
A Critical Review of the Official Oil Forecast

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ASPO Australia
Australian Association for the Study of Peak Oil and Gas

The Official Forecast

Resources forecast by:

- USGS: United States Geological Society
 - World Petroleum Assessment 2000Covers thirty year period 1995-2025

Production forecast by:

- IEA: International Energy Agency (Paris)
 - World Energy Outlook 2004
- EIA: Energy Information Administration (USA)
 - International Energy Outlook 2006



United States Geological Society
Global Conventional Oil and NGL (1995)

World Petroleum Assessment

Cumulative Production	:	717 Gb
Remaining Reserves	:	959 Gb
Reserve Growth	:	730 Gb
Undiscovered Resources	:	939 Gb
Total Oil Endowment	:	3345 Gb
Percentage Remaining	:	79%
		71% 2005



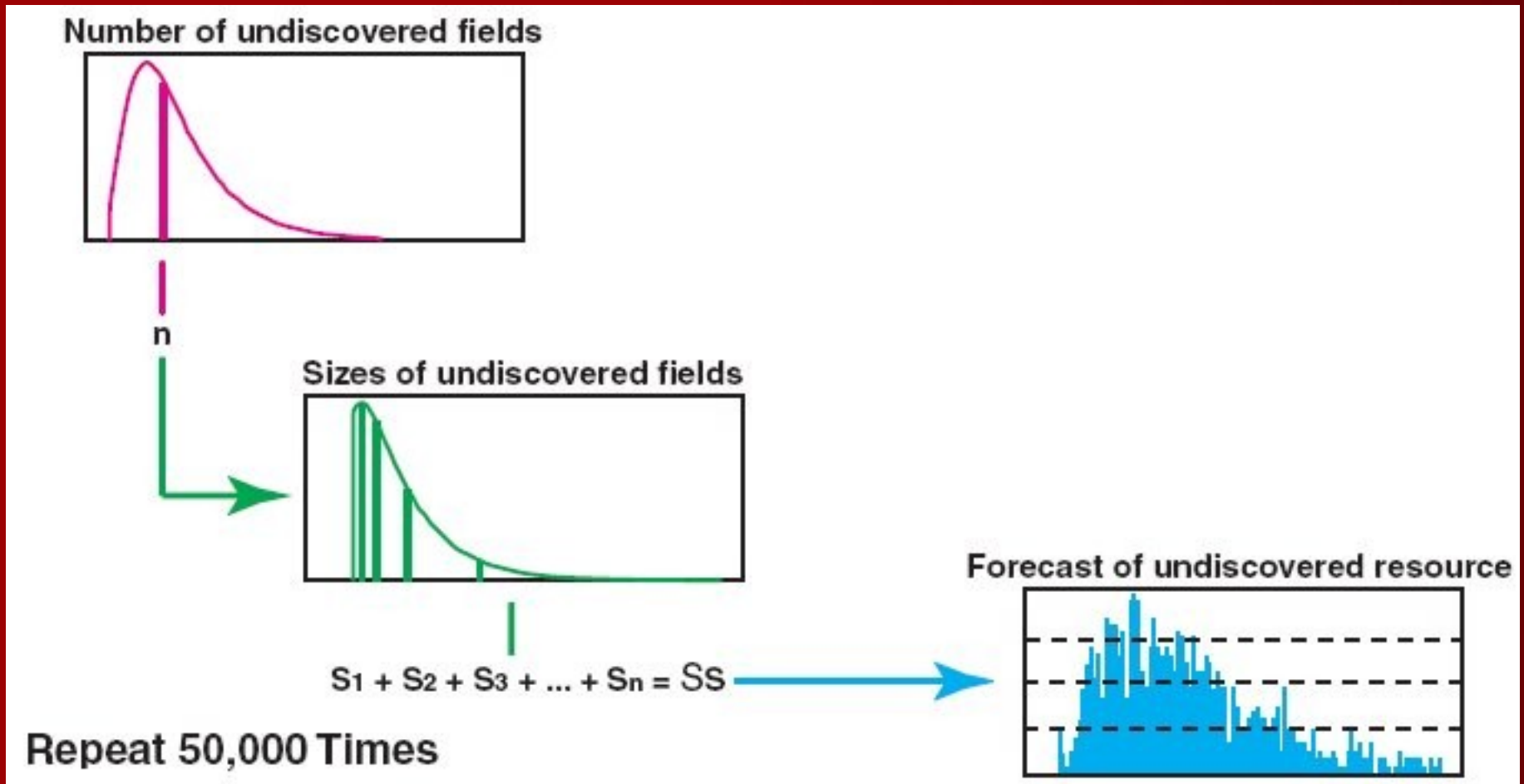
USGS - Undiscovered Resources

World Petroleum Assessment

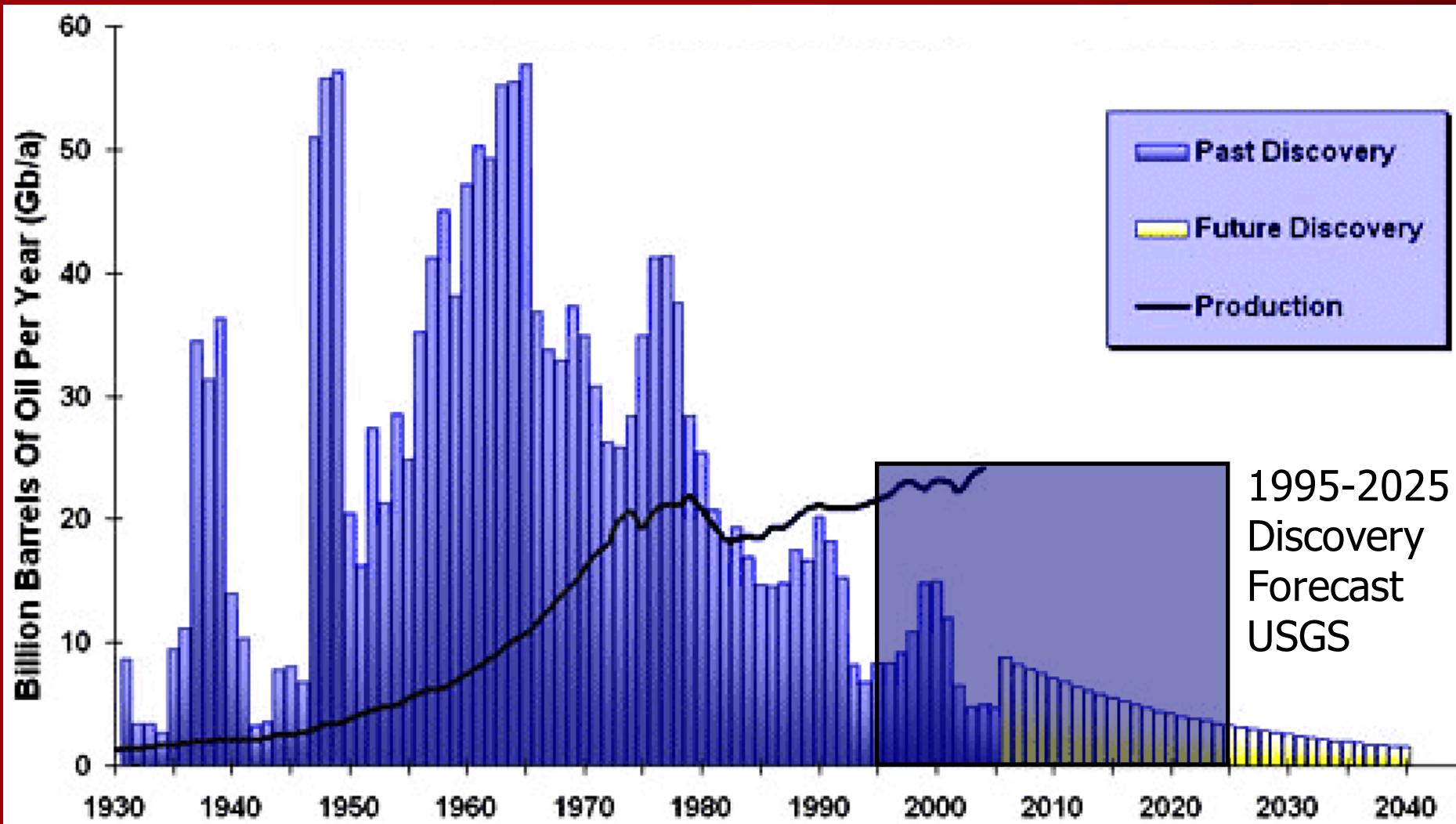
- 270 Assessment Units in 159 Total Petroleum Systems, across 96 countries.
- In each Assessment Unit; assign values for geological risk (adequate petroleum charge, suitable reservoir rocks and migration timing) and access risk.
- Develop histograms for number and size of fields with 'potential to be discovered'.
- Monte-Carlo computer simulation to generate probability distribution of undiscovered resources in each Assessment Unit.



