

# **WORLD OIL SUPPLY AND IMPACT ON TRANSPORTATION**

**WILLIAM L. FISHER  
JACKSON SCHOOL OF GEOSCIENCES  
THE UNIVERSITY OF TEXAS AT AUSTIN**

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ON  
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# THE SYMMETRICAL LIFE CYCLE

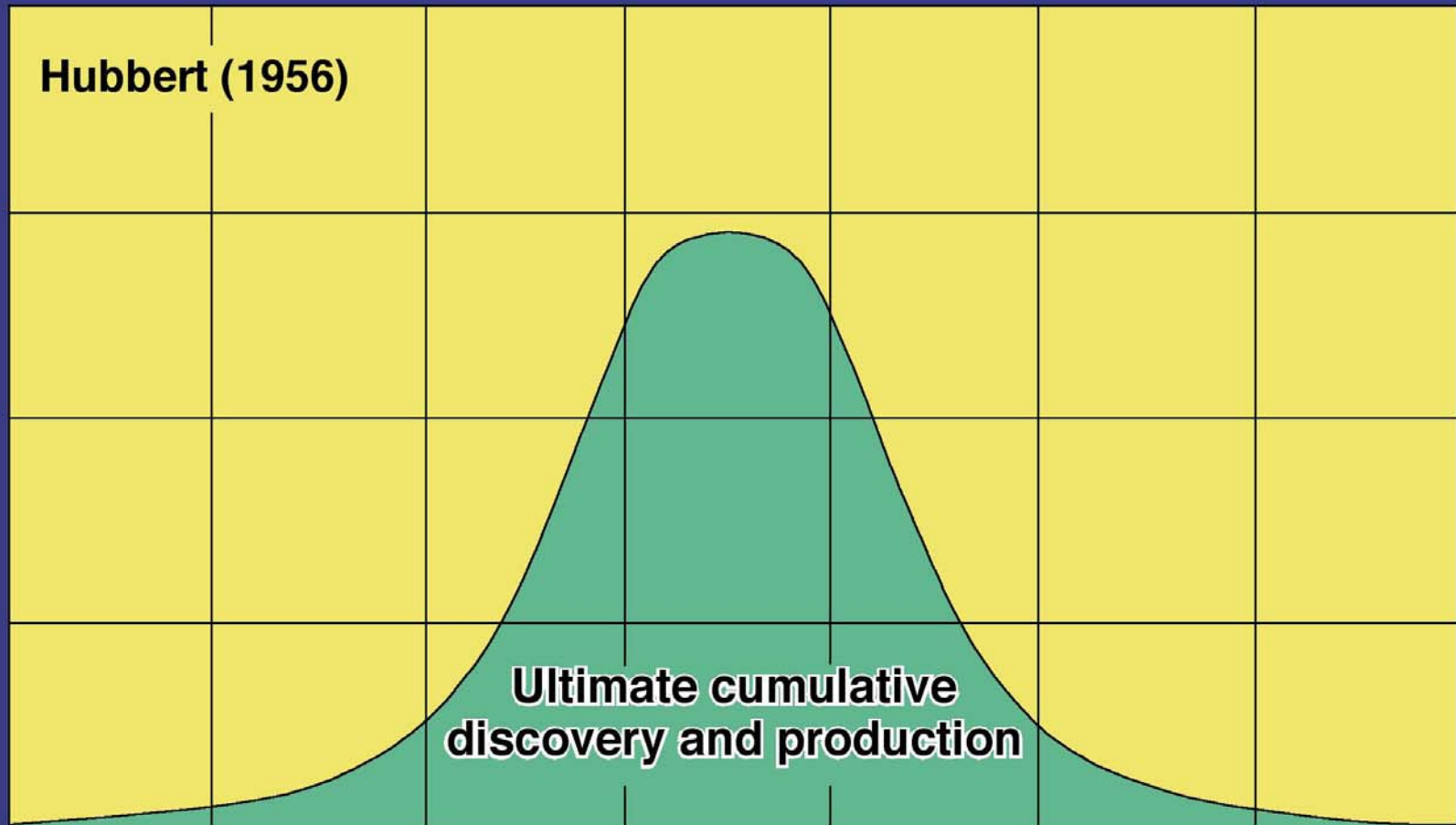
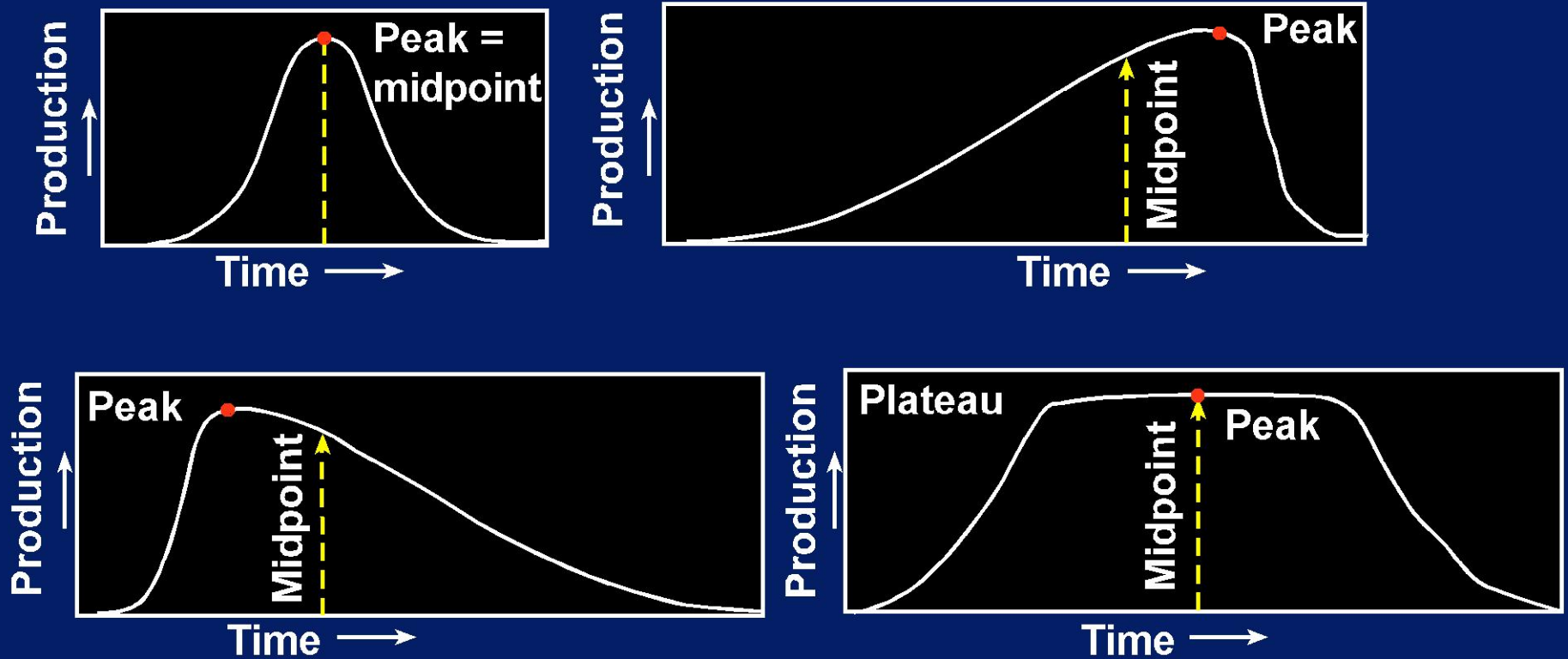


