

Oil Production Outlook 2005-2040

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REVIEW DRAFT – COMMENTS WELCOME

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Introduction – Peaking of World Oil Production

The amount of oil we consume increases each year while oil in the ground exists in a finite amount. One day in the not so far away future, world oil production will reach its peak. We can identify this moment in time as: the highest production volume of oil in the history of mankind. After it, oil production will start its terminal decline.

Because of the extremely important nature of oil for our society this peak will turn our lives upside down. All aspects of industrial society will be influenced. Some argue that the peak data lies within the very near future, perhaps three years from now while others think it will happen around 2030. It is quite clear that the peak in world oil production will happen somewhere the next 25 years.

We can keep arguing about the data. It is a certainty that the necessary time to transition to a sustainable society is very short. Without timely mitigation the economic, social and political costs involved will be unprecedented. It would be wise if actions are taken and plans are made beforehand. In the present most political leaders, businessmen and scientists unfortunately do not take this issue very seriously.

We often forget that long before the peak arrives the world will already change. In recent years spare oil capacity went to almost zero, the light crude variant has peaked¹ and there is a refinery shortage. A real gap between supply and demand has formed. Liquid fuel prices are rising dramatically and becoming more volatile every day. Oil is becoming scarce in economical terms already.

The central question is how much we can grow in the near future and when oil production will peak. Since our economy thrives on growth, a plateau of oil production would be disastrous. Let alone a decline in oil production.

We have not prepared anything for this dire problem. Only recently some world leaders are starting to awaken. Some emergency plans are being formed in case of long oil disruptions. No consistent policies for a transition to a durable society are in place. If oil production peaks we do not have the slightest clue on what course of action to take.

If we would be wise we would begin now with forming consistent policies to assure a sustainable future.

There are four paths necessary to achieve this future:

- Behavioral change, going from an exponential growing society to a stable based society
- Energy efficiency, decreasing the amount of energy needed to do the same
- Energy saving, decreasing the amount of energy unnecessary to provide needs
- Renewable energies, implementing them as fast as possible.

¹ OPEC Montly Oil Market - <http://www.opec.org/home/Monthly%20Oil%20Market%20Reports/2005/MR082005.htm>

Method and outline

A) basics

Which does not help to the clarity of the peaking date is the way most institutes and geologist model the peak of oil production. Central to their approach is the estimated total amount of oil that will ever be extracted (I.E. Estimated Ultimate Recovery). In the present this figure varies between 1850 and 4000 billion barrels. Most estimates lie around 2500 billion barrels. Because the total amount of oil that will ever be extracted is a guesstimate a lot of the predictions done in the past by all kinds of experts were totally wrong. Too much factors are involved and the arguments from all sides vary widely.

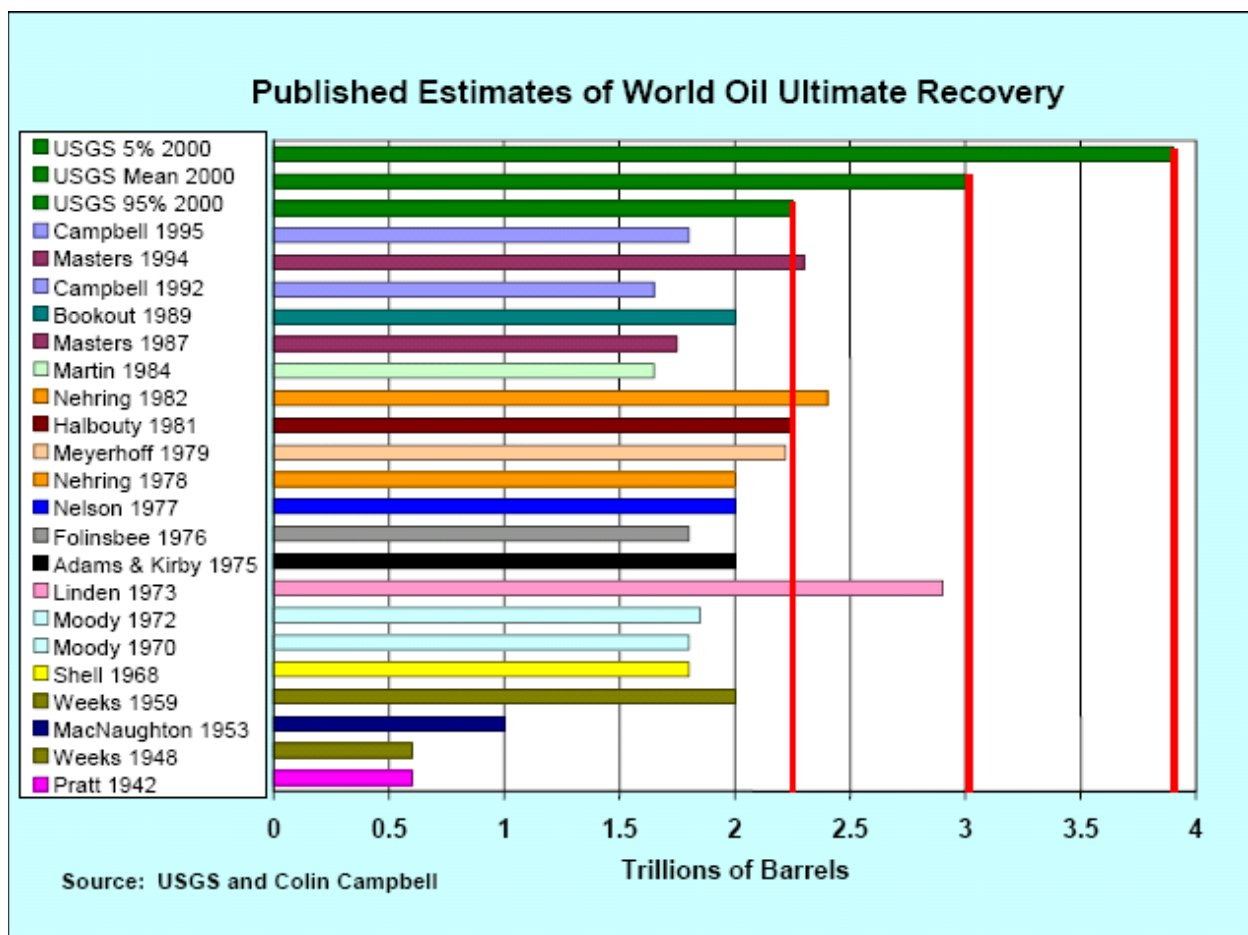


Figure I – Estimates of Ultimate Recovery.

A better way to estimate to peak is to look at it from an oil production perspective. How much oil are we producing now? Which part of production is in decline? What is the amount of new oil production is coming online?

Because of the more certain nature of these figures a probable estimate for the near future can be obtained.

The production figures from 1996 to 2004 are well documented in the Oil, Gas, Coal and Electricity Quarterly Statistics² from the International Energy Agency which is updated every quarter. The countries that have already peaked can be read in these figures. Future production can be estimated by the decline rates of current fields and the new oil projects coming online. New projects are well documented because of the huge costs, leading times and multiple parties involved. These figures can be obtained from various sources.

B) Method

Oil production figures are taken from the Oil, Gas, Coal and Electricity Quarterly Statistics. Based on these figures a decline rate is calculated for countries which have peaked and declined for several years. The decline rate for the years 2005-2010 is calculated by taking the average decline rate from the peak.

In the case of an indication that a country is going to peak or an underlying decline rate, data from various sources is analyzed and a probable decline rate is estimated for a certain part of the countries oil production.

Added to the declining oil production are new oil projects taken from various sources. Mostly from the Energy Information Administration³, The Oil Depletion Analysis Center⁴ and Alexander's gas and oil Connections⁵ but also from various oil company websites and other sources.

The sum of the predicted output from all separate significant producing countries is taken as a basic outlook to predict 2005-2010 production. From those numbers a prediction of future production until 2040 is made.

Oil production and new projects data can be found in Appendix A.

Example: Indonesia

The countries oil production has peaked. From 1998 to 2004 the countries average decline was 4.71% per year. From 2001 to 2004 the countries average decline was 6.19% per year. A decline rate of 6.19% is added over the oil production in 2004.

Indonesia	2003	2004	2005	2006	2007	2008	2009
Total production	1200	1143	1125	1070	1019	971	960
Declining fields	1025	968	910	855	804	756	710
New production			40			35	
Stable production	175	175	175	175	175	175	175

Table 1 – Oil production example

² IEA, *Oil, Gas, Coal and Electricity Quarterly Statistics*, <http://puck.sourceoecd.org/>

³ Energy Intelligence Agency, Country analysis briefs - <http://www.eia.doe.gov/emeu/cabs/contents.html>

⁴ ODAC Megaprojects - <http://www.odac-info.org/bulletin/documents/MegaProjRelease16-11-04.pdf>

⁵ Alexander's gas and oil connections – <http://www.gasandoil.com>

C) Assumptions

It is assumed that:

There will be no material, pipeline, shipping or manpower restrictions to bring any oil production to the market. There are some doubts as to the amount of drilling rigs which can be obtained by various producer countries of which most noted is Saudi Arabia⁶.

There are no refinery restrictions to bring the new oil supply to the market. It is obvious that there is a refinery shortage at the moment. This is due to the fact that Light Sweet crude oil production has peaked⁷ and medium and heavy crude's are becoming an increasing part of the market. Unfortunately there is not enough data at the moment to determine the probable effect of this shortage and its duration. Further study is needed.

There are no political, economical or natural events that take oil production offline. This happens quite regularly, some examples are:

- The Venezuelan oil strike from end 2002 until the beginning of 2003 resulting in a loss in production of an average 2 million barrels per day for 3 months.
- A delay until 2006 in the startup of Thunderhorse due to Hurricane Dennis. Thunderhorse is BP's newest oil rig with a production of 250.000 barrels per day
- The destruction of a drilling platform due to a fire in the Bombay High field, taking 70% of 110.000 barrels per day off the market for a few weeks. And 30% of 110.000 for a longer period of time.
- The destruction of a drilling platform in the UK part of the North Sea due to the Piper Alpha fire in 1988

D) Comments

The increases in the year 2009 and 2010 are probably too low. This is mainly due to a probable increase from new projects which are currently in the bidding stage. It is quite likely that production in those years is a little bit higher than in this outlook. There is also the possibility that several declining regions have not been figured in which means that oil production will be slightly lower.

⁶ The Oil Drum - <http://theoil Drum.blogspot.com/2005/08/more-on-saudi-fields-and-rigs.html>

⁷ OPEC Monthly Oil Market - <http://www.opec.org/home/Monthly%20Oil%20Market%20Reports/2005/MR082005.htm>

OPEC

Total gross OPEC liquids production is expected to increase by 7.0 mb/d per day. Big gross production increases are coming from Iran (990.000 b/d), Nigeria (1.320.000 b/d), Saudi Arabia (1.510.000 b/d) and the United Arabic Emirates (1.040.000 b/d). Due to declining oil fields in Iran, Libya, Saudi Arabia, Dubai, Venezuela and Indonesia total net OPEC liquids production is expected to increase with 4.27 mb/d between 2005 and 2010.

An often heard comment is that if Saudi Arabia peaks the world will peak in world oil production. Given the amount of projects still coming on stream, this scenario is impossible given observed gross decline rates of between 5 and 12%.