USGS - Undiscovered Resources



USGS - Undiscovered Resources



1995-2025
Discovery
Forecast
USGS



USGS - Reserve Growth

Studied apparent field size increases over time in USA Lower-48 and applied apparent 44% growth to worldwide remaining reserves and undiscovered volumes.

Several factors influenced apparent reserve growth in USA:

- Reporting under SEC requirements; additional reserves booked only as the area drilled and developed was expanded.
- Company balance sheets benefited from gradual booking of reserves.
- Initial field development using primary oil recovery only; enhanced oil recovery applied late in field life.



USGS - Reserve Growth

Situation now not comparable to early development of US industry:

- Most stated reserves do not meet SEC requirements (NOCs).
- International oil companies no longer have the luxury of spreading reserves bookings over time.
- Enhanced oil recovery now applied extensively and early in field development.

Once traditional EOR techniques have been applied (steam, water, gas injection), it takes a disproportionate amount of time, money and resources to achieve even a further 1-2% recovery.

With 'easy' oil declining, new technology is less about increasing recovery and more about producing the remaining 'difficult' oil:

- Deep reservoirs, deep water.
- High pressures, high temperatures.
- Small, thin, complex fields.
- Heavy, sour, corrosive fluids.



USGS - Remaining Reserves

	UAE	Iran	Iraq	Kuwait	Saudi Arabia	Venezuela	Neutral Zone
1983	32.3	55.3	65.0	67.0	168.8	25.9	5.7
1984	32.5	58.9	65.0	92.7	171.7	28.0	5.6
1985	33.0	59.0	65.0	92.5	171.5	54.5	5.4
1986	97.2	92.9	72.0	94.5	169.7	55.5	5.4
1987	98.1	92.9	100.0	94.5	169.6	58.1	5.3
1988	98.1	92.9	100.0	94.5	255.0	58.5	5.2
1989	98.1	92.9	100.0	97.1	260.1	59.0	5.2
1990	98.1	92.9	100.0	97.0	260.3	60.1	5.0
1991	98.1	92.9	100.0	96.5	260.9	62.6	5.0
1992	98.1	92.9	100.0	96.5	251.2	63.3	5.0
1993	98.1	92.9	100.0	96.5	261.4	64.4	5.0
1994	98.1	94.3	100.0	96.5	261.4	64.9	5.0
1995	98.1	93.7	100.0	96.5	261.5	66.3	5.0
1996	97.8	92.6	112.0	96.5	261.4	72.7	5.0
2005	97.8	136.3	115.0	101.5	264.2	80.0	5.0

“The hike in OPEC countries’ estimates of their reserves was driven by negotiations at that time over production quotas, and had little to do with the actual discovery of new reserves.”