FIGURE 1

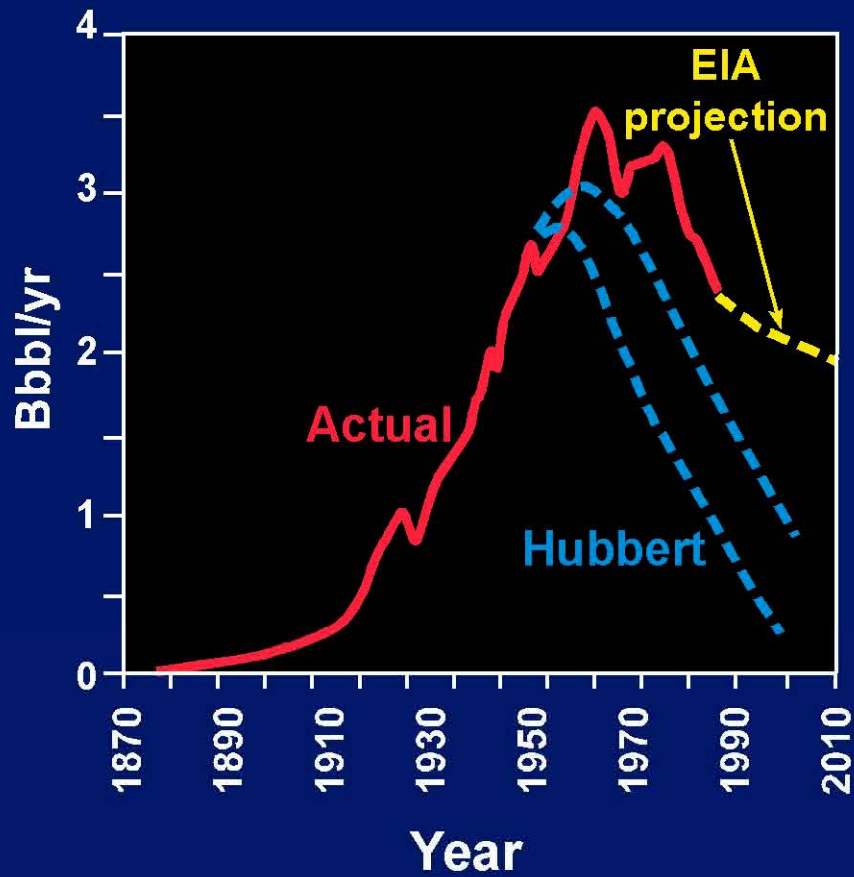
# PRODUCTION PATTERNS OVER TIME



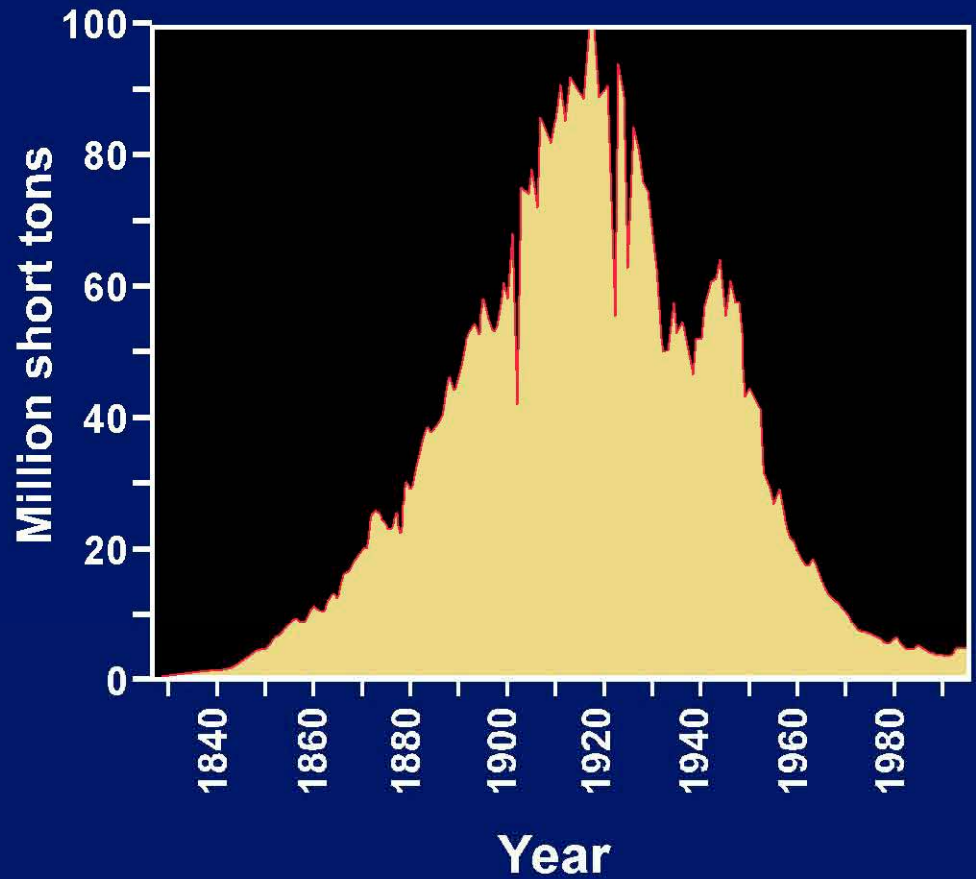
Schollnberger (1998)

