

It's the Economy, Stupid

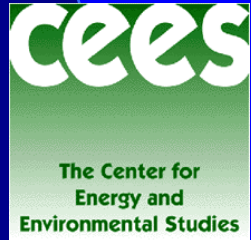
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ASPO-USA

October 27, 2006



<http://www.bu.edu/cees/people/faculty/kaufmann/index.html>



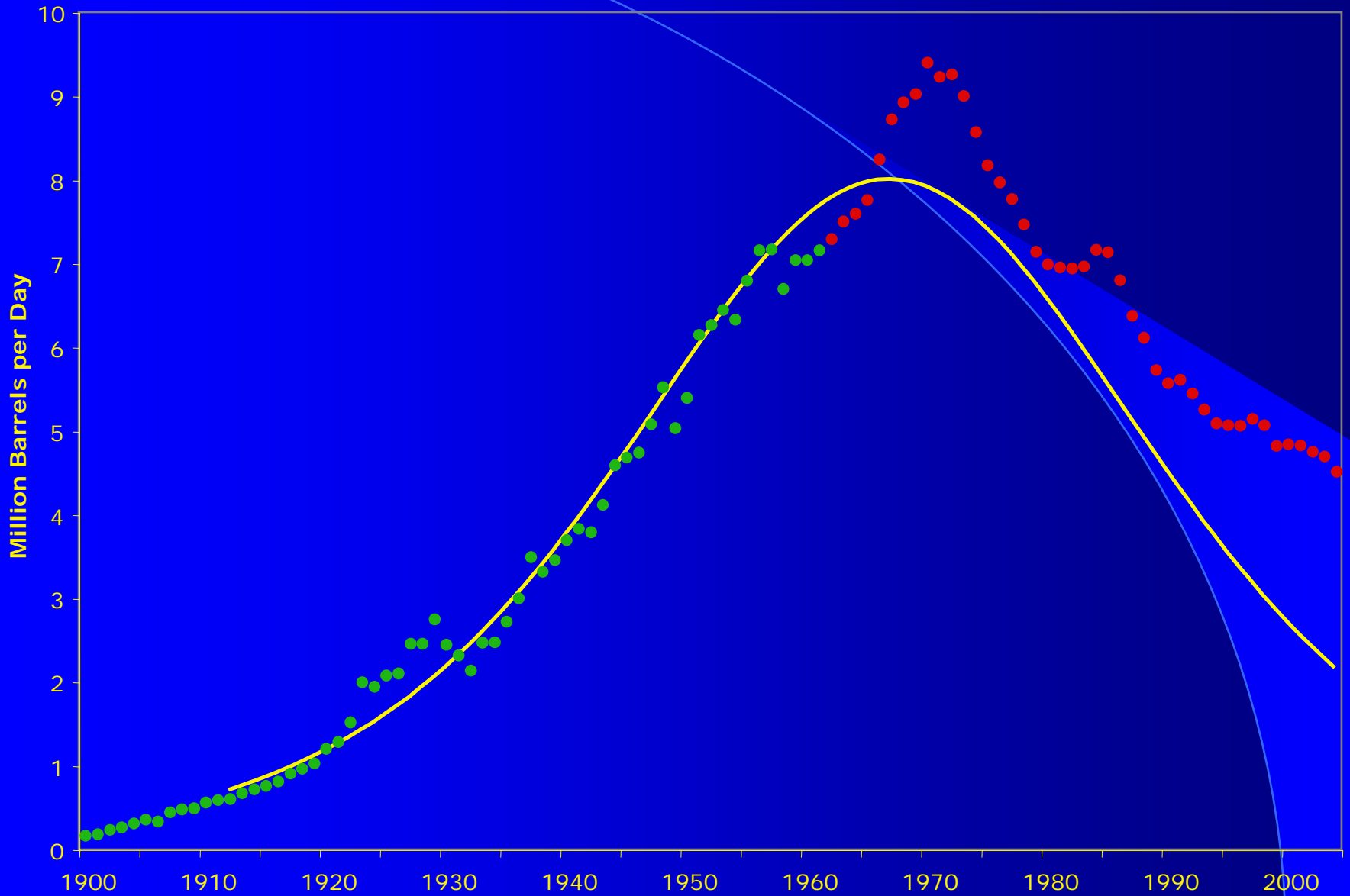
**Oil Companies Do Not
Produce Oil**

**Oil Companies Produce Profit
By Producing Oil When and
Where Conditions Permit**

Summary

- Large uncertainties about the quantity of oil that remains to be produced have little effect on the date for a peak
- Large quantities of alternative fuels will be needed within a short period following the peak
- Uncertainty about the date of the peak generates an a divergence in what maximizes profits for firms and total social welfare for society

Hubbert's Prediction



The Economic, Geological, and Institutional Determinants of Oil Production in the Lower 48 States