IEA World Energy Outlook 2004



USGS - Remaining Reserves

LONDON, Jan 20 (Reuters, 2006)

Kuwait oil reserves only half official estimate

OPEC producer Kuwait's oil reserves are only half those officially stated, according to internal Kuwaiti records seen by industry newsletter Petroleum Intelligence Weekly.

"PIW learns from sources that Kuwait's actual oil reserves, which are officially stated at around 99 billion barrels, or close to 10 percent of the global total, are a good deal lower" the PIW reported on Friday.

It said that according to data circulated in Kuwaiti Oil Co (KOC), .. Kuwait's remaining proven and non-proven oil reserves are about 48 billion barrels.



USGS

What then for future resources?

	USGS 1995 (Gb)	Alternative 2006 (Gb)
Cumulative Production	717	980
Remaining Reserves	959	650
Reserves Growth	730	240
Undiscovered	939	210
Total Resource	3345	2080
Percentage Consumed	21%	47%



International Energy Agency

- Developed 'World Energy Model' to produce '*2004 Outlook*'.
- Five modules:
 - Final Energy Demand
 - Power Generation
 - Refinery and Other Transformation
 - Fossil Fuel Supply
 - CO2 Emissions
- Fossil Fuel Supply split into three categories:
 1. Non-OPEC
 2. OPEC
 3. Non-Conventional



International Energy Agency World Energy Outlook 2004

Derivation of Non-OPEC production of conventional oil:

- Short-term approach: Field-by-field analysis to estimate production profiles.
- Long-term approach: Based on USGS level of ultimately recoverable resources, depletion rates and reserve growth.



International Energy Agency World Energy Outlook 2004

(million barrels per day)

	2002	2010	2030
OECD	21.1	20.1	12.7
Former Soviet Union	9.5	14.6	15.9
Developing Countries	14.6	16.6	14.8
OPEC	28.2	33.3	64.8
Non-conventional	1.6	3.8	10.1
World	77.0	90.4	121.3

- USGS assigns one quarter of undiscovered resources to OPEC.
- IEA assumes OPEC will provide 70% of supply increase from 2002-2030.
- 36.6 Mb/d OPEC production increase.
- 7.7 Mb/d net increase for non-OPEC.



International Energy Agency World Energy Outlook 2004

Derivation of OPEC production:

“OPEC conventional oil production is assumed to fill the gap between non-OPEC production and non-conventional and total world oil demand.”

“Saudi Arabia, Iraq and Iran are likely to contribute most of the increase in Middle East production.”



Energy Information Administration (EIA) International Energy Outlook 2006

In the United States, the prime agency is the Energy Information Administration. Methodology is similar to the IEA (demand based) but the numbers are different.

“Reserve growth and undiscovered estimates are based on World Petroleum Assessment 2000 by USGS.”

“The estimates of production increases are based on current proved reserves and a country-by-country assessment of ultimately recoverable petroleum.”



Energy Information Administration (EIA)

International Energy Outlook 2006

(million barrels per day)

	2003	2015	2030	Increase
Non-OPEC	48.9	58.6	72.6	23.7
OPEC	30.7	39.7	45.3	14.6
World	80	98	118	38

“Disruptions in oil supply for any reason were not assumed.”

“The level of OPEC conventional production that would be needed to balance world oil markets was calculated by subtracting non-OPEC conventional supplies and total unconventional supplies from total world oil demand.”



The Official Forecast

EIA: "It is generally acknowledged that OPEC members with large reserves and relatively low costs for expanding production capacity can accommodate sizeable increases in petroleum demand."



The Official Forecast

IEA 2004: "The average IEA crude oil import price.. is assumed in the Reference Scenario to fall back from current highs to \$22 in 2006." *(real year-2000 dollars)*

Howard Ronaldson (Secretary to the Department of Infrastructure Victoria, 16th Feb 2006): "The best advice we have is that petrol prices will remain between \$1.10 and \$1.20 for the next ten to twenty years." Four days later..

We need better advice.