Production in thousand barrels per day	2004	1 st qtr 2005	End 2005	End 2006	End 2007	End 2008	End 2009	End 2010
OPEC								
Algeria	1930	2067	2080	2160	2260	2370	2500	2580
Indonesia	1143	1132	1125	1070	1019	971	960	983
Iran	4149	4161	4336	4399	4434	4555	4492	4471
Kuwait	2469	2563	2469	2563	2663	2619	2663	2863
Libya	1614	1693	1791	1829	1823	1803	1773	1744
Nigeria	2513	2551	2643	2913	3158	3373	3733	3752
Qatar	1020	1027	1050	1050	1050	1050	1090	1190
Saudi Arabia	10135	10358	10579	10593	11037	11037	10954	10785
United Arabic Emirates	2561	2593	2655	2970	2980	3190	3351	3543
Venezuela	3523	3837	3556	3478	3469	3424	3382	3345
Iraq	2010	1812	1889	1927	1966	2005	2045	2086
Neutral Zone	597	597	597	597	597	597	597	597
Total OPEC	33664	34391	34770	35550	36455	36994	37542	37938

Table 2 – OPEC production from 2004 to 2010

A) Algeria

In 2004 oil production was 1.21 mb/d and NGL production was 723.000 b/d. Giving a total liquids production of 1.93 mb/d in 2004. It is assumed that the 2004 liquids production stays stable. Above this a total of 5 new projects are coming on-stream adding 650.000 b/d in total.

Specific information:

“In coming years, it is likely that Algeria's oil production capacity will rise, as the country plans to increase investments in exploration and development efforts. Algeria's production goal is 1.5 million bbl/d of crude oil by 2005 and 2.0 million bbl/d by 2010, a level it will likely reach at current levels of production growth.”⁸

B) Indonesia

In 2004 oil production was 968.000 b/d and NGL production was 175.000 b/d. Giving a total liquids production of 1.143 mb/d. The countries oil production has peaked. From 1998 to 2004 the countries average decline was 4.71% per year. From 2001 to 2004 the countries average decline was 6.19% per year.

An annual decline rate of 6.19% over 2004 oil production has been added. NGL production is assumed to stay stable. Above this a total of 3 new projects are coming on-stream adding 140.000 b/d in total.

Specific information:

“Four-fifths of Indonesia's oil production is from depleting resources that are decades old, Apco's Vriens said. The oldest producing field, Talang Akar in South Sumatra, was discovered in 1921 and developed by Standard Oil Co. of New Jersey, before being nationalized in 1956 and folded into the state oil company, according to a Pertamina document.”⁹

C) Iran

In 2004 oil production was 3.93 mb/d and NGL production was 219.000 b/d. Giving a total liquids production of 4.149 mb/d. An annual decline rate of 2% over 2004 oil production has been added. NGL production is assumed to stay stable. Above this a total of 11 new projects are coming on-stream adding 990.000 b/d in total.

Specific Information:

“Iran has ambitious plans to increase national oil production - to 4.5 million bbl/d by the end of 2005, more than 5 million bbl/d by 2009, and 7 million bbl/d by 2024. The country is counting on billions of dollars in foreign investment to accomplish this, but this is unlikely to be achieved without a significant change in policy to attract such investment (and possibly a change in relations with the West).”³

“Iran's existing oilfields have a natural decline rate estimated at 8-13 percent per year (300,000-500,000 bbl/d) and are in need of upgrading, modernization, and enhanced oil recovery efforts (i.e., gas reinjection).”¹⁰

⁸ Energy Intelligence Agency, Country analysis briefs - <http://www.eia.doe.gov/emeu/cabs/contents.html>

⁹ Bloomberg - <http://www.gasandoil.com/goc/company/cns51906.htm>

¹⁰ Energy Intelligence Agency, Country analysis briefs - <http://www.eia.doe.gov/emeu/cabs/contents.html>

D) Iraq

In 2004 oil production was 1.99 mb/d and NGL production was 18.000 b/d. Giving a total liquids production of 2.01 mb/d in 2004. Because of the highly uncertain nature of Iraq's oil production a slight annual increase of 2% starting in 2006 has been added. 2005 production is set at 1.89 mb/d.

E) Kuwait

In 2004 oil production was 2.34 mb/d and NGL production was 125.000 b/d. Giving a total liquids production of 2.47 mb/d. It is assumed that the 2004 liquids production stays stable. Above this a total of 2 new projects are coming on-stream adding 600.000 b/d in total.

Specific information:

“Project Kuwait aims at increasing daily output in the four fields bordering Iraq from the current 530,000 bpd to 900,000 bpd. But the targeted output will only be sustained for six years during the proposed 20-year period, setting average daily production at 680,000 bpd, or just 150,000 bpd above the current level.

Kuwait, which sits atop around 10 % of global reserves, has already prequalified some 25 operator and non-operator foreign companies for Project Kuwait, including Shell, ExxonMobil, BP Amoco, ENI, Total and Chevron.”¹¹

F) Libya

In 2004 oil production was 1.55 mb/d and NGL production was 68.000 b/d. Giving a total liquids production of 1.61 mb/d. An annual decline rate of 2% over 2004 oil production has been added. NGL production is assumed to stay stable. Above this a total of 5 new projects are coming on-stream adding 314.000 b/d in total. Because of the high probability of additional oil finds and projects in Libya the coming years a total of 200.000 b/d for yet to find has been added.

Specific information:

“Overall, Libya would like foreign company help to increase the country's oil production capacity from 1.60 million bbl/d at present to 2 million bbl/d by 2008-2010, and to 3 million bbl/d by 2015. In order to achieve this goal, and also to upgrade its oil infrastructure in general, Libya is seeking as much as \$30 billion in foreign investment over that period. Libya is considered a highly attractive oil province due to its low cost of oil recovery (as low as \$1 per barrel at some fields), the high quality of its oil, its proximity to European markets, and its well-developed infrastructure.”¹²

“Production from Libya's traditional areas is on the decline and the country is pushing exploration in the less developed Murzuk Basin, where Spain's Repsol-YPF and four partners appear to have brought in another successful well.”¹³

“With reserve replacement slipping since the 1970s, and with state-operated oil fields undergoing a 7%-8% natural decline rate, Libya's challenge is maintaining production at mature fields (Brega, Sarir, Sirtica, Waha, Zueitina) while finding new oil and developing new discoveries. With production at existing fields expected to

¹¹ Arab Times - <http://www.gasandoil.com/goc/news/ntm52122.htm>

¹² Energy Intelligence Agency, Country analysis briefs - <http://www.eia.doe.gov/emeu/cabs/contents.html>

¹³ Liquid Africa - <http://www.gasandoil.com/goc/company/cna42963.htm>

fall by around 400,000 bbl/d by 2010, NOC hopes that EOR techniques will help add 250,000 bbl/d of overall oil production capacity by 2010.”¹⁴

G) Nigeria

In 2004 oil production was 2.32 mb/d and NGL production was 190.000 b/d. Giving a total liquids production of 2.51 mb/d. An annual decline rate of 2% over 2004 oil production has been added. NGL production is assumed to stay stable. Above this a total of 11 new projects are coming on-stream adding 1.32 mb/d in total.

Specific information:

“07-10-04 Nigeria and Angola must speed up expansion plans if they were to meet targets of doubling oil output and growing Africa's share and influence of the global industry, an ExxonMobil executive said. Kevin Biddle, ExxonMobil's vice-president for Africa, told an oil and gas conference in South Africa that Angola wanted to raise production to 2 mm bpd from just above 1 mm, while Nigeria wanted to double to 4 mm bpd by 2008. "Things will have to be accelerated to meet these targets in just four years," Biddle said. "There are opportunities there, but to meet the desires of the two countries some things will need to be done quickly to spur the process.”¹⁵

“25-01-04 Group Managing Director of the Nigerian National Petroleum Corporation (NNPC) Engr. Funso Kupolokun said that the nation's crude oil production would by the year 2007, go up to 4 bn bpd as against the current production level of 2.2 bn bpd. Moreover, he said the nation would be earning up to \$ 6 bn annually from gas by the year 2010.”¹⁶

“03-03-05 Multinational oil companies operating in Nigeria's deep offshore oil region, have threatened to halt further investment in protest against plans to significantly amend the tax laws governing operations in the area. The threat, if carried out, may affect the \$ 15 bn expected to be invested in exploration and drilling in Nigeria's deep offshore over the next five years.”¹⁷

H) Qatar

In 2004 oil production was 770.000 b/d and NGL production was 250.000 b/d. Giving a total liquids production of 1.02 mb/d. Liquids production is assumed to stay stable. Above this a total of 3 new projects are coming on-stream adding 170.000 b/d in total.

¹⁴ Energy Intelligence Agency, Country analysis briefs - <http://www.eia.doe.gov/emeu/cabs/libyareserves.html>

¹⁵ Business report - <http://www.gasandoil.com/goc/company/cna44320.htm>

¹⁶ Vanguard - <http://www.gasandoil.com/goc/company/cna40629.htm>

¹⁷ This day - <http://www.gasandoil.com/goc/company/cna51206.htm>

I) Saudi-Arabia

In 2004 oil production was 8.75 mb/d, NGL production was 1.31 mb b/d and unconventional oil production was 80.000 b/d. Giving a total liquids production of 10.14 mb/d. An annual decline rate of 8% over 3.2 mb/d (Abqaiq, Berri, Safaniyah and a part of Ghawar) starting in 2006 has been added. Remaining oil, NGL and neutral zone production is assumed to stay stable. Above this a total of 5 new projects are coming on-stream adding 1.51 mb/d.

Special Note: The khurais project as announced by Saudi Aramco has not been added due to the unlikely nature of the project.

Specific information:

“One challenge for the Saudis in achieving this objective is that their existing fields sustain 5 percent-12 percent annual "decline rates," (according to Aramco Senior Vice President Abdullah Saif, as reported in Petroleum Intelligence Weekly and the International Oil Daily) meaning that the country needs around 500,000-1 million bbl/d in new capacity each year just to compensate.”¹⁸

“Saudi Aramco has continued aggressively expanding its crude oil production capacity with multiple mega projects. "These projects are at various stages of planning, design and construction, with a total capacity about 2.2 mm bpd," said Jum'ah. "These projects will lift Saudi Aramco's maximum production capacity to close to 12 mm bpd, thereby consolidating the company's leading role in the oil industry.”¹⁹

“It is puzzling to consider that Saudi Aramco would entertain spending \$3 to \$4 billion on Khurais, thinking that the field could produce as much as 800,000 barrels of oil a day. The odds of reaching that production goal must be relatively long. The fact that Aramco announced that this project was almost ready to proceed, only to quickly reverse itself and question whether a major expansion would actually go ahead, seems to signal the serious nature of the difficulties and challenges the Khurais expansion faces.”²⁰

J) United Arabic Emirates

In 2004 oil production was 2.35 mb/d and NGL production was 208.000 b/d Giving a total liquids production of 2.56 mb/d. Current liquids production is assumed to stay stable. Above this a total of 5 new projects are coming on-stream adding 1.04 mb/d.

Specific information:

“He added UAE's crude oil output currently stands at 2.5 mm bpd. However, this will rise to 3 mm bpd according to ADNOC's plans. The production capacity of ADNOC for onshore oil operations will increase from the current ceiling of 1.2 mm bpd to 1.4 mm bpd while offshore oil output capacity will also be increased from the current 47,000 bpd to 600,000 bpd.”²¹

¹⁸ Energy Intelligence Agency, Country analysis briefs - <http://www.eia.doe.gov/emeu/cabs/contents.html>

¹⁹ Opec Bulletin, May 2005 - <http://www.opec.org/library/OPEC%20Bulletin/2005/pdf/OB052005.pdf>

²⁰ Twilight in the Desert: The coming Saudi Oil Shock and the world Economy, *Matthew R. Simmons*, July 2005

²¹ Xinhua - <http://www.gasandoil.com/goc/company/cnm44508.htm>

K) Venezuela

In 2004 oil production was 2.58 mb/d, NGL production was 395.000 b/d and unconventional oil production was 548.000 b/d. Giving a total liquids production of 3.52 mb/d. An annual decline rate of 4% over 2004 oil production has been added. NGL and unconventional oil production is assumed to stay stable. Above this a total of 3 new projects are coming on-stream adding 298.000 mb/d.