Prod	Oil Production in the lower 48 states (billion barrels)
Price	Real wellhead oil prices (1982 dollars per barrel)
Cost	Average cost of production in the lower 48 States (1982 dollars per barrel)
Ration	Fraction of Texas capacity allowed to operate by the TRC (dimensionless)

Hubbert Was Genius & Lucky

Genius:

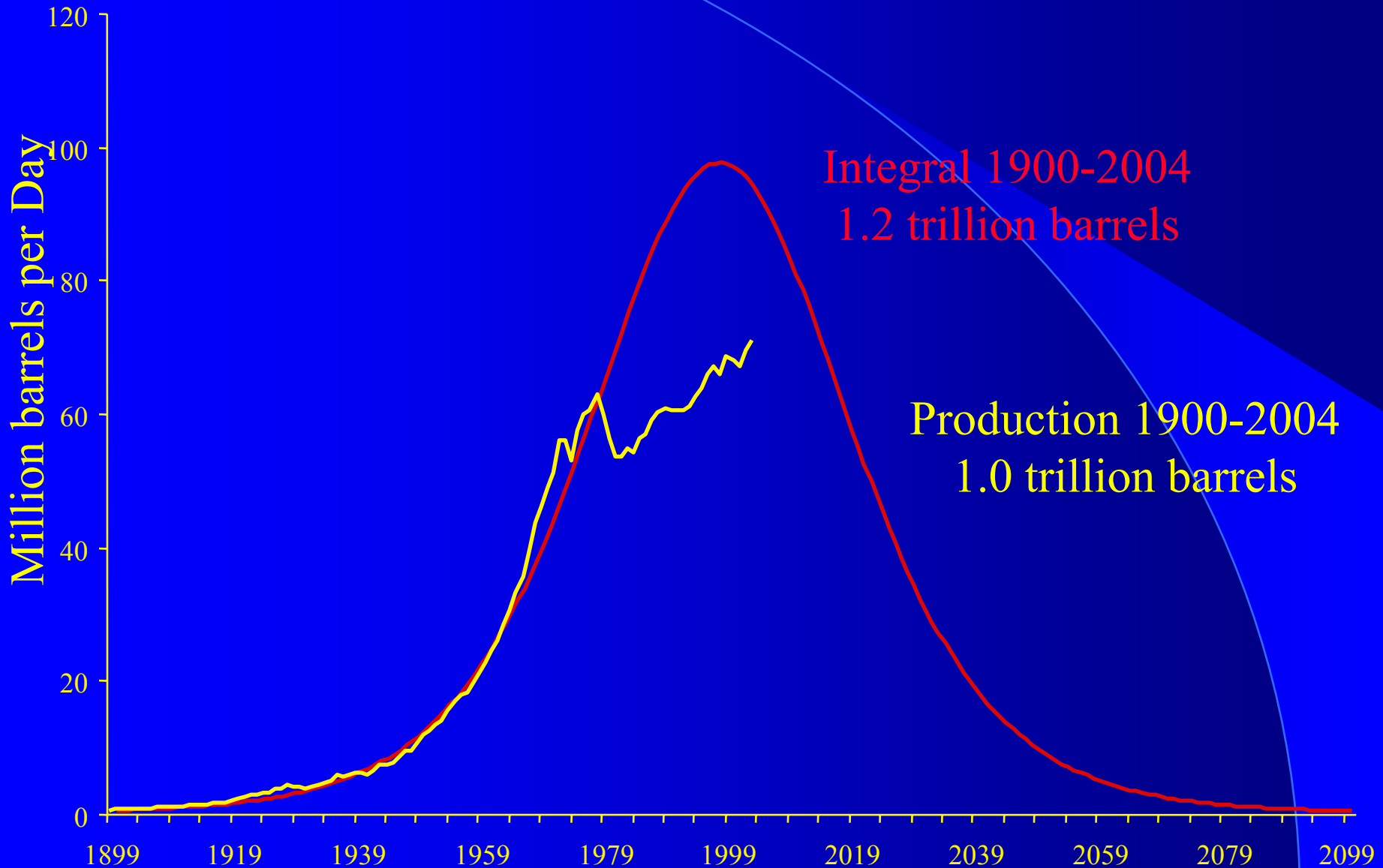
Peak of bell-shaped curve is relatively insensitive to recoverable supply

Lucky:

