

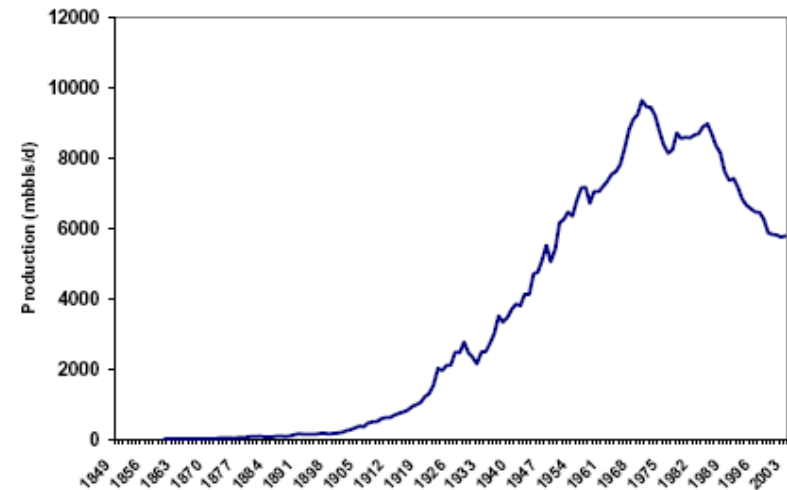


Peak Oil Misconceptions

Mark Gordon
Chief Investment Officer
Ascent Oil Fund

- There is no question that global oil production will peak. The only question is when.
- The recent surge in unconventional oil production has enabled the market to ignore peak oil.
- Amid widespread disbelief, US conventional oil production peaked in 1970. King Hubbert, a Shell petroleum geologist, had predicted the peak 14 years earlier in 1956.
- **‘Peakists’ are often dismissed despite Hubbert having made one of the best long term forecasts in history.**

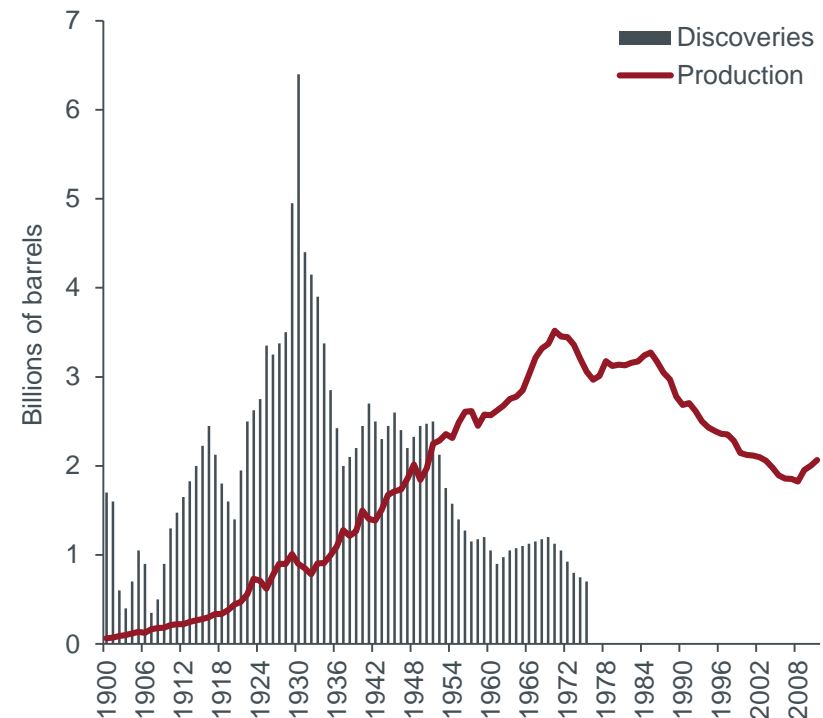
US conventional production – 1850 to present



Source: Oil & Gas Journal Energy Statistics Sourcebook (14th Edition), EIA

- Mathematically, the area under the discovery curve needs to be equal to the area under the production curve. US conventional discoveries peaked in 1930, and US conventional production peaked 40 years later in 1970.
- Given the bell-shaped curve of discoveries, Hubbert assumed that the production curve would have the same shape. **This assumption implies that oil production will peak once 50% of the resource is depleted.**
- The discovery curve creates a limit on the production curve, both on the way up and on the way down.