Specific information:

“On the other hand, the loss of 18,000 employees who were fired for joining the anti-government strike could make it difficult for the company to counter normal oil production capacity depletion rates for Venezuela of an estimated 25% per year.”²²

“After a strike that resulted in a near complete shutdown of PdVSA's operations in late 2002 and the early months of 2003 and in a loss of nearly half its employees, current oil production levels in Venezuela are a bit uncertain. While PdVSA insists that oil production has recovered to pre-strike levels, outside observers, as well as former PdVSA employees, claim that production remains considerably lower.”²²

²² Energy Intelligence Agency, Country analysis briefs - <http://www.eia.doe.gov/emeu/cabs/contents.html>

Non OPEC

Total gross Non- OPEC liquids production is expected to increase by 12.91 mb/d per day. Big gross liquids production increases are coming from Azerbaijan (1.200.000 b/d), Kazakhstan (1.423.000 b/d), Russia (650.000 b/d) Canada (1.567.000 b/d), Brazil, (1.495.000 b/d) and Mexico (1.150.000 b/d). Due to declining oil fields in the North Sea, USA, Canada, Mexico, Oman, Syria, Yemen, Egypt, Australia, China, Malaysia and various other countries non-OPEC liquids production is expected to see a net increase of 5.21 mb/d between 2005 and 2010.

Countries which are probably near their peak are China (2006), Malaysia (2006), India (2008), Denmark (2005), Brunei (2nd peak in 2007), Peru (2nd peak in 2008)

Production in thousand barrels per day	2004	1 st qtr 2005	End 2005	End 2006	End 2007	End 2008	End 2009	End 2010
Former Soviet Union								
Azerbaijan	309	345	459	659	1009	1109	1309	1509
Kazakhstan	1209	1275	1362	1662	1842	1997	2177	2632
Russia	9227	9343	9287	9417	9667	9727	9877	9877
Uzbekistan	82	71	80	79	77	76	74	73
Other FSU	390	375	390	390	390	390	390	390
FSU Total	11217	11409	11578	12207	12985	13299	13827	14481

Table 3 – FSU production from 2004 to 2010

Production in thousand barrels per day	2004	1 st qtr 2005	End 2005	End 2006	End 2007	End 2008	End 2009	End 2010
Non OPEC Non FSU								
USA	7668	7714	7645	7849	7815	7613	7393	7184
Canada	3089	2944	3210	3325	3389	3662	3909	4180
Mexico	3825	3746	3881	3826	3814	3832	3666	3632
Argentina	780	755	758	737	717	697	678	659
Brazil	1796	1849	2054	2293	2410	2812	3017	3045
Columbia	528	522	505	483	461	441	422	403
Ecuador	526	530	526	530	540	526	530	540
Peru	84	79	105	125	122	118	114	111
Trin & Tobago	123	168	173	223	223	223	223	223
Other S & Central America	236	258	236	258	470	236	258	470
Denmark	389	393	381	341	315	296	271	249
United Kingdom	2054	2005	1922	1811	1734	1756	1646	1545
Norway	3188	3075	3141	3241	3176	3111	3100	3088
Italy	110	120	114	134	169	166	163	160
Romania	114	109	111	108	105	102	99	96
Other Europe	370	360	370	370	370	370	370	370
Oman	758	736	723	691	684	680	659	621

Syria	450	433	434	425	411	403	386	369
Yemen	402	378	415	404	403	389	374	361
Other middle east	277	278	277	277	277	277	277	277
Angola	988	1123	1248	1538	2103	2303	2303	2303
Cameroon	67	66	63	58	54	51	47	44
Congo Brazzaville	230	225	295	286	315	306	298	290
Egypt	708	702	702	698	681	658	637	616
Gabon	235	230	220	205	192	180	168	157
Tunisia	80	80	80	80	80	80	80	80
Other Africa	1361	1412	1461	1681	1701	1721	1721	1721
Australia	538	512	538	646	608	574	569	552
Brunei	216	210	188	242	240	239	237	235
China	3485	3629	3572	3548	3437	3316	3199	3092
India	799	803	790	792	834	856	848	841
Malaysia	857	841	844	849	821	794	768	743
Papua New Guinea	45	31	42	39	36	33	31	29
Vietnam	405	357	357	357	357	357	357	357
Other Asia-Pacific	410	420	410	420	423	410	420	423
Non OPEC Non FSU Total	37191	37093	37790	38964	39562	39660	39312	39141

Table 4 – Non OPEC Non FSU production from 2004 to 2010

1) USA

In 2004 oil production was 5.43 mb/d, NGL production was 1.81 mb/d and unconventional oil production was 425.000 b/d. Giving a total liquids production of 7.67 mb/d. The countries oil production has peaked. From 1998 to 2004 the countries oil production showed an average decline rate of 2.3%.

An annual decline rate of 5% over 2004 oil production has been added. NGL and unconventional oil production is assumed to stay stable. Above this a total of 10 new projects are coming on-stream adding 947.000 b/d in total.

2) Canada

In 2004 oil production was 1.79 mb/d, NGL production was 691.000 b/d and unconventional oil production was 605.000 b/d. Giving a total liquids production of 3.09 mb/d. An annual decline rate of 5% over 2004 oil production has been added. NGL and unconventional oil production is assumed to stay stable. Above this a total of 17 new projects are coming on-stream adding 1.57 mb/d in total.

Specific information:

Decline rate: "By 2015, conventional production is projected to drop more than 40 per cent, to 600,000 barrels a day."²³

3) Mexico

In 2004 oil production was 3.38 mb/d and NGL production was 442.000 b/d. Giving a total liquids production of 3.83 mb/d. An annual decline rate of 10% over 388.000 b/d of 2004 oil production has been added. An annual decline rate of 12% over 2.14 mb/d of 2004 oil production (Cantarell) has been added. An annual decline rate of 3% over 548.000 b/d of 2004 oil production has been added. NGL production is assumed to stay stable. Above this a total of 3 new projects are coming on-stream adding 1.15 mb/d in total.

Specific information:

"According to then Exploration and Production Director Ramírez Corzo, Cantarell's production should remain stable until 2006, but would decline by 14% per year after that. However, Ramírez Corzo recently stated on November 2, 2004 that "Our best estimate is that Cantarell will start to decline toward the middle of next year [2005]," raising the possibility that Cantarell's decline could come sooner than originally had been thought."²⁴

4) Argentina

In 2004 oil production was 698.000 b/d and NGL production was 82.000 b/d. Giving a total liquids production of 780.000 b/d. The countries oil production has peaked. From 1998 to 2004 the countries oil production showed an average decline rate of 3.1%. An annual decline rate of 3.1% over 2004 oil production has been added. NGL production is assumed to stay stable.

Specific information:

"10-08-04 ChevronTexaco's country manager in Argentina warned that the South American country could be a net oil importer within three years if government policies continue driving away investment. Noting that

²³ Toronto Star - <http://www.energybulletin.net/1191.html>

²⁴ Energy Intelligence Agency, Country analysis briefs - <http://www.eia.doe.gov/emeu/cabs/contents.html>

Argentine oil production has declined in recent years, Richard Cohagan told a Council of the Americas-sponsored conference that "at this pace, Argentina could need to import oil by 2007."²⁵

5) Brazil

In 2004 oil production was 1.48 mb/d, NGL production was 61.000 b/d and unconventional oil production was 258.000 b/d. Giving a total liquids production of 1.80 mb/d. An annual decline rate of 4% over 140.000 b/d of 2004 oil production has been added. An annual decline rate of 10% over 460.000 b/d of 2004 oil production has been added. Remaining oil, NGL and unconventional oil production is assumed to stay stable. Above this a total of 12 new projects are coming on-stream adding 1.51 mb/d in total.

Specific information:

Decline rate: "Albacora is in the north part Campos basin It had an estimated 400 million barrels of oil equivalent recoverable. It was discovered in 1984 and began producing in 1996. The production has already peaked in 1998 at 174,000 barrels of oil equivalent per day (boe/d). Thus this field produced 139,860 barrels of oil per day in 2003. It is a declining field."²¹

"Marlin was discovered in January 1985. It has 1.7 billion barrels of oil reserves. It will peaked production in 2002 at 586,000 boe/d. It is a declining field. In 2003 it produced 532, 000 boe/d. This illustrates how rapidly a field can decline."²⁶

6) Colombia

In 2004 oil production was 528.000 b/d. Giving a total liquids production of 528.000 b/d. The countries oil production has peaked. From 2001 to 2004 the countries oil production showed an average decline rate of 4.4%. An annual decline rate of 4.4% over 2004 oil production has been added.

Specific information:

"In total, the government hopes companies will drill 40 oil wells this year, up from 21 wells drilled last year. According to a study in January by the finance ministry, oil production will fall to 510,000 bpd in 2005 from 528,830 bpd last year and well below an all-time high of 830,000 bpd in 1999."²⁷

7) Ecuador

In 2004 oil production was 526.000 b/d. Giving a total liquids production of 526.000 b/d. Current production has been kept stable.

8) Peru

In 2004 oil production was 84.000 b/d. Giving a total liquids production of 84.000 b/d. The countries oil production has peaked. From 1998 to 2004 the countries oil production showed an average decline rate of 5.4%. An annual decline rate of 5.4% over 2004 oil production has been added. Above this a total of 1 new project is coming on-stream adding 50.000 b/d in total.

²⁵ Dow Jones Newswires - <http://www.gasandoil.com/goc/company/cnl43583.htm>

²⁶ DMD Publishing - <http://home.entouch.net/dmd/brazil.htm>

²⁷ Dow Jones Newswires - <http://www.gasandoil.com/goc/company/cnl52140.htm>

Specific information:

“2005 - Output in February reached an average 114,571 barrels of oil and other hydrocarbon liquids per day, up 35.4 % compared to the same month a year earlier, mainly due to hydrocarbon liquids from Camisea.

New Projects: none”²⁸

9) Trinidad & Tobago

In 2004 oil production was 123.000 b/d. Giving a total liquids production of 123.000 b/d. Current liquids production is assumed to stay stable. Above this a total of 1 new project is coming on-stream adding 100.000 b/d in total.

10) Denmark

In 2004 oil production was 389.000 b/d. Giving a total liquids production of 389.000 b/d. According to the Danish Energy Authority production will peak in 2005.²⁹ Liquids production added as taken from the report: *Oil and Gas Production in Denmark 2004* published by the Danish Energy Authority.²⁴

11) United Kingdom

In 2004 oil production was 1.85 mb/d and NGL production was 209.000 b/d. Giving a total liquids production of 2.05 mb/d. The countries oil production has peaked. From 1999 to 2004 the countries oil production showed an average decline rate of 7.2%. From 2002 to 2004 NGL production showed an average decline rate of 7%. An annual decline rate of 7.2% over 2004 oil production has been added. An annual decline rate of 7% over 2004 NGL production has been added. Above this a total of 4 new projects are coming on-stream adding 231.000 b/d in total.

12) Norway

In 2004 oil production was 2.80 mb/d and NGL production was 391.000 b/d. Giving a total liquids production of 3.19 mb/d. The countries oil production has peaked. From 2000 to 2004 the countries oil production showed an average decline rate of 3.3%. An annual decline rate of 4.3% over 2004 oil production has been added. NGL production is assumed to stay stable. Above this a total of 6 new projects are coming on-stream adding 541.000 b/d in total.

13) Italy

In 2004 oil production was 102.000 b/d and unconventional oil production was 8.000 b/d. Giving a total liquids production of 110.000 b/d. From 1998 to 2001 the countries oil production showed an average decline rate of 15.2%. Assuming that this decline rate has continued a base of 40.000 b/d is still declining in 2004. An annual decline rate of 15.2% over 40.000 b/d of 2004 oil production has been added. Above this a total of 2 new projects are coming on-stream adding 75.000 b/d in total.