Prices

Prorationing

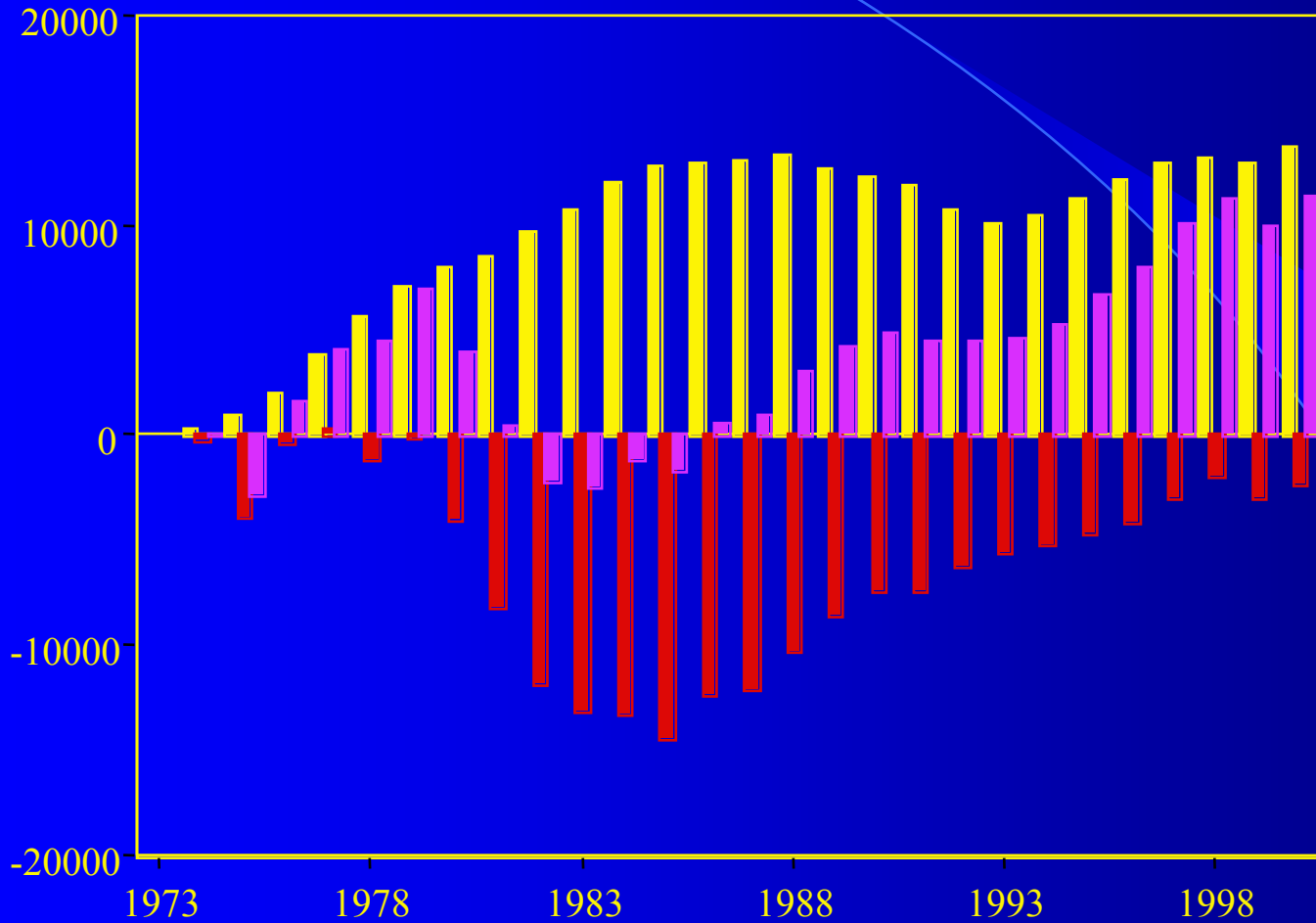
Hubbert's Forecast for a Global Peak



A Demand Constrained World

36 mbd	Increased Consumption 1960-1973