FIGURE 2

# U.S. OIL PRODUCTION



# PENNSYLVANIA ANTHRACITE PRODUCTION



From McCabe

FIGURE 3

# U.S. NATURAL GAS PRODUCTION

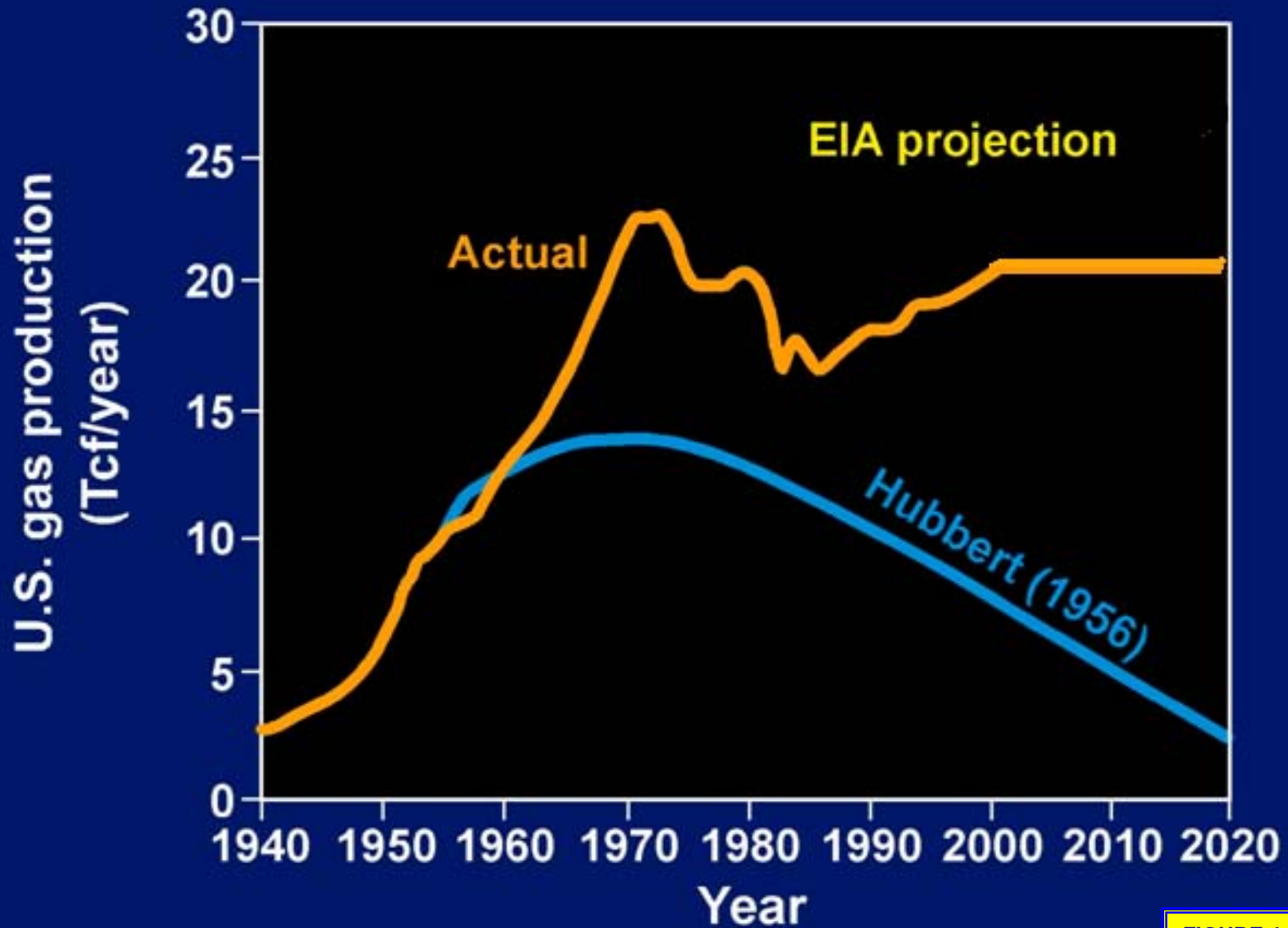