²⁸ Dow Jones Newswires - <http://www.gasandoil.com/goc/company/cnl51459.htm>

²⁹ Danish Energy Authority -

http://www.ens.dk/graphics/Publikationer/Olie_Gas_UK/Oil_gas_Production_GB_2004/html/chapter08.htm

14) Romania

In 2004 oil production was 114.000 b/d. Giving a total liquids production of 114.000 b/d. The countries oil production has peaked. From 2000 to 2004 the countries oil production showed an average decline rate of 2.8%. An annual decline rate of 2.8% over 2004 oil production has been added

15) Oman

In 2004 oil production was 758.000 b/d. Giving a total liquids production of 758.000 b/d. The countries oil production has peaked. From 2001 to 2004 the countries oil production showed an average decline rate of 7.3%. An annual decline rate of 7.3% over 2004 oil production has been added. Above this a total of 1 new project is coming on-stream adding 140.000 b/d in total.

16) Syria

In 2004 oil production was 450.000 b/d. Giving a total liquids production of 450.000 b/d. The countries oil production has peaked. From 1998 to 2004 the countries oil production showed an average decline rate of 4.6%. The decline has increased, since 2001 the country has shown annual oil production decline rates of 7.3%. An annual decline rate of 4.6% over 2004 oil production has been added. Above this a total of 1 new project is coming on-stream adding 30.000 b/d in total.

17) Yemen

In 2004 oil production was 402.000 b/d. Giving a total liquids production of 402.000 b/d. The countries oil production has peaked. From 2000 to 2004 the countries oil production showed an average decline rate of 4.2%. An annual decline rate of 4.2% over 2004 oil production has been added. Above this a total of 2 new projects are coming on-stream adding 50.000 b/d in total.

18) Angola

In 2004 oil production was 988.000 b/d. Giving a total liquids production of 988.000 b/d. Current liquids production is assumed to stay stable. Above this a total of 7 new projects are coming on-stream adding 1.32 mb/d in total.

19) Cameroon

In 2004 oil production was 67.000 b/d. Giving a total liquids production of 67.000 b/d. The countries oil production has peaked. From 1998 to 2004 the countries oil production showed an average decline rate of 6.7%. An annual decline rate of 6.7% over 2004 oil production has been added.

20) Congo Brazzaville

In 2004 oil production was 230.000 b/d. Giving a total liquids production of 230.000 b/d. The countries oil production has peaked. The countries oil production has peaked. From 2001 to 2004 the countries oil production showed an average decline rate of 4.3%. An annual decline rate of 4.3% over 2004 oil production has been added. Above this a total of 2 new projects are coming on-stream adding 113.000 b/d in total.

21) Egypt

In 2004 oil production was 594.000 b/d and NGL production was 114.000 b/d. Giving a total liquids production of 708.000 b/d. The countries oil production has peaked. From 2000 to 2004 the countries oil production showed an average decline rate of 4.3%. An annual decline rate of 4.3% over 2004 oil production has been added. NGL production is assumed to stay stable. Above this a total of 2 new projects are coming on-stream adding 46.000 b/d in total.

22) Gabon

In 2004 oil production was 235.000 b/d. Giving a total liquids production of 235.000 b/d. The countries oil production has peaked. From 1998 to 2004 the countries oil production showed an average decline rate of 6.5% An annual decline rate of 6.5% over 2004 oil production has been added.

23) Tunisia

In 2004 oil production was 80.000 b/d. Giving a total liquids production of 80.000 b/d. Current liquids production is assumed to stay stable.

24) Australia

In 2004 oil production was 449.000 b/d and NGL production was 86.000 b/d. Giving a total liquids production of 538.000 b/d. The countries oil production has peaked. From 2000 to 2004 the countries oil production showed an average decline rate of 10.55%. An annual decline rate of 10.55% over 2004 oil production has been added. NGL production is assumed to stay stable. Above this a total of 2 new projects are coming on-stream adding 235.000 b/d in total.

25) Brunei

In 2004 oil production was 190.000 b/d and NGL production was 26.000 b/d. Giving a total liquids production of 216.000 b/d. The countries oil production has peaked. An annual decline rate of 1% over 2004 oil production has been added. NGL production is assumed to stay stable. Above this a total of 1 new project is coming on-stream adding 30.000 b/d in total.

Specific information:

Decline rate: "Brunei's oil production peaked in 1979 at about 240,000 bbl/d, but was cut back deliberately to extend life of the fields and to improve recovery rates."³⁰

26) China

In 2004 oil production was 3.49 mb/d. Giving a total liquids production of 3.49 mb/d. Continued decline from the Daqing, Liaohe, Huabei and Tuha fields with decline rates and 2004 production numbers as shown in Table 4 is added. Daqing and Liaohe declines are set to increase annually to a level of 8% in 2008 because of the enormous water cuts. Shengli field which produced 580.000 b/d in 2004 is set to start declining again in 2007 to an annual level of 8%. Remaining liquids production of 1.61 mb/d is assumed to stay stable. Above this a total of 2 new project are coming on-stream adding 160.000 b/d in total.

³⁰ Energy Intelligence Agency, Country analysis briefs - <http://www.eia.doe.gov/emeu/cabs/contents.html>

Specific information:

Five fields in China are declining, the Daqing, Liaohe, Huabei, Tuha and Shengli field³¹.

Production in Thousand of barrels per day	2002	2003	2004	Average decline rate
Daqing	1020.5	985.3	942.0	3.92%
Liaohe	259.1	253.6	245.4	2.7%
Huabei	89	88.4	87.6	.8%
Tuha	54.1	50.7	48.4	5.41%

Table 5 – Oil production in from 2002 to 2004 in four Chinese oil fields

“The crude oil in the Daqing region had an average water cut of 89.1% increased from the water cut of 88.4% in 2003.”³¹

“In 2004 the oil we produced in the Liaohe region had an ... average water cut of 72.5%”³¹

27) India

In 2004 oil production was 683.000 b/d and NGL production was 116.000 b/d. Giving a total liquids production of 799.000 b/d. From 1989 to 2005 the Bombay field showed an average decline rate of 3.37%, from 400.000 to 260.000 b/d. An annual decline rate of 3.37% over Bombay’s 2004 oil production has been added. NGL production is assumed to stay stable. Above this a total of 2 new projects are coming on-stream adding 90.000 b/d in total.

28) Malaysia

In 2004 oil production was 762.000 b/d, NGL production was 80.000 b/d and unconventional oil production was 15.000 b/d. Giving a total liquids production of 857.000 b/d. An annual decline rate of 4% over 2004 oil production has been added. NGL production is assumed to stay stable. Above this a total of 1 new project is coming on-stream adding 17.000 b/d in total.

Specific information:

“Malaysia is an oil exporter, but if we do not find new oil reserves, then by 2009, we will become a net importer,” said Deputy Prime Minister Najib Razak. “This means we cannot continue to lean on the oil sector.”³²

Annual average consumption increase has been 4.1% since 2001. Assuming that this trend will continue consumption will increase to 616.000 barrels per day in 2009.

To become a net importer an annual decline of 4% is necessary starting in 2004.

Thousand barrels per day	Years	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Consumption		448	489	480	504	525	546	569	592	616	641
Production		666	698	738	762	732	702	674	647	621	570

Table 6 – Malaysian oil consumption and production from 2001 tot 2010

³¹ SEC – FORM 20F Petrochina <http://www.sec.gov/Archives/edgar/data/1108329/000114554905001175/u99842e20vf.htm>

³² Associated Press, July 23rd 2005, <http://www.forbes.com/work/feeds/ap/2005/07/23/ap2153640.html>

29) Vietnam

In 2004 oil production was 405.000 b/d and NGL production was 405.000 b/d. Giving a total liquids production of 405.000 b/d. A stable production of 352.000 barrels per day is assumed.

Specific information:

“In January 2005, however, the Vietnamese government announced that its 2004 record oil production of 401,548 bbl/d may fall to 352,000 bbl/d in 2005 due to decreases in output at Bach Ho and Su Tu Den to prolong the life of the fields.”³³

30) Azerbaijan

In 2004 oil production was 309.000 b/d. Giving a total liquids production of 309.000 b/d. Current production is assumed to stay stable. Above this a total of 3 new projects are coming on-stream adding 1.2 mb/d in total.

31) Kazakhstan

In 2004 oil production was 1.01 mb/d and NGL production was 198.000 b/d. Giving a total liquids production of 1.21 mb b/d. Current production is assumed to stay stable. Above this a total of 4 new projects are coming on-stream adding 1.42 mb/d in total.

32) Russia

In 2004 oil production was 8.95 mb/d and NGL production was 278.000 b/d. Giving a total liquids production of 9.23 mb/d. Current production is assumed to stay stable. Above this a total of 4 new projects are coming on-stream adding 650.000 b/d in total.

Specific information:

“Russian production growth [in 2006] is estimated at just 80.000 – 100.000 b/d, compared to 730,000 b/d in 2004 and 170,000 b/d in 2005. Ongoing field ramp ups, brownfield developments, and new field start-ups offshore Sakhalin are expected to offset Russia’s estimated decline of 150.000 b/d per year and further production losses at Yukos and other producers.”³⁴

"In a recent interview, Vagit Alekperov, president of No. 1 Russian producer OAO Lukoil, said he expects industry production to stabilize between 9.2 million and 9.4 million barrels a day over the next several years after ["slight growth"] this year. Rising domestic demand is likely to leave less crude for export, he said. Government forecasts also see production stagnating through at least 2008, after rising 9% or more annually in recent years."³⁵

³³ Energy Intelligence Agency, Country analysis briefs - <http://www.eia.doe.gov/emeu/cabs/contents.html>

³⁴ Oil Magazine, A quarterly magazine published by the ministry of oil, Kuwait - <http://www.moo.gov.kw/magazine/>

³⁵ Rigzone, June 3rd 2005, http://www.rigzone.com/news/article.asp?a_id=22927

World Production Outlook 2005-2010

Capacity added – A total gross capacity of 19.94 million barrels per day is expected to be added to the world production stream between 2005 and 2010. Due to declining oil production a net capacity of 9.5 million barrels per day is expected to be added to the world production stream between 2005 and 2010

Supply and demand balance – maximum possible demand growth in the period 2005-2010 lies around 2%. Liquids production will grow much slower than in 2003 (3.51%) and in 2004 (4.16%). Previous growth levels will not be able to continue. Demand will exceed supply until prices rise high enough for demand destruction to occur and low demand rates are maintained.

Sharp Prices increases – Due to little spare capacity on the market, which is bound to get worse, any oil disruption due to political, economical or natural events will have a profound effect on oil prices. Economic disruption to an oil shock is likely.

Refinery and Production Problems – Please keep in mind that refinery, material, manpower and shipping restraints are not figures into this outlook.

Conclusion:

It is very unlikely that a peak of world oil production occurs before 2010.