17 mbd	Increased consumption 1973 - 1998

Changes in World Oil Supply/Demand

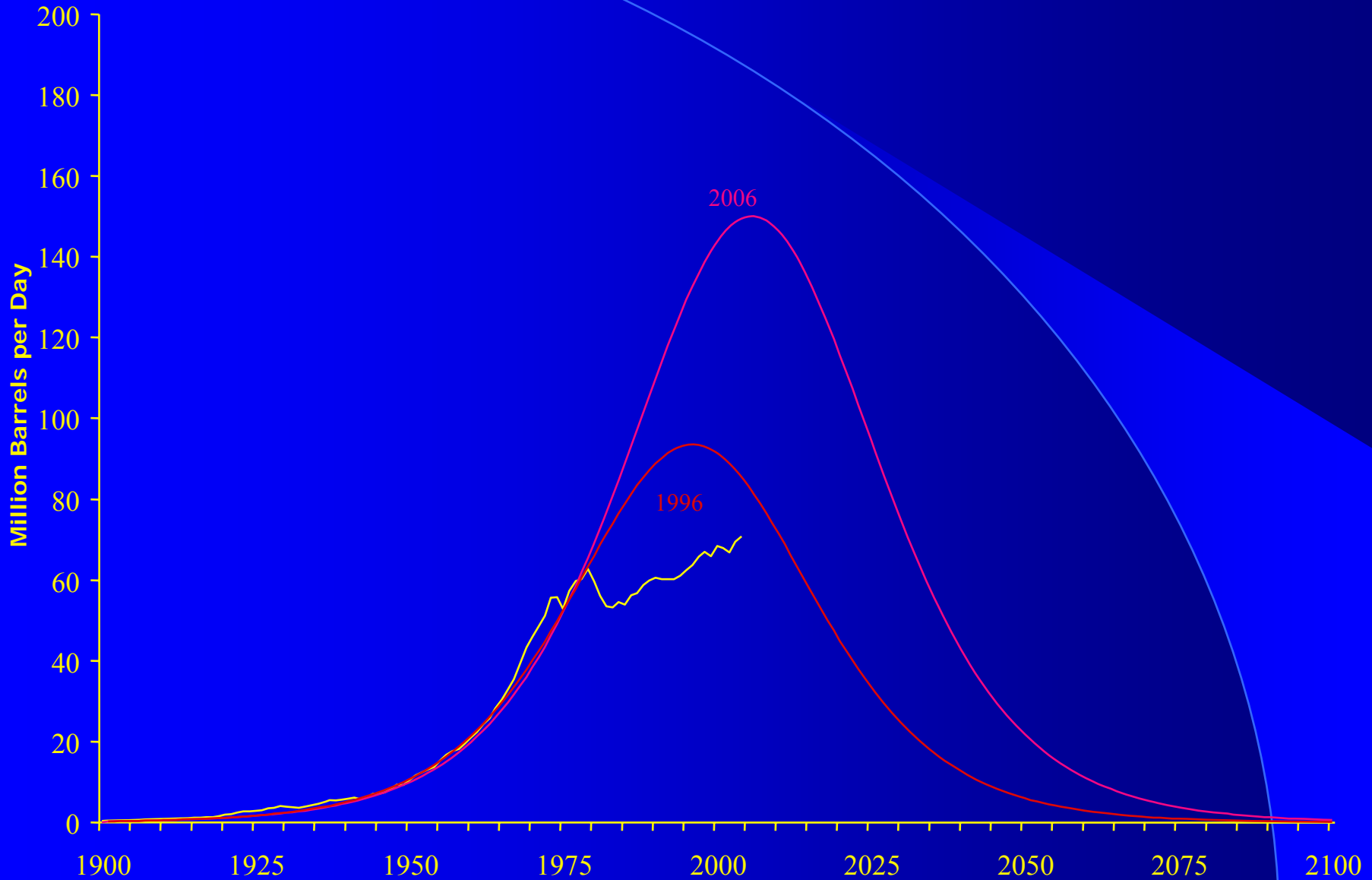


Δ Non-Opec production

Δ Opec Supply

Δ Demand

Slower Demand & Hubbert's Curve