FIGURE 4

# RECENT ESTIMATES: ULTIMATE OIL RECOVERY, WORLD

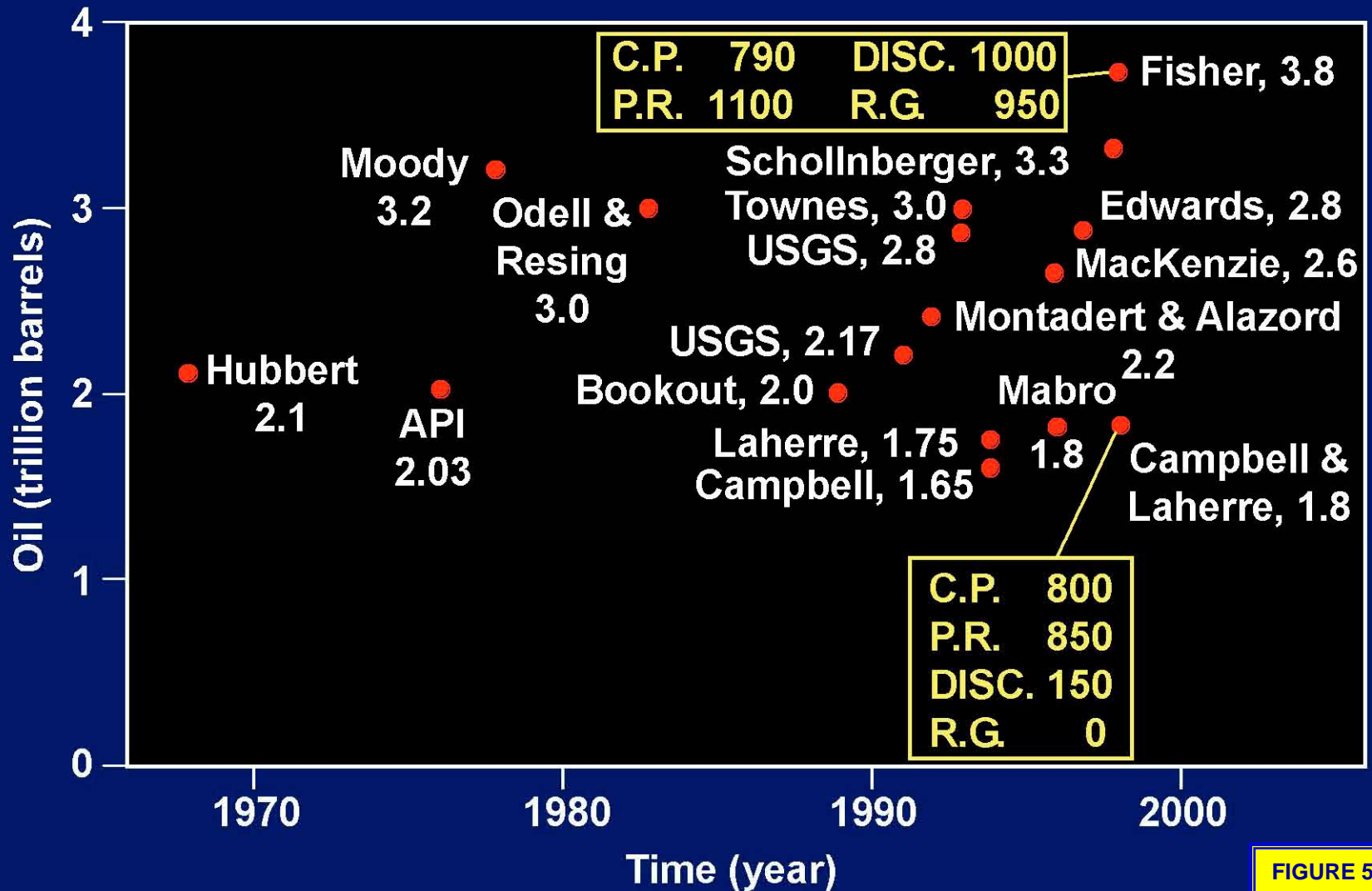
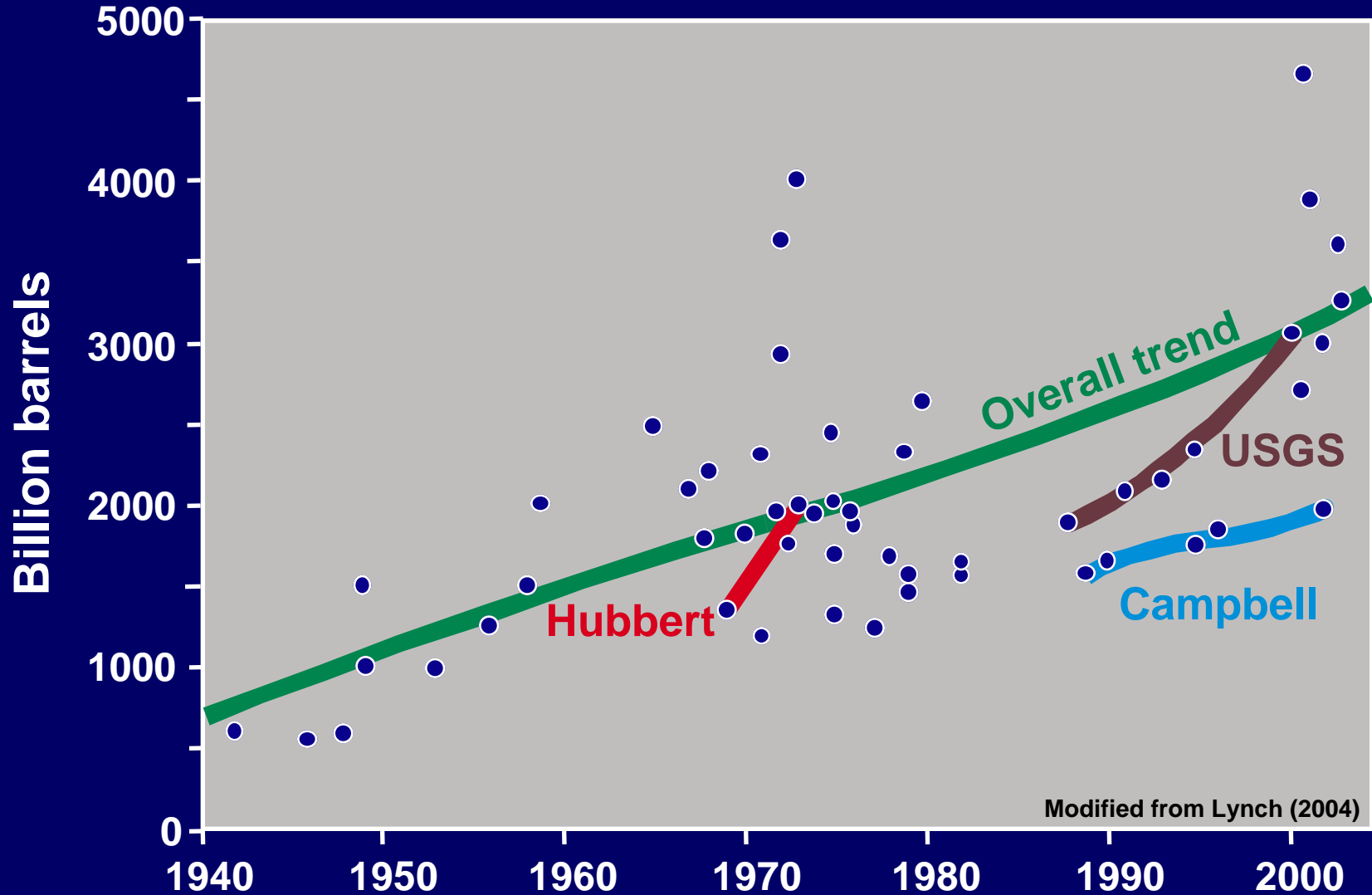