Production Thousand bbl/day	Years	2004	End 2005	End 2006	End 2007	End 2008	End 2009	End 2010
Region								
OPEC		33664	34732	35479	36357	36873	37403	37785
Non OPEC		48048	49368	51171	52547	52959	53139	53622
Processing Gains		1834	1865	1897	1929	1962	1995	2029
World Total		83906	86004	88618	90931	91915	92776	93789
1% Growth		83906	84745	85593	86448	87313	88186	89068
2% Growth		83906	85584	87296	89042	90823	92639	94492

Table 7 – World oil production from 2004 to 2010

World liquids production outlook 2005-2010

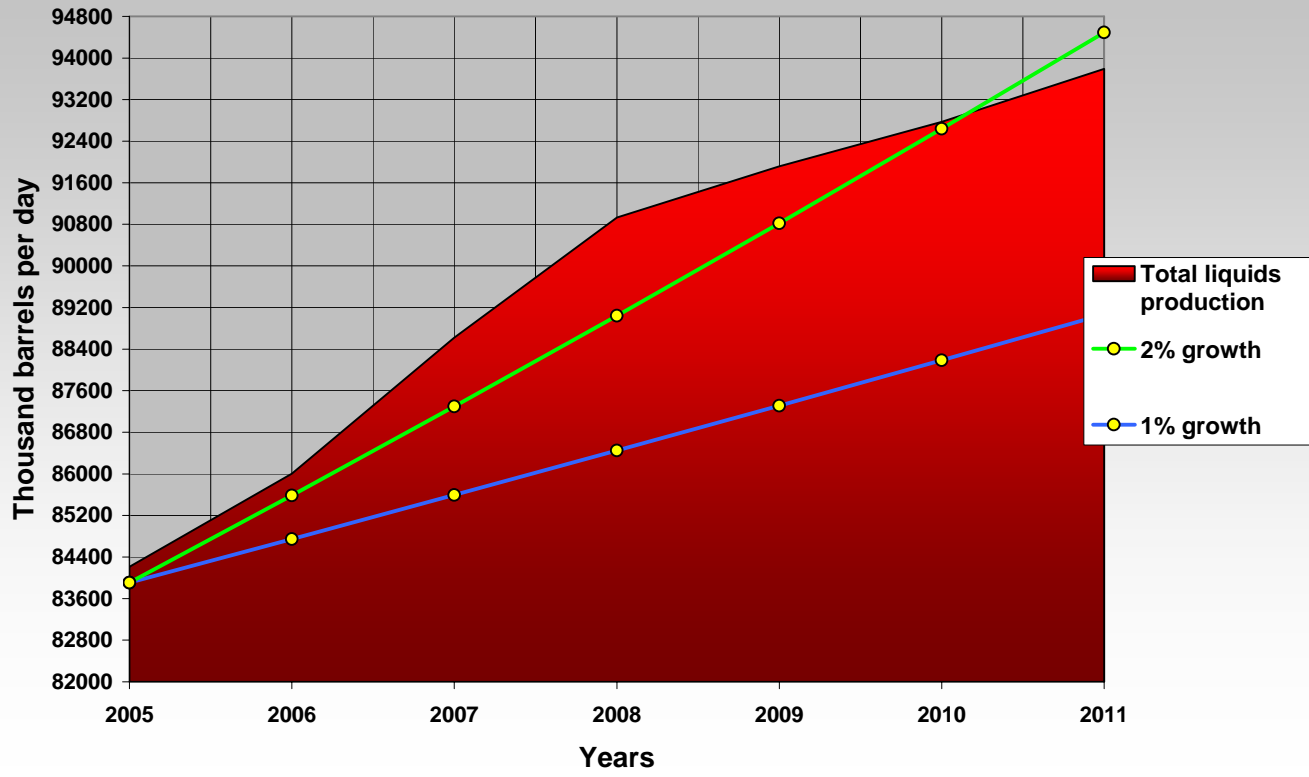


Figure 2 – World liquids production outlook 2005-2010

Where did the increase during 2005-2010 come from?

For 86 projects coming on-stream between 2005-2010 the type and discovery date was determined. Of these 86 projects 17.09% of production is coming on-stream from enhanced oil recovery projects. 82.91% of new production is coming from non EOR projects, and the major bulk of this comes from an existing reserve base. Only 21.94% of new production comes from recent discoveries made in the period of 2000-2005

This is in accordance with analysis from IHS energy concluding that:

“New discoveries from 1993 to 2002 added only 137 billion barrels of oil, ... of the liquid reserves added during the past 10 years, 75 percent came from discoveries made prior to 1992, and only 25 percent of reserves added came from new discoveries made since then!”³⁶

It appears that the existing reserve base is rapidly being brought into production.

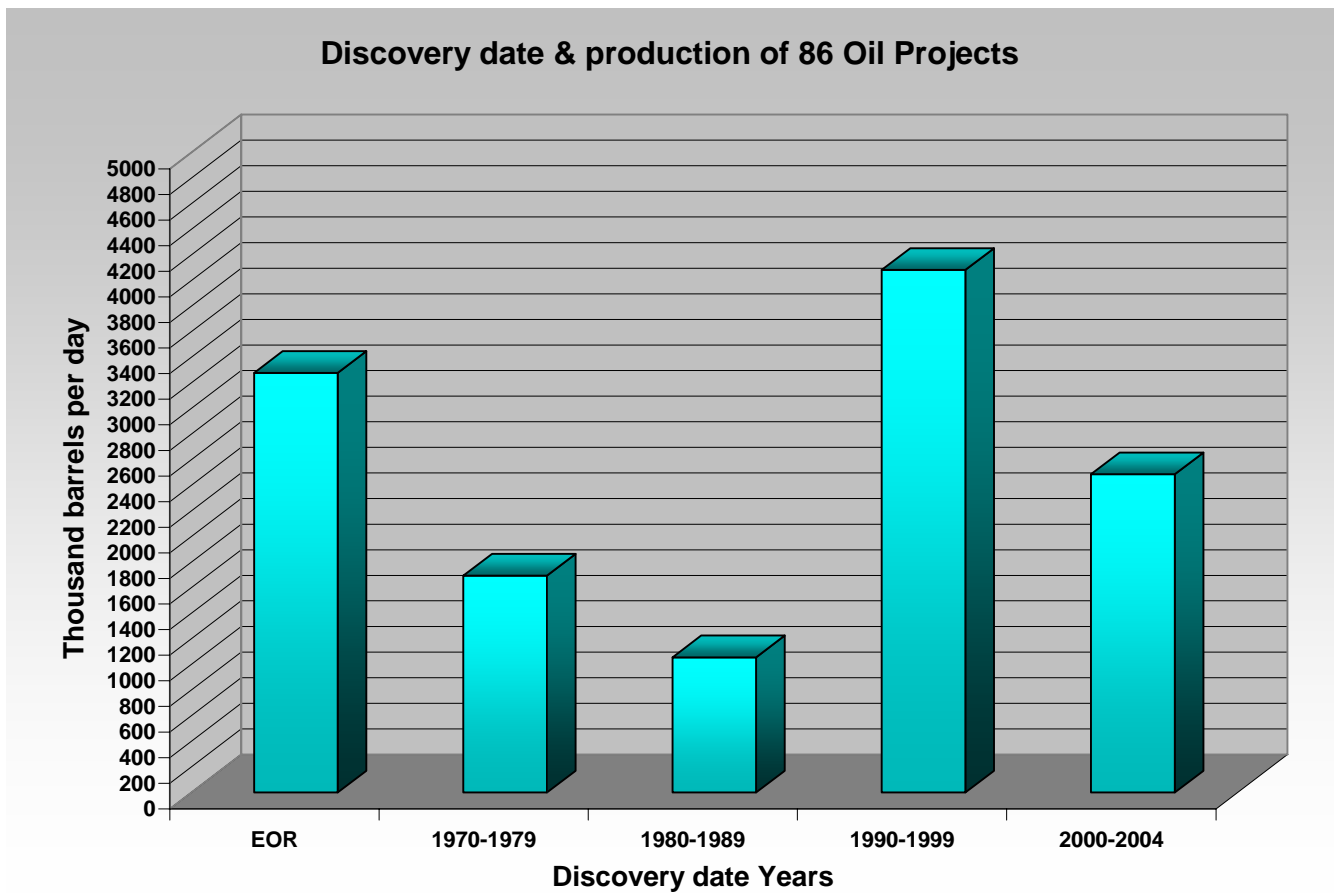


Figure 3 – Discovery dates, production and categories from 86 oil projects added during the period 2005-2010

³⁶ IHS Energy - <http://www.ihsenergy.com/company/pressroom/articles/files/01-04-worldwatch.pdf>

Extrapolating Liquids production, a production outlook until 2040

To make an estimate of when peaking of world oil production will happen we need to estimate a few parameters.

- The decline rate of existing and future production
- The amount of projects from recent discoveries
- The amount of projects from increased recovery due to new technology
- The amount of projects from the existing reserve base

We can define these parameters into four streams:

The decline rate: *An annual decline in world oil production*

Projects from recent discoveries: *projects which increase production from recent discoveries*

Projects from Enhanced oil recovery: *projects which increase or maintain production due to increased recovery from new technology*

Projects from existing reserve base: *projects which increase production from an existing reserve base*

As a base the production figures from the world liquids production outlook 2005-2010 are taken. Although it is noted that the increases in the year 2009 and 2010 are probably too low. By projecting these four streams based on observed trends and then adding them together we can make an estimate of future liquids production.

Decline rates

The International Energy Agency makes an assumption of an average decline ranging from 5 to 11% per year. This is probably based on the average decline per well or field. If the decline would be that steep for the entire world liquids production then the peak in world liquids production would already have occurred.

“Decline rates assumed in our analysis vary over time and range from 5% per year to 11% per year. Rates of decline are generally lowest in regions with the best production prospects and the highest R/P ratios, such as the Middle East, where they range from 4% to 6%. Decline rates are highest in mature OECD producing areas. By 2030, most oil production worldwide will come from capacity that is yet to be built.”³⁷

When we look at gross decline rates in our outlook the average annual decline rate is estimated to be 1.86% of total world liquids production.

Decline in thousand barrels per day	2004/2005	2005/2006	2006/2007	2007/2008	2008/2009	2009/2010
Decline	1720	1828	1740	1642	1533	1433
Decline percentage	2.04	2.13	1.96	1.81	1.67	1.54

Table 8 – Decline rates in the period 2005-2010

Since the absolute decline base decreases, the decline rate when compared to total world production also decreases. According to Shell, BP and the International Energy Agency more regions will start declining in the future so we can assume that the decline as presented here is probably on the low side and will increase in the future.

³⁷ IEA, World Energy Outlook 2004

If we assume that as time progresses more areas will go into decline we can make an estimate of future world decline rates. At some point almost all of the worlds oil production will be in decline. This probably means that at a certain point world production will decline with an average of 7% per year. Figuring in the estimate of IEA stated on page 32.

A depletion starting point of 1.43 mb/d in 2010 is taken. Based on that point a conservative estimate is made, an increase in the depletion base of 3% for the next year is assumed. This brings depletion to 1.48 mb/d in 2011. It is then assumed that this depletion base increases with 1% annually until it reaches an average decline of 7% per year.

The amount of production from future discoveries

In 1964 world oil discoveries peaked, since 1984 more oil is produced/consumed than found³⁸. An alarming trend which appears to be accelerating. In 2004 we produced/consumed 4 times more oil and 2.3 times more liquids than were globally found.

Discoveries from 1900 to 2040	Years	Discoveries in GB
	1900-1910	11
	1910-1919	15
	1920-1929	18
	1930-1939	104
	1940-1949	250
	1950-1959	305
	1960-1969	474
	1970-1979	323
	1980-1989	264
	1990-1999	140
	2000-2009	97
Extrapolation taken from ASPO	2010-2019	64
Extrapolation taken from ASPO	2020-2029	42
Extrapolation taken from ASPO	2030-2039	28

Table9 – Discoveries from 1900 to 2040, data taken from ASPO³⁹.