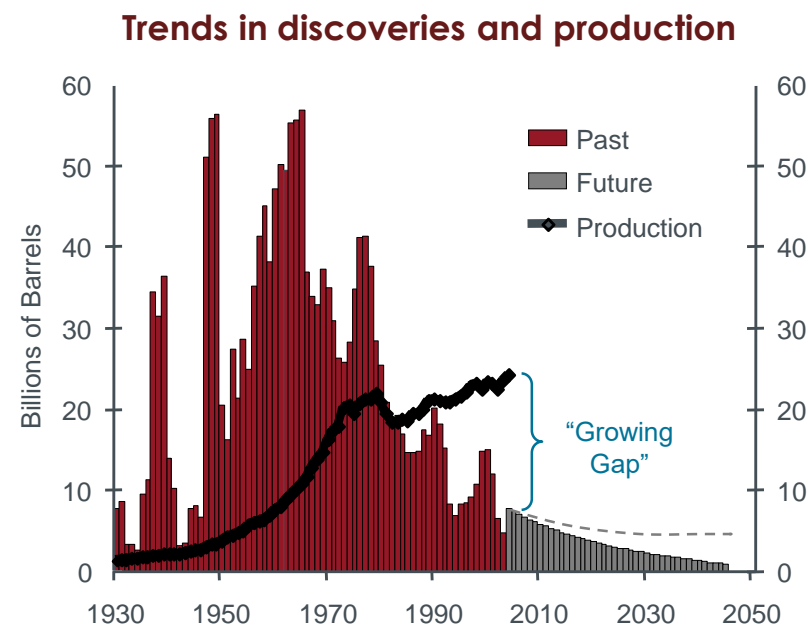
Lower 48 discoveries and US production



Source: Oil & Gas Journal Energy Statistics Sourcebook (14th Edition), EIA

Note: Any market analysis, estimates, and similar information, including all statements of opinion and/or belief, contained in this presentation are subject to inherent uncertainties and qualifications and are based on a number of assumptions.

- James Schlesinger (the former Secretary of Energy, Secretary of Defense, and Director of the CIA) used this chart when he testified before the Senate Committee on Foreign Relations in 2005.
- According to Schlesinger's chart, global discoveries peaked in **1962**, and global production started to outpace discoveries **by 1981**.
- **This imbalance between discovery and production is unsustainable. The situation for conventional oil is precarious.**



Source: US Senate

Peak production year (50% depletion)

EUR (Trillion B)	2.3	2.4	2.5	2.6	2.7	2.8	2.9
Year	2004	2008	2010	2012	2014	2015	2017

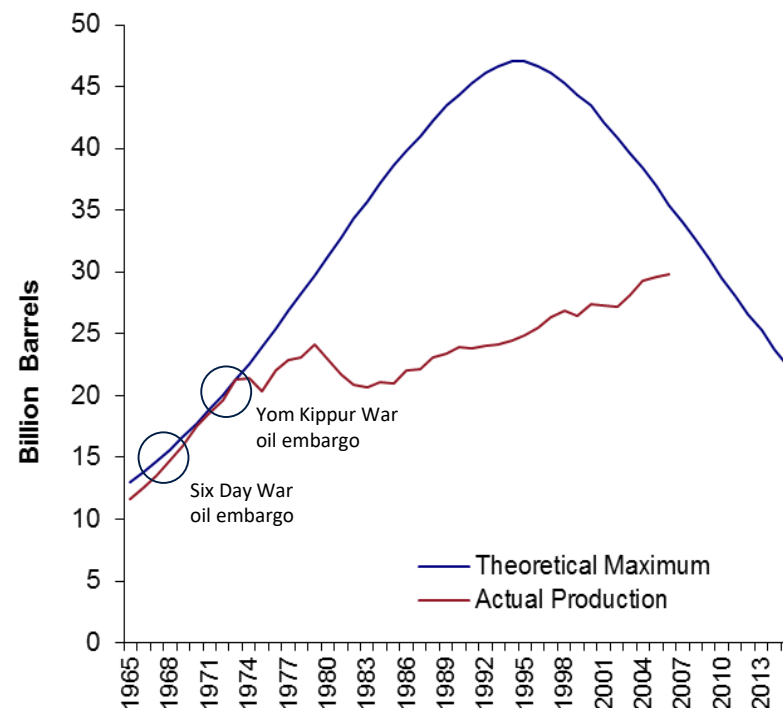
Source: BP Statistical Review of World Energy

- Standard peak oil methodology assumes the peak in production will happen at the 50% depletion point for the global Estimated Ultimate Recovery (EUR).
- **Most peak oil theorists believe the EUR is around 2.5 Trillion barrels. From their perspective, global oil production already should have begun its relentless decline in 2010. They have no ability to explain why production continues to grow.**
- **This perspective governed oil prices from 2003 to 2014 despite having a fundamental flaw.**

Note: Any market analysis, estimates, and similar information, including all statements of opinion and/or belief, contained in this presentation are subject to inherent uncertainties and qualifications and are based on a number of assumptions.