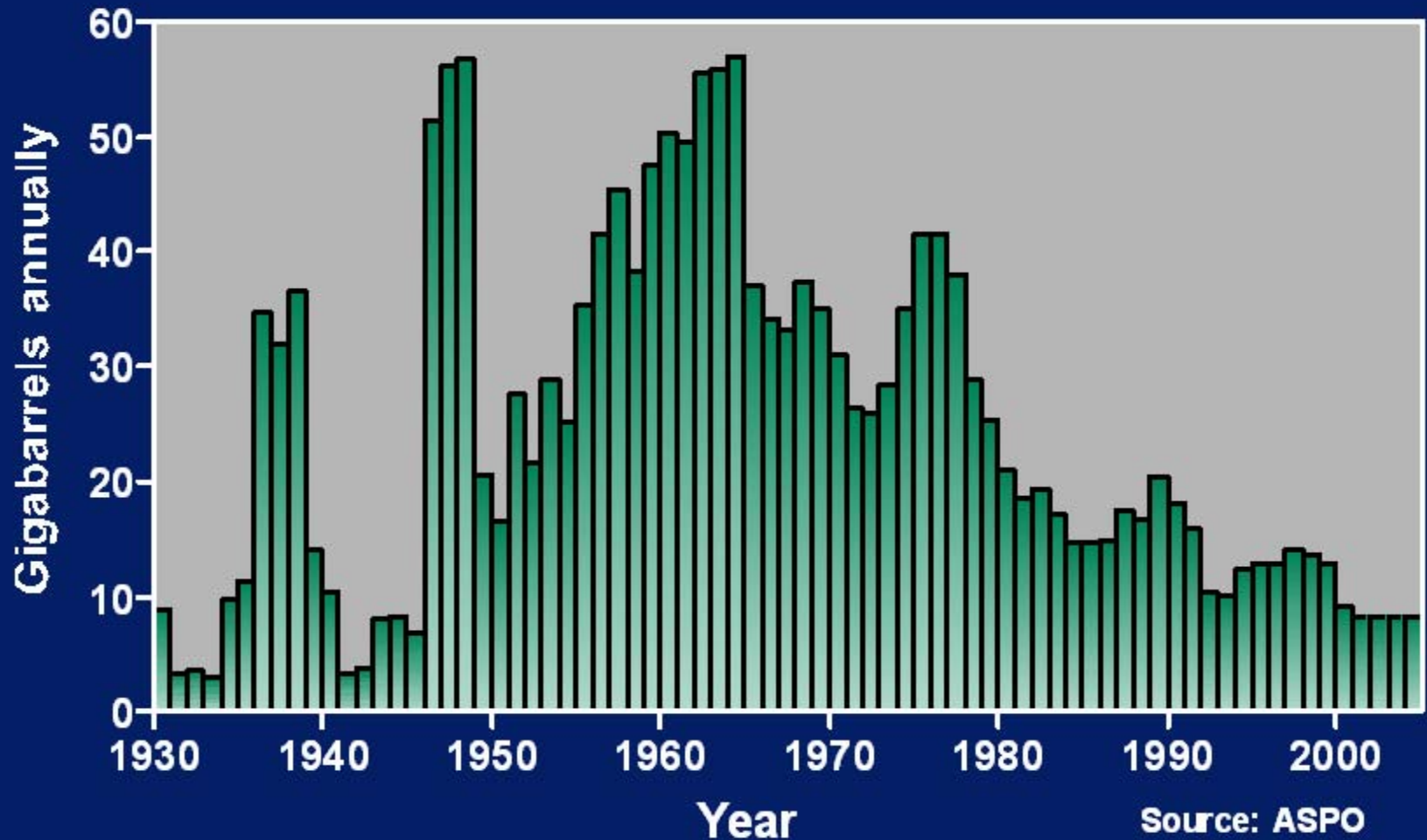
FIGURE 5

# ESTIMATES OF ULTIMATE OIL RECOVERY (GLOBAL)



Modified from Lynch (2004)

# DISCOVERY



Source: ASPO

FIGURE 7



# DISCOVERY MINUS PRODUCTION

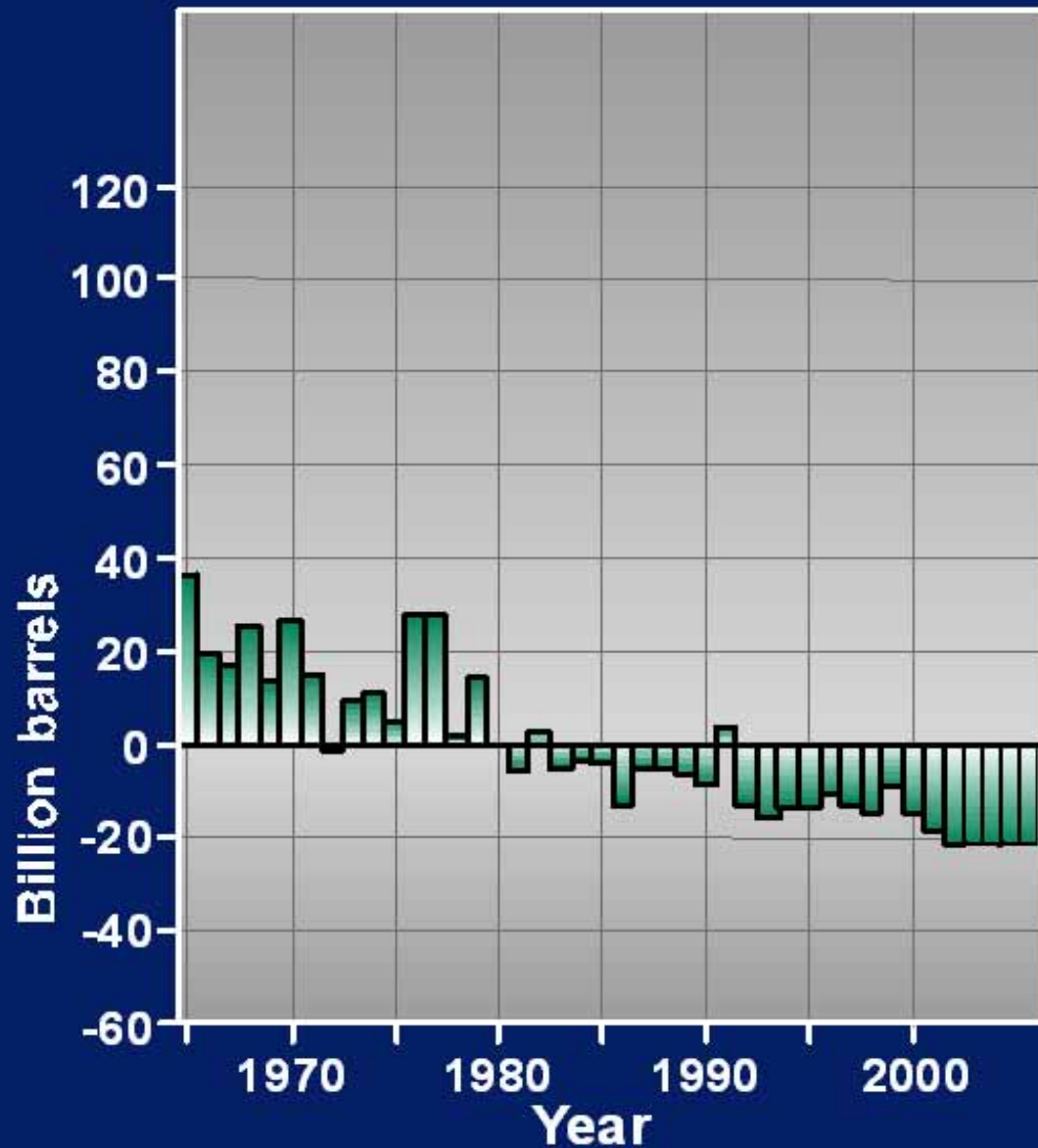


FIGURE 8

# TOTAL DISCOVERY TO DATE WORLDWIDE

- **6.8 TRILLION BARRELS IN CONVENTIONAL RESERVOIRS**
- **AMOUNT OF OIL RECOVERED FROM THESE RESERVOIRS INCREASES OVER TIME WITH BETTER RECOVERY TECHNOLOGIES**
- **CURRENTLY, AVERAGE GLOBAL RECOVERY IS 34%, MEANING 2.3 OF THE 6.8 TRILLION BARRELS HAS BEEN OR WILL BE RECOVERED**
- **INCLUDES 1.1 TRILLION PRODUCED AND CONSUMED TO DATE**
- **PLUS 1.2 TRILLION BARRELS, PROVED RESERVES YET TO BE PRODUCED**
- **WACH 1% INCREASE IN RECOVERY EQUALS 68 BILLION BARRELS**