By assuming that the decrease in world oil production will be smaller due to renewed drilling efforts but still declining, the following extrapolation was made:

Total Discoveries in GB	Years	Oil	Total Liquids
	2000	17.9	42.9
	2001	10.4	20.7
	2002	10.9	15.1
	2003	7.7	19.7
	2004	7.6	13.0
Extrapolation	2005	7.52	12.74
Extrapolation	2006	7.45	12.23
Extrapolation	2007	7.37	11.50
Extrapolation	2008	7.29	10.58
Extrapolation	2009	7.20	9.52
Extrapolation	2010	7.11	8.38
Extrapolation	2011	7.02	8.27

³⁸ HIS Energy - http://www.ihsenergy.com/news/presentations/appex_2005/chew.pdf

³⁹ ASPO - <http://www.peakoil.net/DiscoverGap.html>

Extrapolation	2012	6.93	8.16
Extrapolation	2013	6.83	8.05
Extrapolation	2014	6.74	7.93
Extrapolation	2015	6.63	7.81
Extrapolation	2016	6.54	7.70
Extrapolation	2017	6.43	7.57
Extrapolation	2018	6.33	7.45
Extrapolation	2019	6.22	7.33
Extrapolation	2020	6.11	7.20
Extrapolation	2021	6.00	7.07
Extrapolation	2022	5.90	6.94
Extrapolation	2023	5.78	6.81
Extrapolation	2024	5.67	6.68
Extrapolation	2025	5.56	6.55
Extrapolation	2026	5.45	6.42
Extrapolation	2027	5.34	6.28
Extrapolation	2028	5.22	6.15
Extrapolation	2029	5.11	6.02
Extrapolation	2030	4.99	5.88
Extrapolation	2031	4.87	5.74
Extrapolation	2032	4.75	5.60
Extrapolation	2033	4.64	5.46
Extrapolation	2034	4.52	5.32
Extrapolation	2035	4.40	5.18
Extrapolation	2036	4.29	5.05
Extrapolation	2037	4.17	4.91
Extrapolation	2038	4.06	4.78
Extrapolation	2039	3.95	4.65
Extrapolation	2040	3.83	4.52

Table 10 – Discoveries in the period 2000 and 2040

To extrapolate production from future discoveries each five years are divided into one block. Discoveries made in the period 2000 – 2004 are assumed to come in production in the period 2005-2009. Discoveries made in the period 2005-2009 are assumed to come in production in the period 2010-2014 et cetera.

These five year blocks are defined as: *projects which increase production from recent discoveries.*

By assuming that 21.94% of total additions between 2005-2010 came from the block 2000-2004 and the fact that the decline trend in discoveries is also reflected in production, a decline rate and likely oil production is estimated:

Period	Increase in reserves	Decline Percentage	Oil Production increase (mb/d)
2000-2004	111		4.123
2005-2009	57	0.73	2.101
2010-2014	41	0.90	1.515
2015-2019	38	0.95	1.406
2020-2024	35	0.87	1.289
2025-2029	31	0.94	1.167
2030-2034	28	0.92	1.040
2035-2039	25	0.92	0.913

Table 11 – Assumed declines in liquid discoveries and corresponding Oil production increases from these discoveries

Increased recovery due to new technology

It is estimated that between 2005 and 2010 a total of 3.28 mb/d liquids production comes on-stream from Enhanced Oil Recovery projects. Adding an average of 546.000 b/d annually. It is assumed that this comes mainly from technological progress which increase the overall recovery rate of oil production. By taking guesstimates of the historical recovery rate increase a likely annually increase of .58% from total world oil production is taken. This means that if at the end of 2010 world liquids production is 93.46 mb/d the amount of new production in 2011 due to “*projects which increase or maintain production due to increased recovery from new technology*” is assumed to be:

$$93.460.000 * .00584 = 545.806 \text{ b/d}$$

Production from the existing reserve base

As stated earlier, the possible additions from the existing reserve base are decreasing. IHS energy recently released a study stating that: “90% of all known [liquid] reserves are now in production”⁴⁰

A graphical representation of this statement from a recent presentation⁴¹:

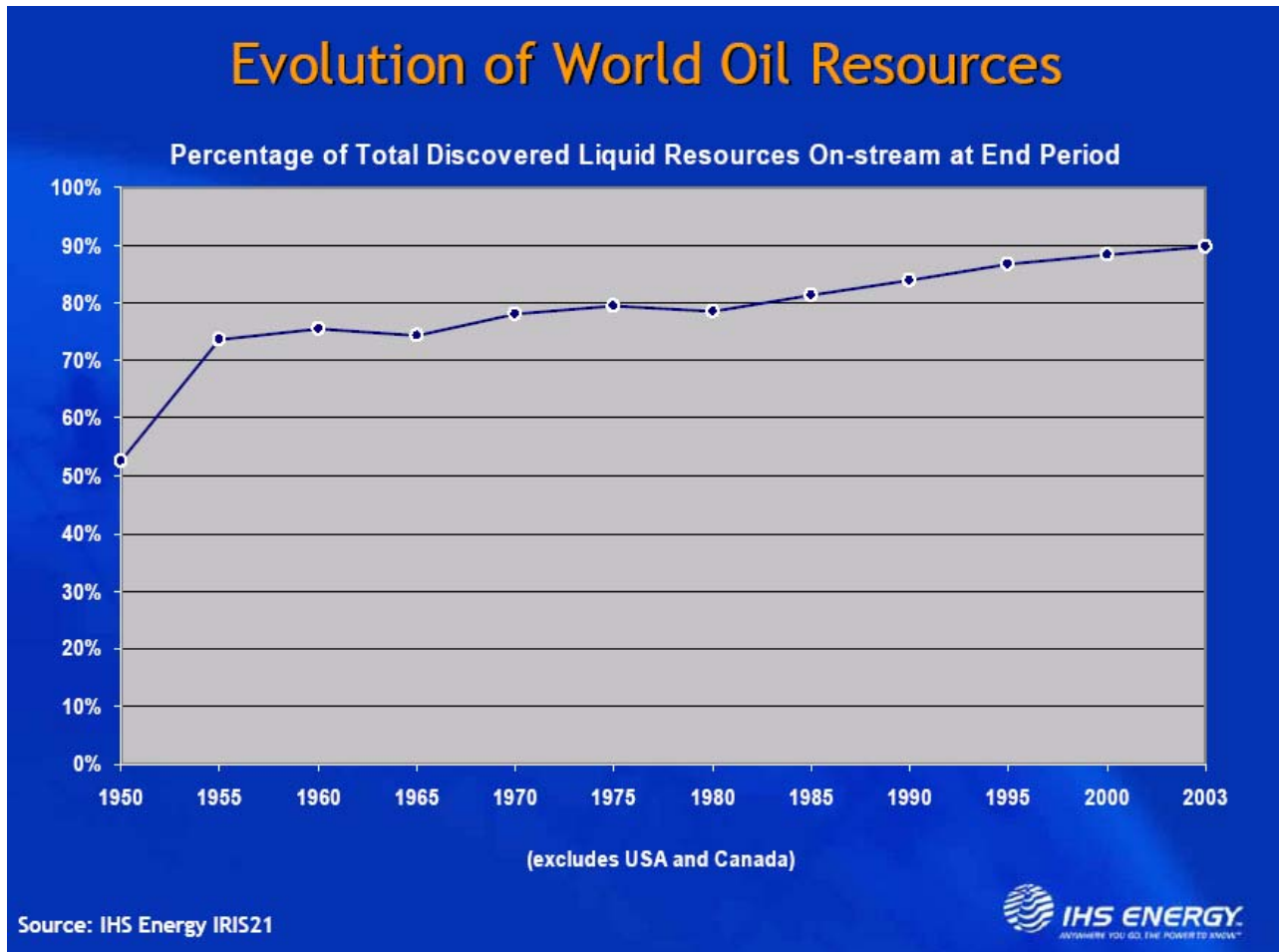


Figure 4 – The amount of total discovered liquids in production from 1950 to 2003.

⁴⁰ The Guardian - <http://www.guardian.co.uk/life/feature/story/0,13026,1464050,00.html>

⁴¹ IHS Energy - http://www.ifp.fr/IFP/en/events/Oapec2005/K_Chew.pdf

We can conclude that the amount of liquids production which can come from “*projects which increase production from an existing reserve base*” is declining. Of the 86 projects, 60.81% are coming from an existing reserve base (discovered between 1970-1999). This means that in the coming years the trend observed by IHS energy will continue.

Between 1983 and 2003 production from the existing reserve base increased from 80% to 90%. An annual increase of .5%. It also appears that this trend is accelerating given the additions coming from the Caspian Sea, Russia, Brazil and other regions. It is estimated that 22% of the production coming on-stream in the period of 2005-2010 comes from projects discovered between 2000 and 2004. Approximately 90-100 billion barrels of reserves are added to on-stream production between 2005 and 2010.

From these observations an increase in on-stream production can be estimated:

Year	Production On-stream (percentage)	Liquids Production increase (mb/d)
2003	90%	?
2004	91%	?
2005	92%	2.301
2006	93%	2.885
2007	94%	2.660
2008	95%	1.412
2009	96%	1.122
2010	96%	1.267
2011	97%	1.014
2012	97%	.811
2013	98%	.649
2014	98%	.519
2015	98%	.415

Table 12 – Production On-stream and increases in production from an existing resource base

A sum of four parts - A likely peak between 2010 and 2015

A likely peak in liquids production between 2010 and 2015 is observed based on four factors:

- A decline in oil discoveries since the 1960's
- Little room for new production from the existing reserve base after 2012
- An average annual recovery factor increase of 0.58%
- An increasing decline rate starting in 2010

Previous assumptions from the 2005-2010 outlook are also taken into account.

A significant break in long time trends is necessary to postpone the peak to a later date than 2015.

World Liquids Production	End 2005	End 2006	End 2007	End 2008	End 2009	End 2010	End 2011	End 2012	End 2013
World Production	86004	88618	90931	91915	92776	93789	94303	94550	94559
Depletion	1720	1828	1740	1642	1533	1433	1476	1535	1612
EOR increase	546	546	546	546	546	546	543	438	540
New discovery increase	800	935	847	661	726	634	428	428	428
Existing base increase	2264	2961	2660	1419	1122	1266	1014	811	649
	End 2014	End 2015	End 2016	End 2017	End 2018	End 2019	End 2020	End 2021	End 2022
World Production	94222	93660	92865	91822	90504	88854	86845	84414	81483
Depletion	1708	1828	1974	2152	2367	2628	2943	3326	3791
EOR increase	540	537	538	534	529	523	515	505	479
New discovery increase	308	308	308	308	308	286	286	286	286
Existing base increase	519	415	332	266	213	170	136	109	87
	End 2023	End 2024	End 2025	End 2026	End 2027	End 2028	End 2029	End 2030	End 2031
World Production	77948	73657	69232	65082	61192	57540	54091	50859	47833
Depletion	4360	5057	5156	4846	4556	4283	4028	3786	3560
EOR increase	461	441	415	390	367	345	325	305	287
New discovery increase	286	262	262	262	262	262	237	237	237
Existing base increase	70	56	45	36	29	17	10	6	4
	End 2032	End 2033	End 2034	End 2035	End 2036	End 2037	End 2038	End 2039	End 2040
World Production	44999	42347	39839	37492	35296	33241	31318	29492	27783
Depletion	3348	3150	2964	2789	2624	2471	2327	2192	2064
EOR increase	270	254	239	225	212	199	188	177	167
New discovery increase	237	237	212	212	212	212	212	186	186
Existing base increase	1	1	0	0	0	0	0	0	0