Sources of Uncertainty

How much oil remains

Low estimate 0.8 trillion barrels

High estimate 2.9 trillion barrels

Production path

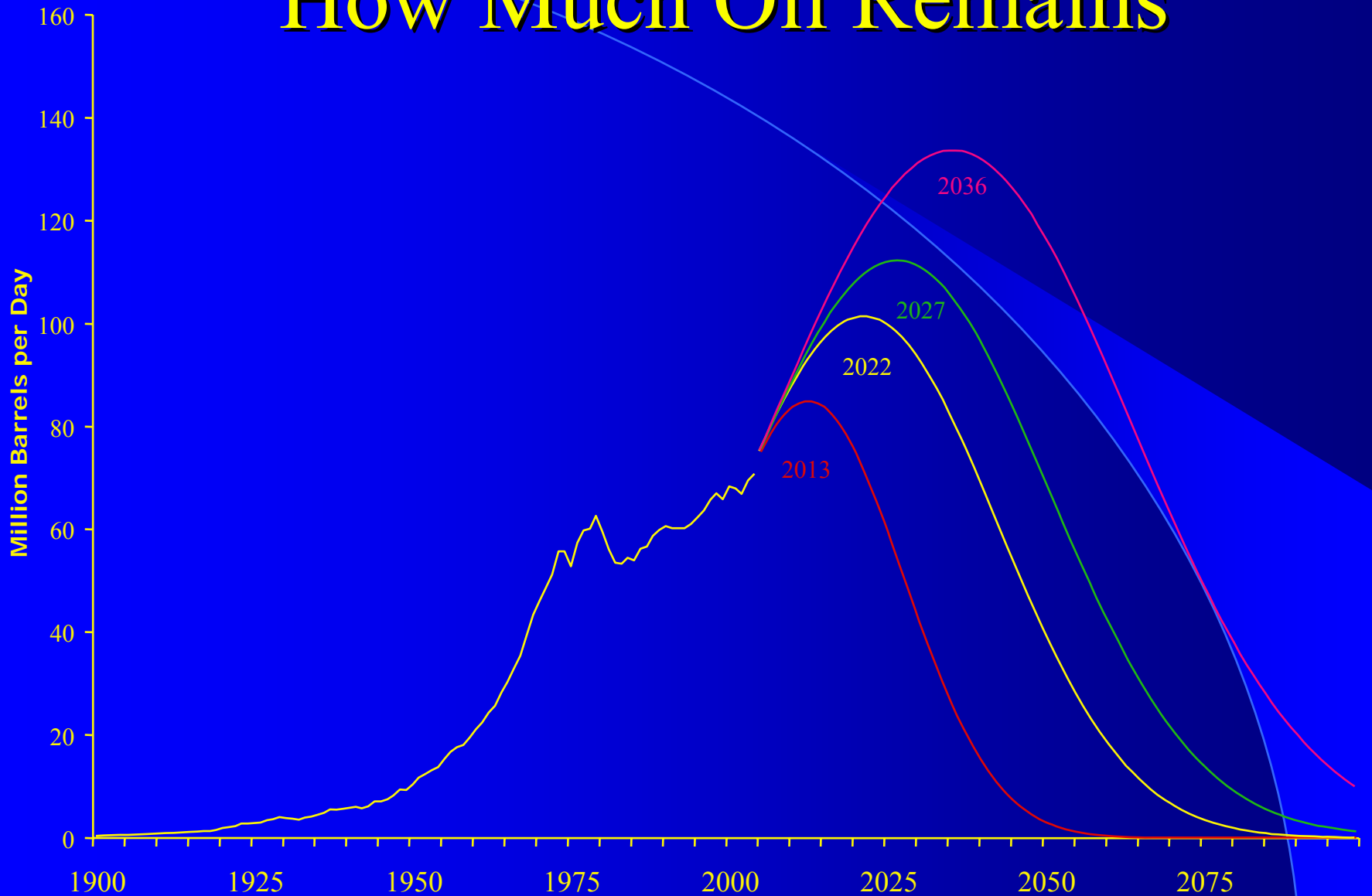