- High oil prices in the 1970s and early 1980s caused demand destruction which ultimately restrained oil production growth. Global oil production has been below its theoretical maximum for the last thirty years.
- **With production below the potential maximum, producers were able to flood the market, causing low prices and disguising the finitude nature of oil.**
- In 1967, when production was under the limit created by the Hubbert Curve, the oil embargo from the Six Day War had no effect on the oil price. However, In 1973, when production was bumping up against the Hubbert Curve, the oil embargo from the Yom Kippur War led to a four-fold increase in oil price.

Below the Hubbert Curve

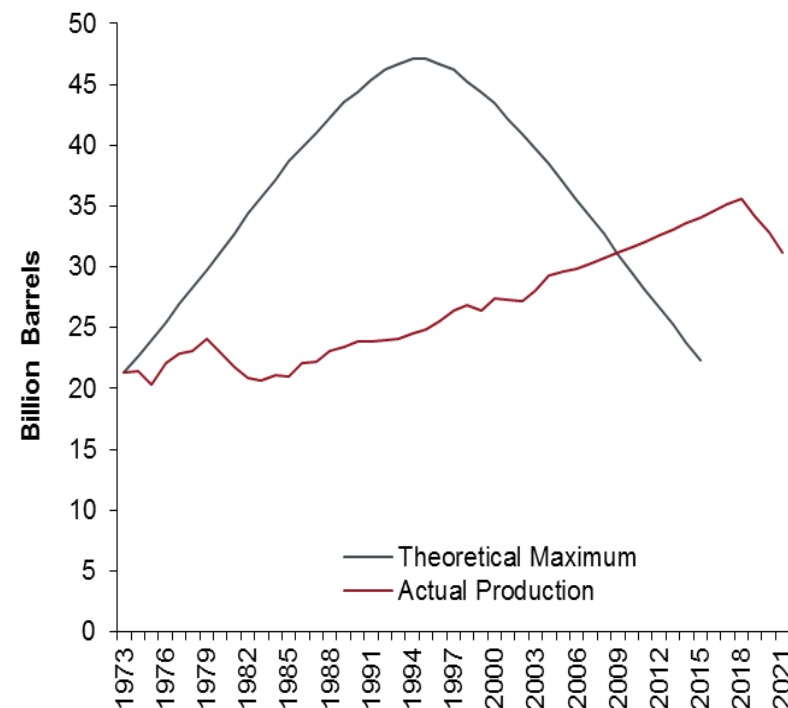


Source: BP Statistical Review of World Energy

Three important consequences of producing below the theoretical maximum:

- A deferred peak – later than expected.
- A peak past 50% depletion (actual peak likely to be closer to 60%).
- A lower production peak.

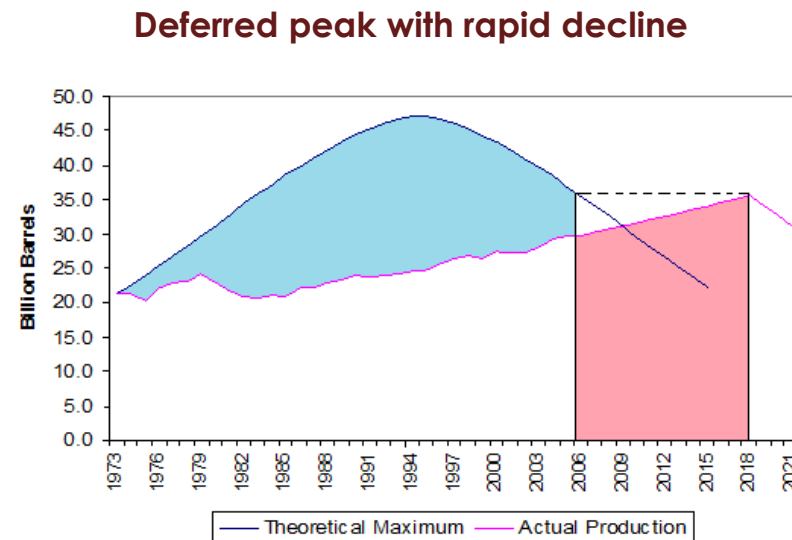
Deferred peak with rapid decline



Source: BP Statistical Review of World Energy

Note: Any market analysis, estimates, and similar information, including all statements of opinion and/or belief, contained in this presentation are subject to inherent uncertainties and qualifications and are based on a number of assumptions.