Table 13 – World Liquids production between 2005 and 2040

World Liquids Production Outlook 2006-2040

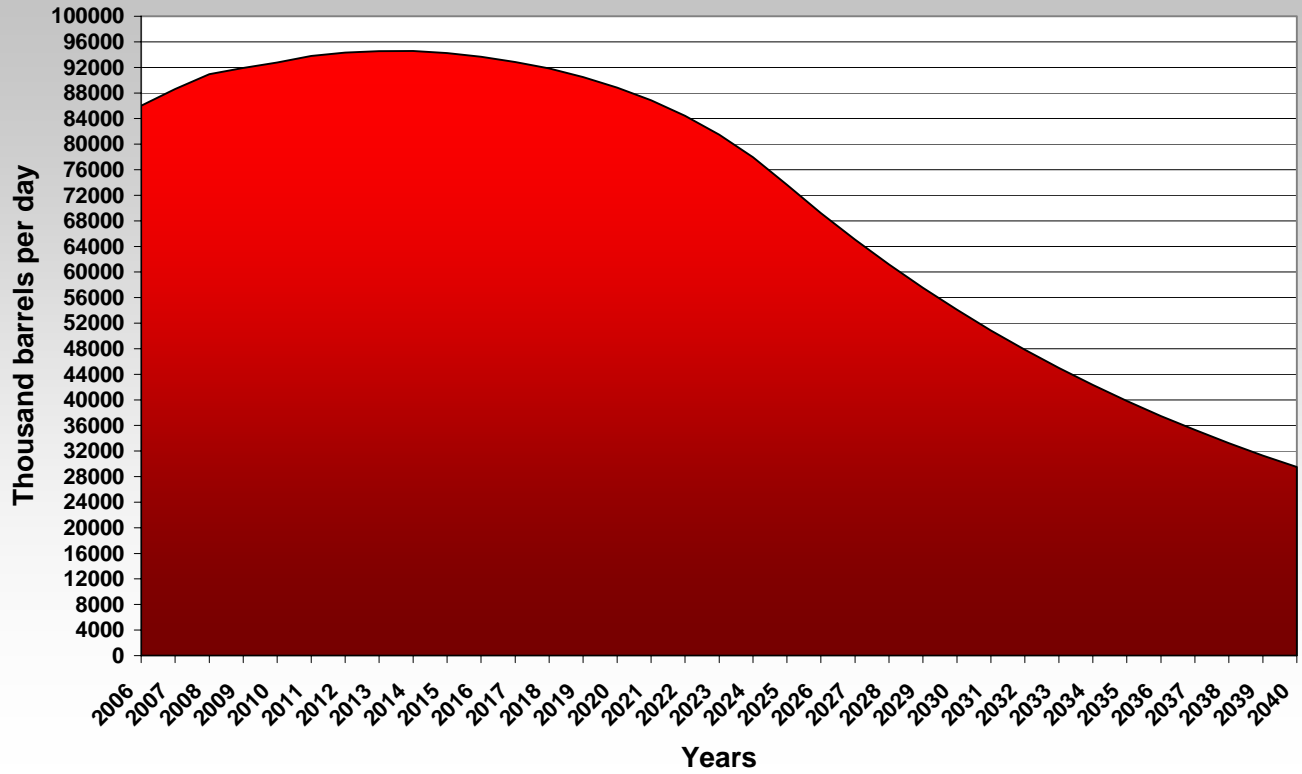


Figure 5 – World liquids production outlook 2006 - 2040

Summary and concluding remarks

Peak – Liquids production is estimated to peak in the period of 2010 and 2015. A production “plateau” of approximately 6 years has been estimated. This estimation is based on the fact that an increasing amount of countries (and thus production) are starting to see declining oil production.

To offset this decline new production has to come on-stream. This can come from an existing reserve base, new oil discoveries and technological improvement. Since 1984 we consume more oil than we produce and this trend has been increasing which leaves little room for production from new discoveries. The existing reserve base where oil production can come from is also starting to get smaller and smaller, after 2012 there is little room for new production from the existing reserve base. Increases from technology are not enough to offset depletion.

Capacity added – A total gross capacity of 19.94 million barrels per day is expected to be added to the world production stream between 2005 and 2010. Due to declining oil production a net capacity of 9.5 million barrels per day is expected to be added to the world production stream between 2005 and 2010

Supply and demand balance – maximum possible demand growth in the period 2005-2010 lies around 2%. Oil production will grow much slower than in 2003 (3.51%) and in 2004 (4.16%). Previous growth levels will not be able to continue. Demand will exceed supply until prices rise high enough for demand destruction to occur and low demand rates are maintained. From 2010 on a permanent gap between supply and demand starts due to the peak plateau after which the gap worsens due to declining world oil production.

OPEC – Total gross OPEC liquids production is expected to increase by 7.0 mb/d per day between 2005 and 2010. Big gross production increases come from Iran (990.000 b/d), Nigeria (1.320.000 b/d), Saudi Arabia (1.510.000 b/d) and the United Arab Emirates (1.040.000 b/d). Due to declining oil fields in Iran, Libya, Saudi Arabia, Dhuhai, Venezuela and Indonesia OPEC liquids production is expected to see a net increase of 3.44 mb/d between 2005 and 2010.

An often heard comment is that if Saudi Arabia peaks the world will peak in world oil production. Given the amount of projects still coming on stream, this scenario is almost impossible given observed gross decline rates of between 5 and 12%.

Non OPEC – Total gross Non- OPEC liquids production is expected to increase by 12.16 mb/d per day between 2005 and 2010. Big gross liquids production increases come from Azerbaijan (1.200.000 b/d), Kazakhstan (1.423.000 b/d), Russia (650.000 b/d) Canada (1.567.000 b/d), Brazil, (1.495.000 b/d) and Mexico (1.150.000 b/d). Due to declining oil fields in the North Sea, USA, Canada, Mexico, Oman, Syria, Yemen, Egypt, Australia, China, Malaysia and various other countries non-OPEC liquids production is expected to see a net increase of 4.78 mb/d between 2005 and 2010.

Countries which are probably peaking between 2005 and 2010 are China (2006), Malaysia (2006), India (2008), Denmark (2005), Brunei (2nd peak in 2007), Peru (2nd peak in 2008)

Sharp Prices increases – Due to little spare capacity on the market, which is bound to get worse, any oil disruption due to political, economical or natural events will have a profound effect on oil prices. Economic disruption to a temporary oil shock is likely in the period of 2005-2010. After 2010 oil will become more scarce and continued increases in prices are likely.

Refinery and Production Problems – Please keep in mind that refinery, material, manpower and shipping restraints are not figures into this model.

Appendix A - Data

A-1 Oil production data 1996-2004

Production in thousand barrels per day	1996	1997	1998	1999	2000	2001	2002	2003	2004	1 st qtr 2005
OPEC										
Algeria	1356	1428	1431	1377	1436	1486	1521	1794	1930	2067
Indonesia	1622	1592	1532	1503	1380	1385	1304	1200	1143	1132
Iran	3718	3649	3705	3572	3760	3775	3510	3959	4149	4161
Kuwait	1905	1941	1926	1768	1880	2141	2010	2297	2469	2563
Libya	1419	1470	1535	1438	1471	1427	1381	1488	1614	1693
Nigeria	2252	2390	2199	2059	2160	2222	2116	2276	2513	2551
Qatar	581	724	751	744	821	822	796	942	1020	1027
Saudi Arabia	8661	8848	8909	8325	8807	8568	8556	9774	10135	10358
United Arab Emirates	2423	2467	2516	2286	2458	2385	2205	2469	2561	2593
Venezuela	3306	3623	3562	3229	3369	3302	3069	3113	3523	3837
Iraq	581	1152	2127	2536	2582	2377	2032	1335	2010	1812
	483	533	545	591	632	565	538	605	597	597
Total OPEC	28307	29817	30738	29428	30756	30455	29038	31252	33664	34391

Table 14 – OPEC production data from 1996-2005 taken from the International Energy Agency - Oil, Gas Coal & Electricity Quarterly Statistics 1999 to 2005

Production in thousand barrels per day	1996	1997	1998	1999	2000	2001	2002	2003	2004	1 st qtr 2005
Former Soviet Union										
Azerbaijan	181	181	231	276	280	298	306	309	309	345
Kazakhstan	473	507	525	613	707	798	960	1044	1209	1275
Russia	6026	6110	6122	6158	6503	7017	7661	8488	9227	9343
Uzbekistan	125	114	94	99	91	80	77	87	82	71
Other Former USSR	277	281	323	347	353	367	387	401	390	375
FSU Total	7082	7193	7295	7493	7934	8560	9391	10329	11217	11409

Table 15 – FSU production data from 1996-2005 taken from the International Energy Agency - Oil, Gas Coal & Electricity Quarterly Statistics 1999 to 2005

Production in thousand barrels per day	1996	1997	1998	1999	2000	2001	2002	2003	2004	1 st qtr 2005
Non OPEC										
USA	8511	8635	8370	8097	8109	8069	8032	7829	7668	7714
Canada	2429	2558	2672	2561	2739	2728	2859	2996	3089	2944
Mexico	3306	3448	3496	3345	3451	3560	3585	3789	3825	3746
Argentina	824	878	895	849	814	827	839	828	780	755
Brazil	1053	1131	1222	1358	1496	1558	1716	1801	1796	1849
Columbia	627	652	758	815	687	604	578	541	528	522
Ecuador	384	385	375	373	385	430	392	418	526	530
Peru	119	118	116	106	99	97	97	91	84	79
Trin & Tobago	120	124	124	125	123	113	131	135	123	168
Other S & Central America	124	135	148	155	163	183	195	217	236	258
Denmark	208	230	238	300	363	346	371	373	389	393
United Kingdom	2712	2803	2840	2926	2705	2534	2496	2326	2054	2005
Norway	3230	3286	3135	3244	3409	3408	3334	3264	3188	3075
Italy	103	112	107	85	77	65	84	90	110	120
Romania	135	128	126	125	121	124	120	117	114	109
Other Europe	435	415	383	353	358	349	361	361	370	360
Oman	885	900	899	906	953	952	895	815	758	736
Syria	612	570	602	570	583	567	495	477	450	433
Yemen	365	361	384	393	436	439	438	431	402	378
Other middle east	69	63	63	211	210	206	269	276	277	278
Angola	691	714	729	748	745	739	897	879	988	1123
Cameroon	110	121	102	91	85	78	72	70	67	66
Congo Brazzaville	201	239	260	257	266	263	249	247	230	225
Egypt	914	893	880	853	811	758	738	744	708	702
Gabon	360	365	352	331	310	275	258	242	235	230
Tunisia	84	77	78	79	80	68	77	76	80	80
Other Africa	634	678	704	757	872	863	938	1041	1361	1412
Australia	597	643	616	608	781	732	710	605	538	512
Brunei	195	195	179	180	190	195	219	219	216	210
China	3116	3189	3193	3186	3229	3297	3390	3410	3485	3629
India	738	755	749	745	734	742	778	785	799	803
Malaysia	707	725	736	712	708	748	785	831	857	841
Papua New Guinea	106	80	79	99	64	60	55	50	45	31
Vietnam	192	180	228	297	316	341	340	347	405	357
Other Asia-Pacific	218	272	275	279	298	363	392	423	410	420
Non OPEC total	42196	43251	43408	43612	44704	45241	46576	47473	48408	48502

Table 16 – Non OPEC production data from 1996-2005 taken from the International Energy Agency - Oil, Gas Coal & Electricity Quarterly Statistics 1999 to 2005