Fast growth, rapid decline

Slow growth, slow decline

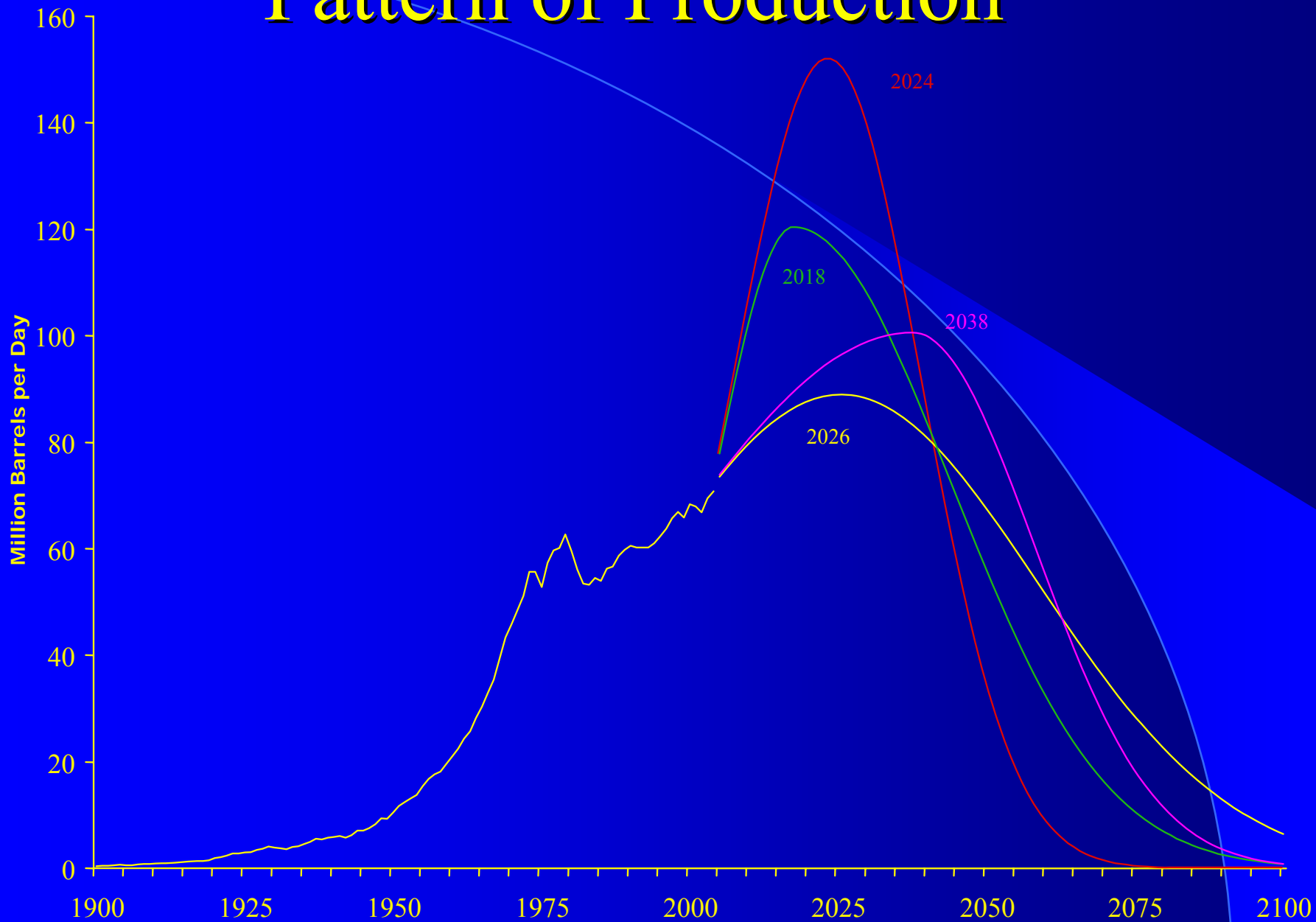
Fast growth, slow decline

Slow growth, fast decline

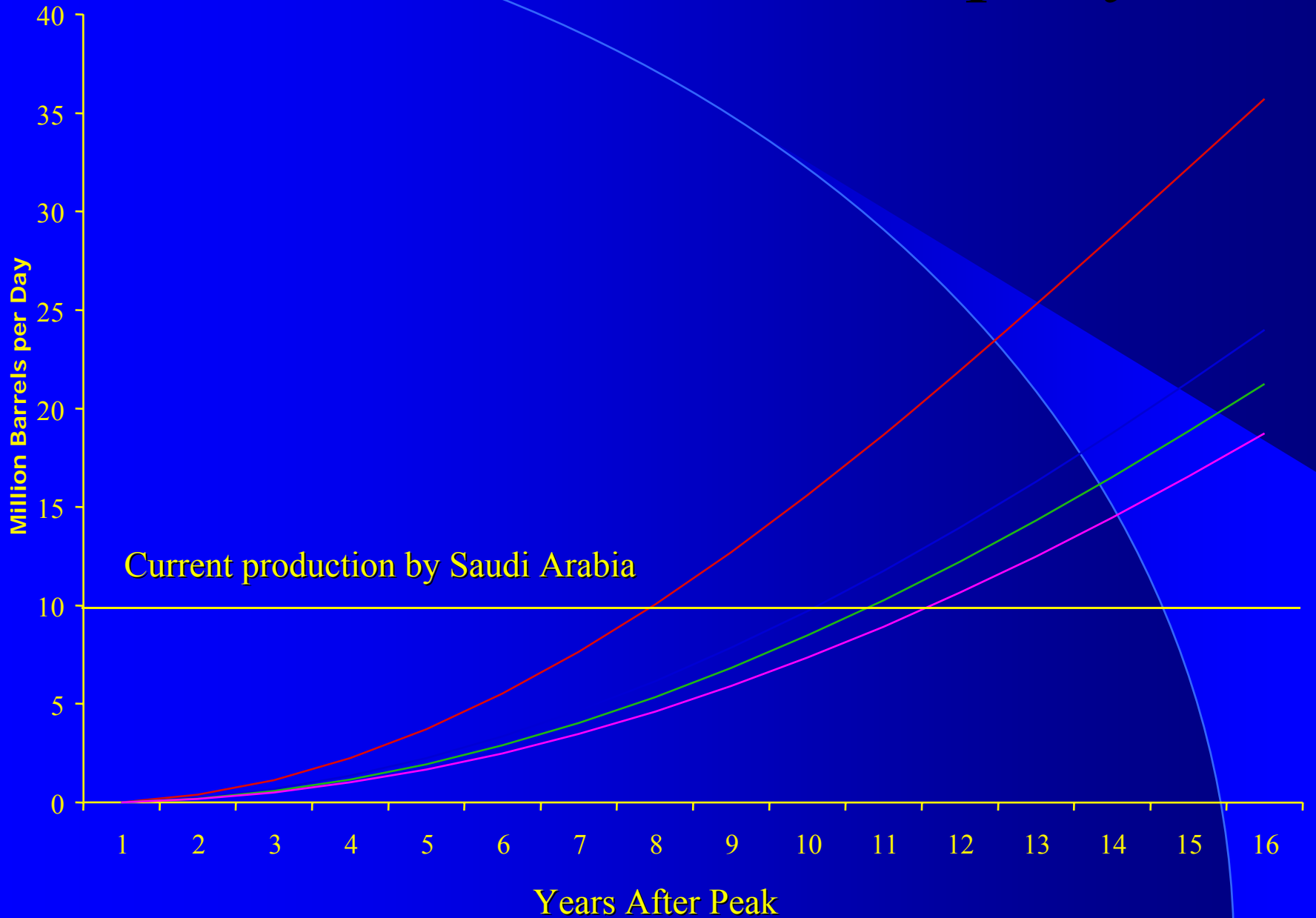