# SOURCES OF RESERVE GROWTH

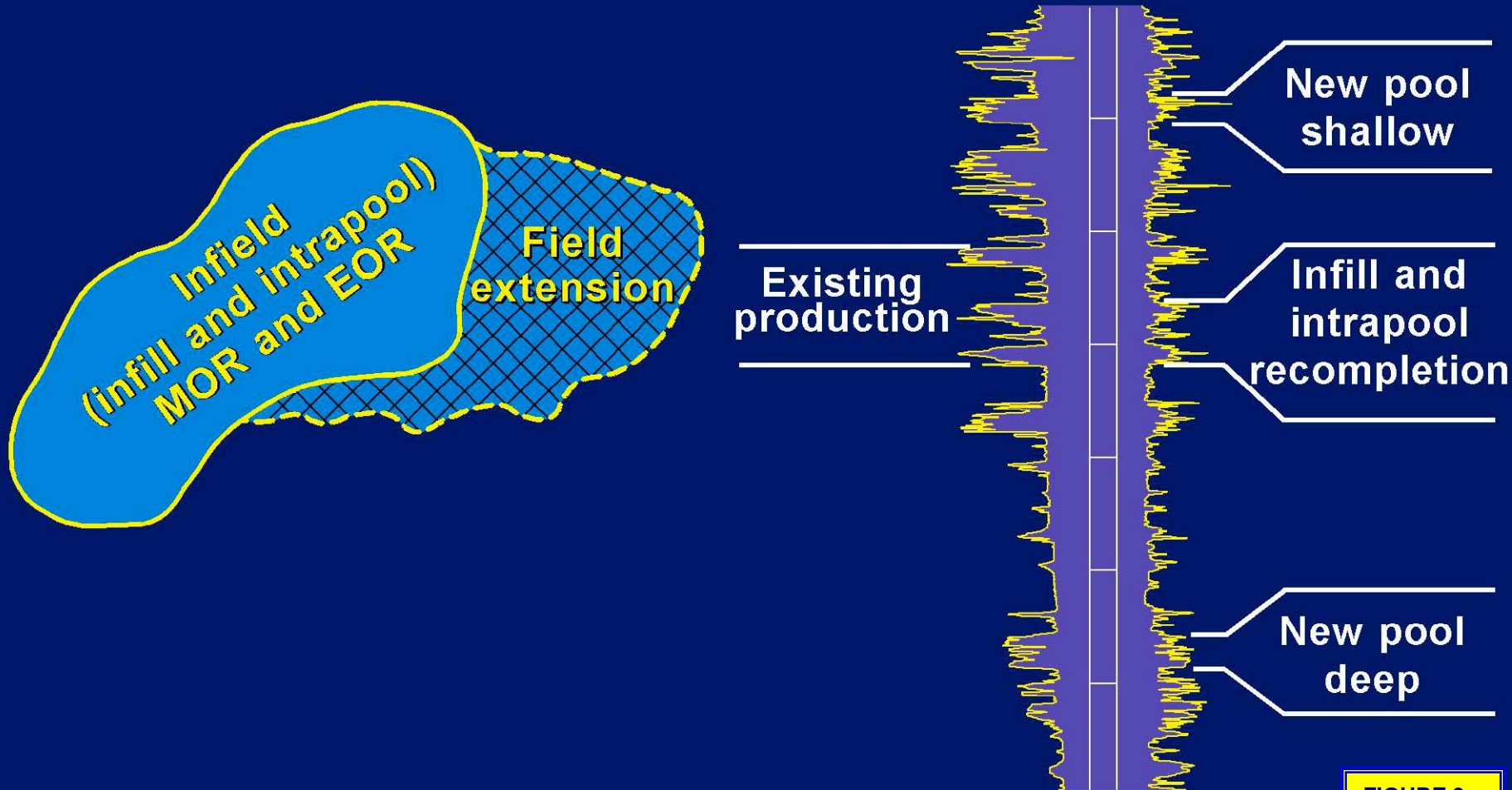


FIGURE 9

# TOTAL ADDITIONS MINUS PRODUCTION

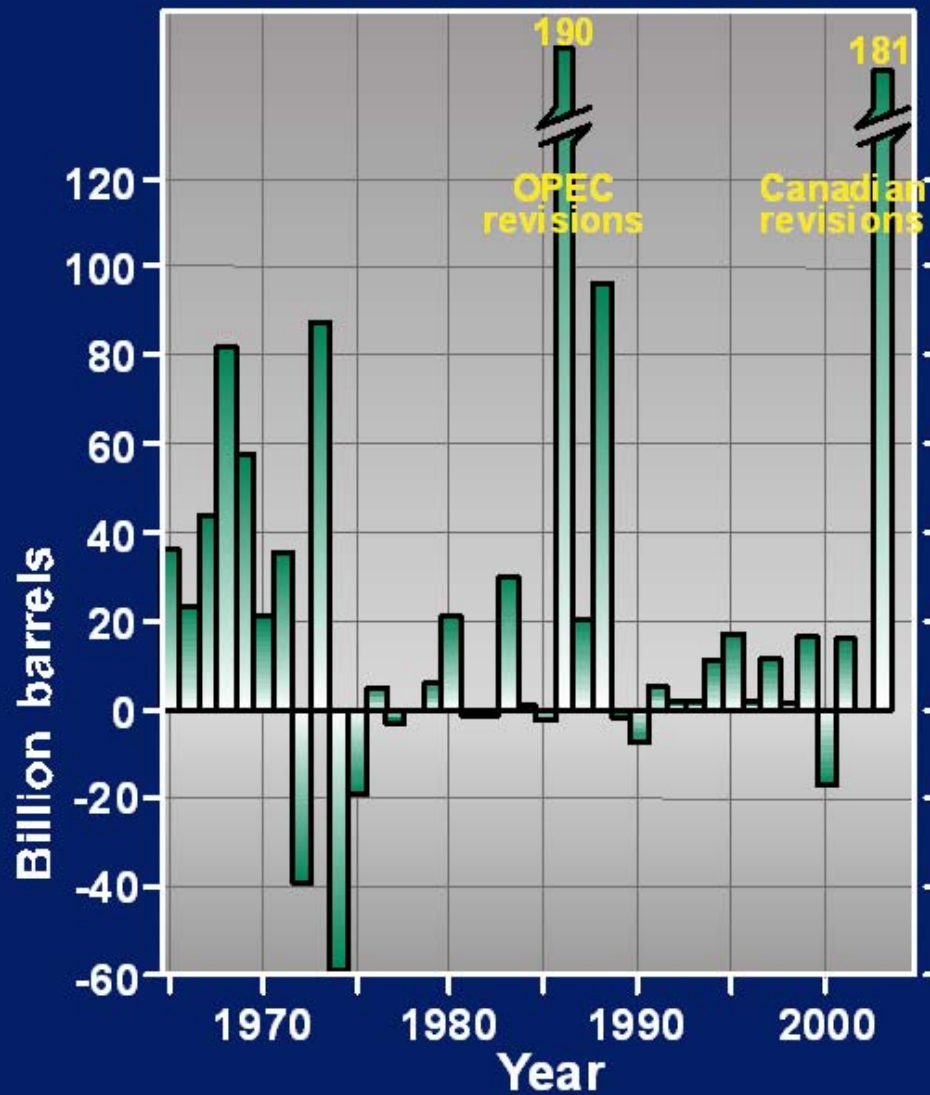


FIGURE 10

# OIL SOURCES BEYOND THE CONVENTIONAL

**EXTRA HEAVY OIL, NOTABLY IN CANADA AND VENEZUELA..... 4.1 TB**

**SOURCE ROCKS, LIKE THE BAKKEN AND THE BARNETT..... 