A-2 Oil Projects Data

Country	Field/Basin	New Production	Starting Date	Ending Date	Type
Algeria	Menzel Ledjmat North	40.000	2003	2004	Oil
Algeria	Rhourde Oulad Djemma	80.000	Oct-04	2004	Oil
Algeria	7 new fields in Berkine Basin	200.000	2007		Oil and Condensate
Algeria	Rhourde El Baguel	100.000	2005	2010	EOR
Algeria	Hassi Messaoud	350.000	2005	2012	EOR
Indonesia	West Seno Phase II	20.000	2005	2005	Oil
Indonesia	Oyong	20.000	late 2005	2005	Oil
Indonesia	Banyu Urip	100.000	2006	2006	Oil
Iran	Darkhovein phase I	50.000	2005	Jul-05	Oil
Iran	Darkhovein phase II	110.000	2006	2006	Oil
Iran	Soroush and Norouz	200.000	2004	Jul-05	Oil
Iran	Foroozan and Esfandiar	60.000	2004	2005	Oil
Iran	Salman	40.000	2004	2005	Oil
Iran	Dorud	50.000	?	2006	Oil
Iran	South Pars phase 1 - 5	200.000	2002	2005	Condensate
Iran	Aghajari	Halting decline	2005	2005	EOR, gas injection
Iran	Darquain	160.000	2002	2008	Oil
Iran	Azadegan	260.000	2007	2012	Oil
Iran	Cheshmeh-Khosh	40.000	2005	2009	Oil
Kuwait	Northern basin	500.000	2006	2009	Oil
Kuwait	Minagish	100.000			EOR
Libya	Murzuk basin Eleph.	140.000	2004	2006	Oil
Libya	Murzuk Basin D-field	35.000	2005	2005	Oil
Libya	Sabratha offshore rig	65.000	Late 2004	2005	Oil and Condensate
Libya	Murzuk Basin NC 186	75.000	2004	2008	Oil
Nigeria	Okwori	40.000	2005	2006	Oil
Nigeria	Yoho	60.000		2005	Oil
Nigeria	Bonga	225.000	2005	2006	Oil
Nigeria	Agbami	250.000	2005	2006	Oil
Nigeria	Erha	150.000	2006	2006	Oil
Nigeria	East Area Oil	110.000		2007	Oil
Nigeria	Bosi	50.000		2007	Oil
Nigeria	Eti/Asasa	25.000		2007	Oil
Nigeria	Usan and Akpo	250.000		2008	Oil
Nigeria	Bonga Southwest	145.000		2009	Oil

Qatar	Al Shaheen Block 5	20.000	2005	2005	Oil
Qatar	Al Karkara and A north	10.000	2005	2005	Oil
Qatar	QatarGas 2		2008		NGL
Qatar	Shell GTL	140.000	2009		Gas to Liquids
Saudi Arabia	Shaybah	300.000	2006	2008	EOR
Saudi Arabia	Haradh	300.000	2004	2006	EOR
Saudi Arabia	Hawiyah	310.000	2007	2008	NGL
Saudi Arabia	Abu Hadriya, Fadhili, Khursaniya	500.000	2005	2007	Oil
Saudi Arabia	Nuayyim	100.000	2009		Oil
UAE	Bu Hasa	180.000	2005	2006	EOR
UAE	Asab	30.000	2005	2006	EOR
UAE	al-Dabb-iyah, Rumaitha, Shanaget	100.000	2005	2006	Oil
UAE	Upper Zakum	650.000	2006	2010	EOR
UAE	Bab	100.000	2005	2008	EOR
Venezuela	Coroco	55.000		2006	Heavy Oil
Venezuela	Sincor II	200.000	2007	2010	Extra Heavy Oil
Venezuela	Tomoporo	250.000	?	?	Oil
USA	Holstein	100.000		2005	Oil
USA	Mad Dog	100.000		2005	Oil
USA	Alpine	40.000	2004	2005	Oil
USA	Atlantis	150.000		2006	Oil
USA	Thunder Horse	250.000		2006	Oil
USA	Tahiti	150.000		2007	Oil
USA	Deepwater K2	60.000	2005	2005	Oil
USA	Constitution	70.000	2006	2007	Oil
Canada	Syncrude phase III	100.000	2001	2006	Bitumen
Canada	White Rose	90.000	2005	2005	Oil
Canada	Athabasca	91.000	?	?	Bitumen
Canada	Primerose North	30.000	2006	2006	Bitumen
Canada	Primerose East	70.000	2008	2009	Bitumen
Canada	Surmont	100.000	2006	2013	Bitumen
Canada	Suncor	140.000	2007	2008	Bitumen
Canada	Horizon oil sands project	300.000	2008	2010	Bitumen
Canada	Fort hills	50.000	2009	2009	Bitumen
Canada	Hanginestone Project	30.000	?	?	Bitumen
Canada	Devon SAGD	25.000	2005	2007	Bitumen
Canada	Long Lake	70.000	2004	2006	Bitumen
Canada	Northern Lights	100.000	2006	2009	Bitumen
Canada	Christina Lake	70.000	2005	2007	Bitumen
Canada	Jackpipe Mine	200.000		2010	Bitumen
Canada	Joslyn Creek Phase II	10.000	?	?	Bitumen
Canada	Sunrise thermal project	50.000	2006	2008	Bitumen
Canada	Kearl Mine	100.000	2008	2010	Bitumen
Mexico	Ku-Maloob-Zaap	450.000	2005	2010	Oil
Mexico	Crudo Ligerio Marino	400.000	2005	2010	Oil
Mexico	Lankahuasa basin	300.000	2005	2010	Oil
Brazil	Cataringa	150.000	2004	2005	Oil
Brazil	Albacora Leste	180.000	2005	2005	Oil
Brazil	Jubarte	60.000	2005	2005	Oil
Brazil	Golfinho	100.000	2006	2006	Oil
Brazil	Espadarte	100.000	2006	2006	Oil
Brazil	Roncador P52	180.000	2007	2008	Oil
Brazil	Marlim Leste P57	180.000	2007	2008	Oil
Brazil	Marlim Leste P53	180.000	2007	2008	Oil
Brazil	Albarcoa	100.000	2008	2008	Oil
Brazil	Frade	100.000	2008	2009	Oil

Brazil	Marlim Sul P51	180.000	2008	2009	Oil
Brazil	Marlim Sul P56	100.000	2008	2009	Oil
Peru	Hunt Oil Camisea	50.000		2009	NGL
Trin. & Tobago	Greater Angostura	100.000	2005	2006	Oil
United Kingdom	Buzzard	190.000	late 2006	2007	Oil
Norway	Staer and Svale	70.000	late 2005	2006	Oil
Norway	Kristin Deepwater Project	126.000	Oct-05	2007	gas condensate
Italy	Tempa Rossa	50.000	2006	2007	Oil
Yemen	block 51	25.000	2004	2005	Oil
Yemen	East Al Hajr BAK-B	25.000	2005	2007	Oil
Oman	Mukhaizna	140.000	2005	2009	Extra heavy Oil
Syriah	Oudeh	30.000	2004	2007	Oil
Angola	Sanha	100.000	2005	2007	Oil, LPG, Condensates
Angola	Bomboco	30.000	2005	2005	Oil
Angola	Kizomba-B	250.000	2005	2006	Oil
Angola	Benguela Belize - Lobito Tomboco	245.000	2007	2009	Oil
Angola	Greater Plutonio	200.000	2007	2008	Oil
Angola	Dalia	225.000	2006	2007	Oil
Congo	Moho North,South, Bilondo	75.000	2005	2005	Oil
Congo	M'Boundi	38.000		2007	Oil
Egypt	Sagqara	40.000	2005	2006	Oil
Sudan	Adar Yeil and Tale	300.000	2005	2006	Oil
Sudan	Thar Jath	?	2006	?	Oil
Eq. Guinea	Block G	60.000		2007	Oil
Australia	Enfield	100.000	2006		Oil
Australia	Mutineer-Exeter	100.000	2005	2006	Oil
Brunei	Egret	30.000	2006	2006	Oil
China	Peng Lai	120.000	2005	2006	Oil
China	Luda	40.000	2005	2006	Oil
India	Krishna Godavari G1,GS15	9.400	2006	2006	Oil
India	Mangala	80.000	2007	2008	Oil
Malaysia	Irong Barat C satellite	17.000	2005	2006	Oil
Azerbaijan	ACG Phase 1	500.000	2005	2007	Oil
Azerbaijan	ACG Phase 2	300.000	2007	2009	Oil
Azerbaijan	ACG Phase 3	400.000	2008	2010	Oil
Kazakhstan	Tengiz production increase	183.000	2006	2010	Oil
Kazakhstan	Kashagan phase 1	75.000	2008	2008	Oil
Kazakhstan	Kashagan phase 2	375.000	2008	2010	Oil
Kazakhstan	Karachnagak	270.000	2004	2006	Oil
Kazakhstan	Kurmangazy	600.000	2006	2013	Oil
Kazakhstan	Buzachi Peninsula	3.000	2003	2006	Oil
Thailand	Thai oil development	16.000	2005	2005	Oil
Mauritania	Chinguetti	75.000	2006	2006	Oil
Russia	Sakhalin-1 Chayvo	250.000	2005	2006	Oil

Table 17 – World oil projects, data taken from various sources

Country	Field/Basin	New Production	Known information	Type
Indonesia	Cepu	170.000	Delayed	Oil
Angola	Cabina South Block		2005 seismic drills	Oil
Iran	Bangestan	100.000	Seismographic studies 2005	EOR
Russia	Sakhalin-3	?	Auction	Oil
Russia	Chayandinskoye	?	Auction	Oil
Russia	Kynsko-Chaselskoye	?	?	Oil
Russia	Termokarstovoye	?	?	Oil
Russia	Talakan	?	?	Oil
Malaysia	Guntong F	?	?	Oil
Australia	Laverda	?	?	Oil
Australia	Vincent	?	?	Oil
Congo Brazzaville	N'Kossa Sud and N'Soko	?	?	Oil
Angola	Gabela and Negage	?	?	Oil
Angola	Kizomba-C	?	?	Oil
Angola	Kizomba-D	?		Oil
Yemen	An Naeem, Harmel and An Nagyah	?	?	Oil
Norway	Skinfak	?	?	EOR
Mexico	Chicopontec North	?	Bidding	Oil
Mexico	Chicopontec South	?	Bidding	Oil
USA	Ticonderoga	?	?	Oil
USA	Great White	?	?	Oil
Venezuela	Lukoil Projects	?		Extra Heavy Oil
Nigeria	Aje	?		Oil
Nigeria	Nda	?	Appraisal well early 2006	Oil
Iran	Marun and Karanj	halting decline ?	?	EOR
Iran	Dasht-e Abadan	?	New discovery 2001	?
Iran	Yadavaran (North Azadegan)	350.000	Negotiations	Oil and NGL
Iran	five Henjam fields	80.000	Assesment	Oil
Iran	Soroush	250.000	Possible Study	EOR, Gas injection
Qatar	ExxonMobil GTL	154.000	Beyond 2010	Gas to Liquids
Venezuela	ChevronTexaco Project	200.000-400.000	?	Extra Heavy Oil
Canada	MEG	5000	2006 Pilot project	Bitumen
Ecuador	Ishpingo-Tapocochoa- Tiputini	190.000	Bidding	Oil
Sudan	Ba	150.000-200.000	Seismic exploration	Oil
Kazakhstan	Kashagan phase 3	750.000	2010	Oil
Canada	Hebron	165.000	2010/2011	Oil

USA	Shenzi	?	Appraisal drilling	Oil
USA	Tubular bells	?	Appraisal drilling	Oil
Denmark	Hejre	?	2009	Oil
Vietnam	Su Tu Trang	?	2010	Oil
Venezuela	Corocoro phase II	?	?	Oil
Timor Sea	Greater Sunrise	?	?	Oil
Venezuela	Tomoporo	250.000	Bidding	Oil
Nigeria	Bolia	60.000	?	Oil
Nigeria	Chota	?	?	Oil
Nigeria	Nwa/Doro	?	?	Oil
Saudi Arabia	Khurais	800.000	2009	Oil
Saudi Arabia	Halfaa-1	6.000	?	Oil
Saudi Arabia	Duaiban-1	3.300	?	Oil
Brazil	Seal-100	?	?	Oil
Brazil	Cachalote	?	?	Oil
Norway	Ellida	?	?	Oil
Angola	Gabela	?	?	Oil
Angola	Tulipa	?	?	Oil
Angola	Orquidea	?	?	Oil
Angola	Cravo	?	?	Oil
Angola	Lirio	?	?	Oil
Malaysia	Kikeh	?	?	Oil
Venezuela	Tomoporo	?	?	Oil
Saudi Arabia	Khurais	800.000	2009	

Table 17 – Potential world oil projects, data taken from various sources.