How Much Oil Remains



Pattern of Production



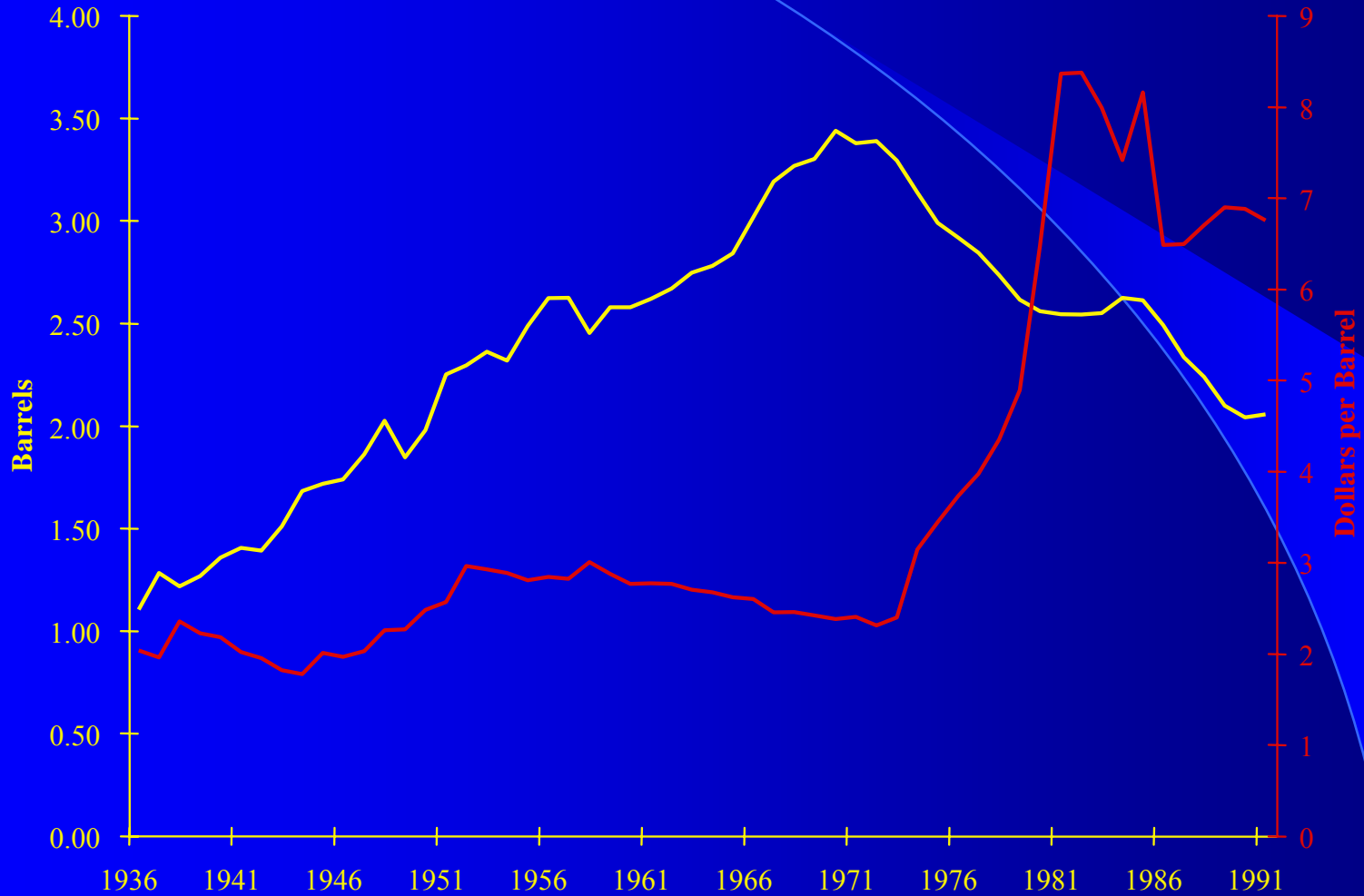
Alternatives Needed Rapidly



Will the Market Deliver Alternatives in a Timely Fashion?