3.0**

**OIL SHALE, SUCH AS THE GREEN RIVER IN COLORADO AND WYOMING..... 3.2**

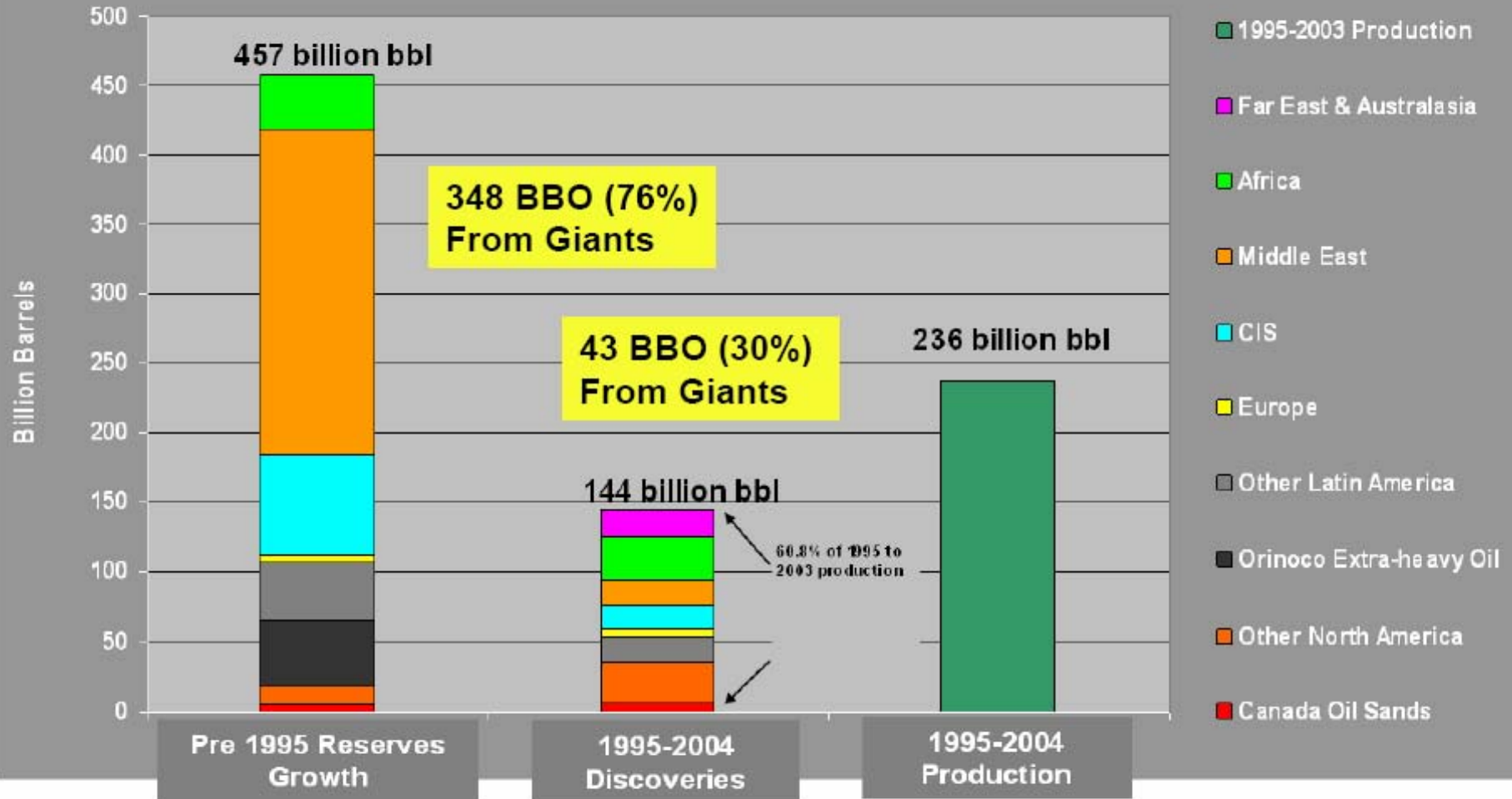
**TOTAL IN PLACE ..... 10.3**

**PLUS GAS TO LIQUIDS (GTL), COAL TO LIQUIDS (CTL) AND BIOFUELS**

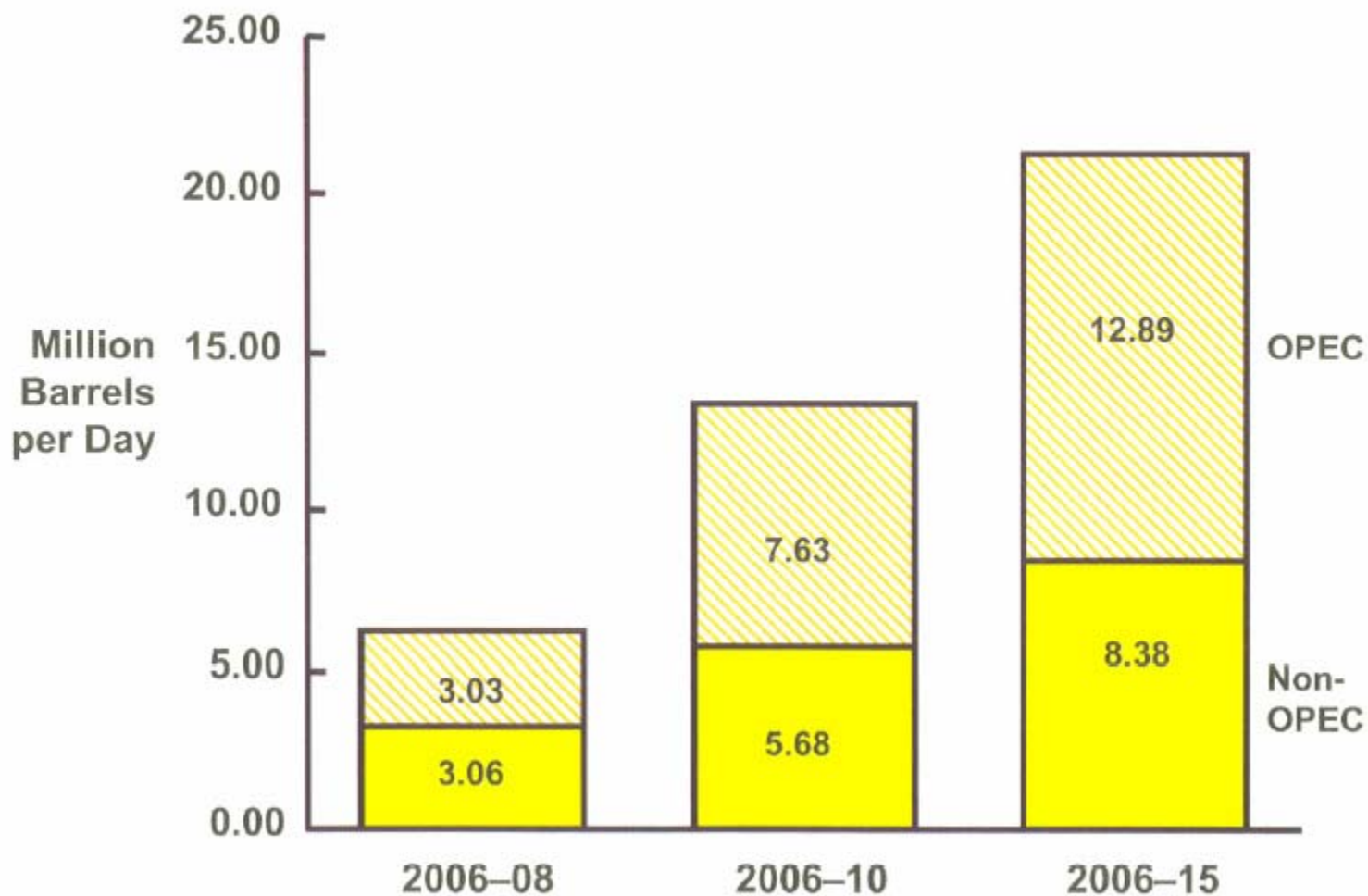
# World Liquids "Reserve Replacement" Adjustments, New Information & Technology Growth vs. Discoveries & Production 1995-2004