- Hubbert methodology can be modified to take into account demand destruction. Basically, for every state of depletion, the Hubbert Curve creates a theoretical maximum limit to production.
- Global production will be back against the limitations of the Hubbert Curve once cumulative depletion and current production are equal between the actual and theoretical curves. This will happen once the red area and the blue area are equal in size.
- **Given the demand destruction created by high prices, the Hubbert Curve will come into effect at a higher state of depletion than the peak oil theorists assume.**



Source: BP Statistical Review of World Energy

Peak year		Depletion percentage			
		50%	55%	60%	65%
EUR (Trillion B)	2.3	2004	2010	2014	2018
	2.4	2008	2013	2016	2020
	2.5	2010	2014	2018	2022
	2.6	2012	2016	2020	2024
	2.7	2014	2018	2022	2026

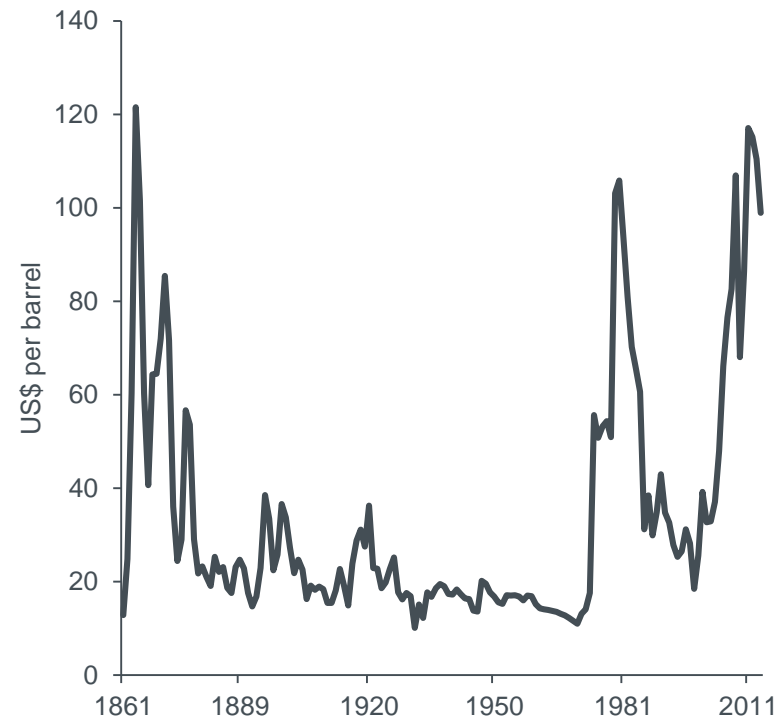
Source: BP Statistical Review of World Energy

- High depletion methodology assumes world oil production will peak past 50% depletion. This methodology explains how production can grow despite the advanced state of depletion and the overstatement of Middle Eastern reserves.
- Extrapolation suggests that peak oil will occur somewhere around 60%-65% depletion. Oil production could peak sooner for 'political' or economic reasons – the Hubbert Curve only delineates maximum possible production.

Note: Any market analysis, estimates, and similar information, including all statements of opinion and/or belief, contained in this presentation are subject to inherent uncertainties and qualifications and are based on a number of assumptions.

- From 1956 (when Hubbert made his forecast) to 1970 (when US conventional production peaked), Hubbert was lucky insofar as his forecast was not affected by price; price did not destroy demand or incent supply.
- Hubberts' methodology cannot be applied to current global conventional production because the oil price has shot up and changed the dynamics of production and consumption.
- Global conventional production, nevertheless, is in an advanced state of depletion and could begin to decline imminently.

Crude oil prices since 1861



Source: BP Statistical Review of World Energy

Note: Any market analysis, estimates, and similar information, including all statements of opinion and/or belief, contained in this presentation are subject to inherent uncertainties and qualifications and are based on a number of assumptions.