forecast	Date	2005	2006	2007	2010	2015	Diff ²	Peak Date	Peak Value
All Liquids									
<i>Observed (EIA)</i>		84.63	84.65	84.32	NA	NA		2006-07	85.54
IEA (WEO)	2004	82.06	83.74	85.41	90.40	98.69	-1.09	2030	121.30
IEA (WEO)	2005	84.00	85.85	87.64	92.50	99.11	-3.32	2030	115.40
Koppelaar	2005	84.06	85.78	86.61	89.21	87.98	-2.29	2011	89.58
Lahèrre	2005	83.59	84.47	85.23	86.96	87.77	-0.91	2014	87.84
EIA (IEO)	2006	82.70	84.50	86.37	91.60	98.30	-2.05	2030	118.00
IEA (WEO)	2006	83.60	85.10	86.62	91.30	99.30	-2.30	2030	116.30
CERA ¹	2006	87.77	89.52	91.62	97.24	104.54	-7.30	2035	130.00
Lahèrre	2006	83.59	84.82	85.96	88.93	92.27	-1.64	2018	92.99
Smith	2006	85.19	87.77	90.88	98.94	98.56	-6.56	2012-05	99.83
Crude Oil + NGL									
<i>Observed (EIA)</i>		81.46	81.38	81.12	NA	NA		2005-05	82.09
GBM	2003	76.06	76.27	76.33	75.30	67.79	4.79	2007-05	76.34
Bakhtiari	2003	80.24	80.89	80.89	77.64	69.51	0.23	2006	80.89

ASPO-46	2004	81.00	80.95	80.80	80.00	73.77	0.32	2005	81.00
ASPO-58	2005	81.00	82.03	83.10	85.00	79.18	-1.98	2010	85.00
Staniford (High)	2005	77.45	77.92	78.31	79.01	78.51	2.81	2011-10	79.08
Staniford (Med)	2005	75.81	75.94	75.97	75.52	73.00	5.15	2007-05	75.98
Staniford (Low)	2005	70.46	70.13	69.71	67.92	63.40	11.41	2002-07	70.88
IEA (WEO)	2006	80.10	81.38	82.67	86.50	92.50	-1.55	2030	104.90
Koppelaar	2006	81.76	82.31	83.68	91.00	NA	-2.56	2010	91.00
Skrebowski	2006	80.95	81.47	82.64	87.37	NA	-1.52	2010	87.97
Smith	2006	80.53	82.81	85.45	91.95	88.60	-4.33	2011-02	92.31
Loglets	2006	81.12	82.14	83.02	84.65	83.26	-1.90	2012-01	84.80
ASPO-76	2006	77.92	79.00	81.35	90.00	85.00	-0.23	2010	90.00
Robelius Low	2006	81.45	82.19	82.50	81.84	72.26	-1.38	2007	82.50
Robelius High	2006	81.45	84.19	86.67	93.40	92.40	-5.55	2012	94.54
Shock Model	2006	80.76	80.43	80.01	78.27	73.74	1.11	2003	81.17
Crude Oil + Lease Condensate									
<i>Observed (EIA)</i>		73.81	73.57	73.16	NA	NA		<i>2005-05</i>	74.30
ASPO-46	2004	72.80	72.56	72.25	71.00	63.55	0.91	2005	72.80
Deffeyes	2004	69.94	69.93	69.84	69.02	65.99	3.33	2005-12	69.95
ASPO-58	2005	73.00	73.80	74.65	76.00	69.50	-1.48	2010	76.00
IEA (WEO)	2006	70.80	71.78	72.77	75.70	80.30	0.40	2030	89.10
CERA ¹	2006	76.49	76.89	78.60	82.29	83.83	-5.44	2038	97.58
ASPO-76	2006	71.11	72.10	73.66	78.00	72.00	-0.50	2010	78.00
HSM	2007	NA	73.56	73.53	72.82	69.53	-0.37	2006	73.56
Ace	2007	NA	73.48	73.03	66.96	58.47	0.13	2006-01	73.55

Table II. Summary of all the forecasts (figures are in mbpd) as well as the last EIA estimates.¹ Productive capacities. ² Difference between the observed production for 2007 and the predicted value (in mbpd), the value in bold indicates the best forecast (i.e. the oldest with the lowest difference).

Next update probably in December.

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