- Higher Prices
- Global Peak

Cost Vs. Production

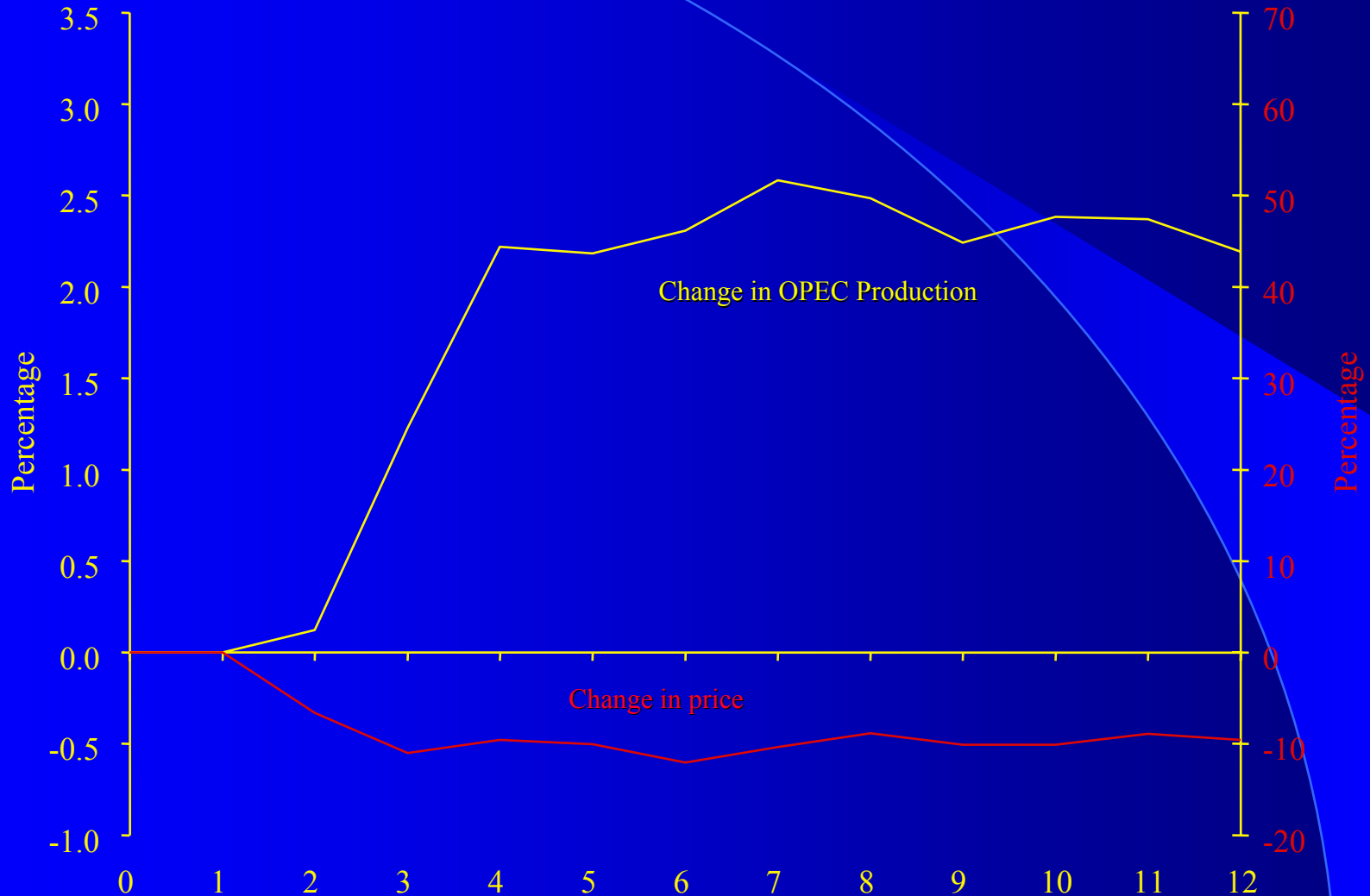


Producer Investments Under Uncertainty

- If realized peak is earlier than expected peak firm is reaps large profits, but society suffers from lack of alternative supply
- If realized peak is later than expected peak, firm suffers large losses, but society is OK
- Outcomes will favor firms to schedule alternative for post-peak period
- This scheduling implies large short-run disruptions for society

**Will OPEC Be Willing to
Increase Production?**

Should OPEC Increase Capacity?



Source: Dees, S, P. Karadeloglou, R.K. Kaufmann, and M. Sanchez, In Press, Modeling the world oil market: assessment of a quarterly econometric model, *Energy Policy*

Wake-Up--What You Missed!

- Regardless of how much oil remains and the rate at which production rises or falls, global oil production is likely to peak between 2012 and 2032
- A new Saudi Arabia of alternatives is needed within a decade of the peak
- The competitive market is unlikely to deliver alternatives in a timely fashion
- OPEC is not likely to increase production to generate a nice peak