Revisions to Resource Estimates of Pre-1995 Discoveries compared with New-Field and New-Pool Resource Additions made between 1995 and 2003

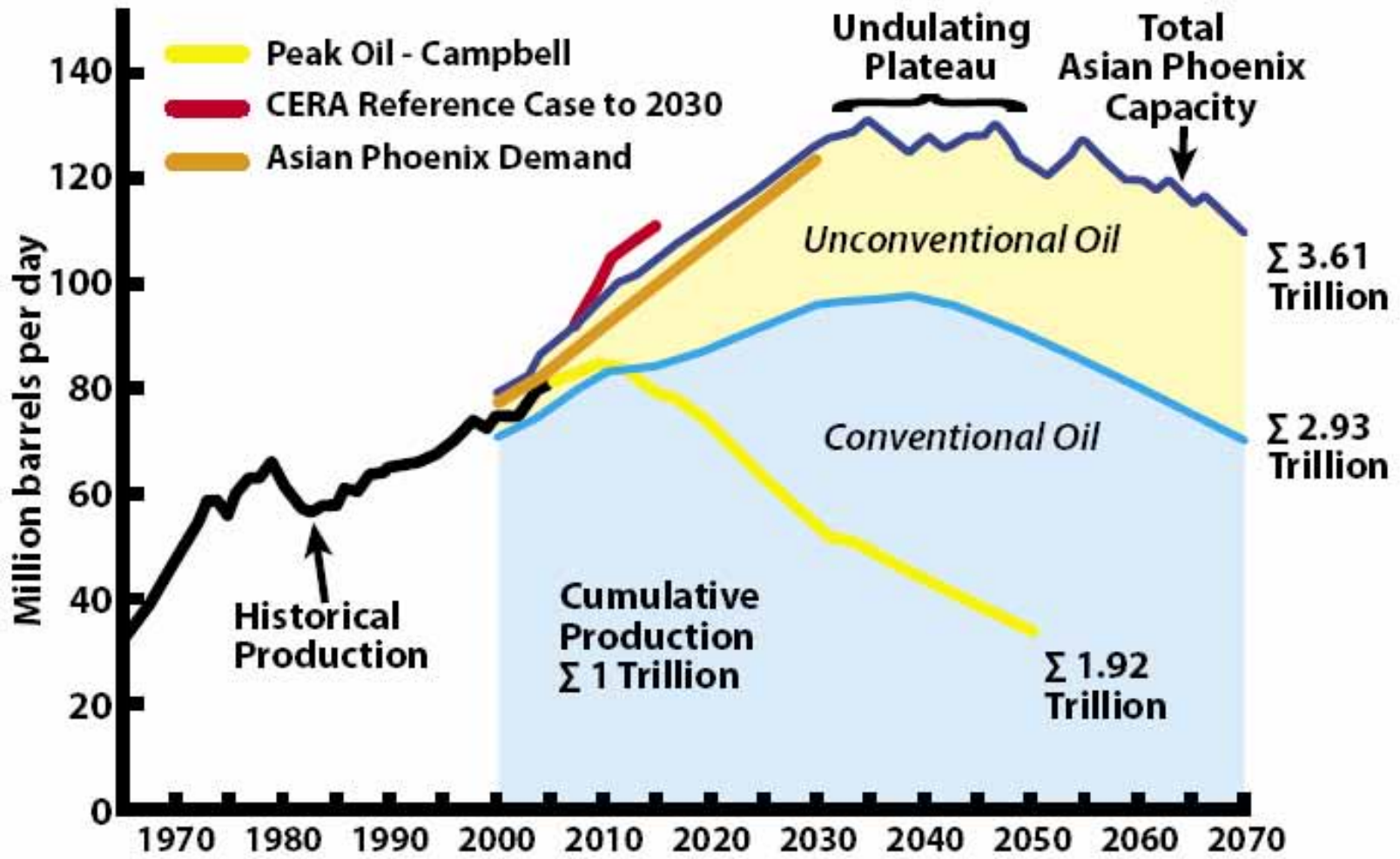


# Global Productive Capacity Growth



Source: Cambridge Energy Research Associates.  
Updated May 2006

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Source: Cambridge Energy Research Associates

FIGURE 13



# CONCLUSIONS

- **WE ARE NOW EXPERIENCING HIGH OIL PRICES BROUGHT ON BY A SUPPLY/DEMAND IMBALANCE, LARGELY DUE TO RAPID INCREASE IN DEMAND FROM EMERGING ECONOMIES. THE SITUATION IS ALSO COMPOUNDED BY THE WEAK DOLLAR, THE CURRENCY IN WHICH OIL IS PRICED, AND TO SOME EXTENT BY HIGH SPECULATION**
- **BUT, THERE ARE ADEQUATE REMAINING RESOURCES OF OIL TO SUPPORT A GLOBAL PRODUCTION ON THE ORDER OF 120 MILLION BARRELS PER DAY, 40% GREATER THAN CURRENT PRODUCTION**
- **FURTHER, RECENT AUDITS OF RESERVE ADDITIONS SHOW THAT RESOURCES ARE BEING CONVERTED TO PRODUCIBLE RESERVES AT A RATE SUBSTANTIALLY EXCEEDING DEMAND**
- **AND, IMPORTANTLY, THERE ARE SUFFICIENT PROJECTS UNDERWAY THAT WILL INCREASE PRODUCTION CAPACITY IN THE NEAR AND INTERMEDIATE TERM ABOVE PROJECTED DEMAND LEVELS**
- **PROJECTING IMMEDIATE OR EARLY PEAKING OF GLOBAL OIL PRODUCTION INVOLVES MAKING ASSUMPTIONS THAT ARE NARROW AND LIMITING AND IN SOME CASES INCONSISTENT WITH THE FACTS**