Is The World Facing a 3rd Oil Shock?

Klaus Rehaag

Head, Oil Industry & Markets Division

Editor, Oil Market Report

International Energy Agency

Paris, France

klaus.rehaag@iea.org

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Overview

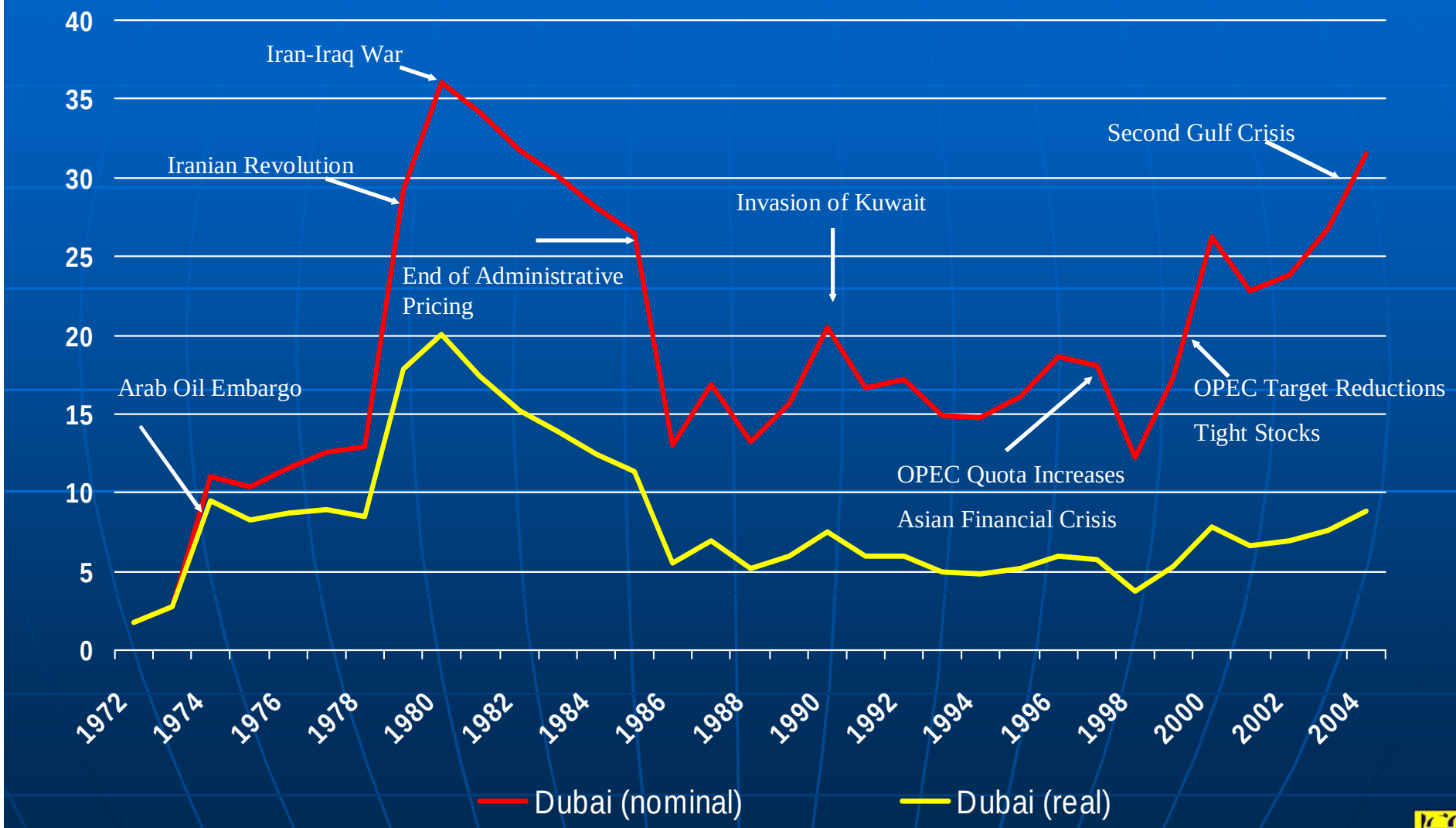
- Is The World Facing A Third Oil Shock? -

- Is the civilized world coming to an end?
- What constitutes an “oil shock”?

- Are we running out of oil?
- Are we faced with a supply crunch?

- Is the system capacity constrained?
- Are we overloading the system?

Nominal vs. Real Crude Prices – Base 1972, US$ Per Barrel



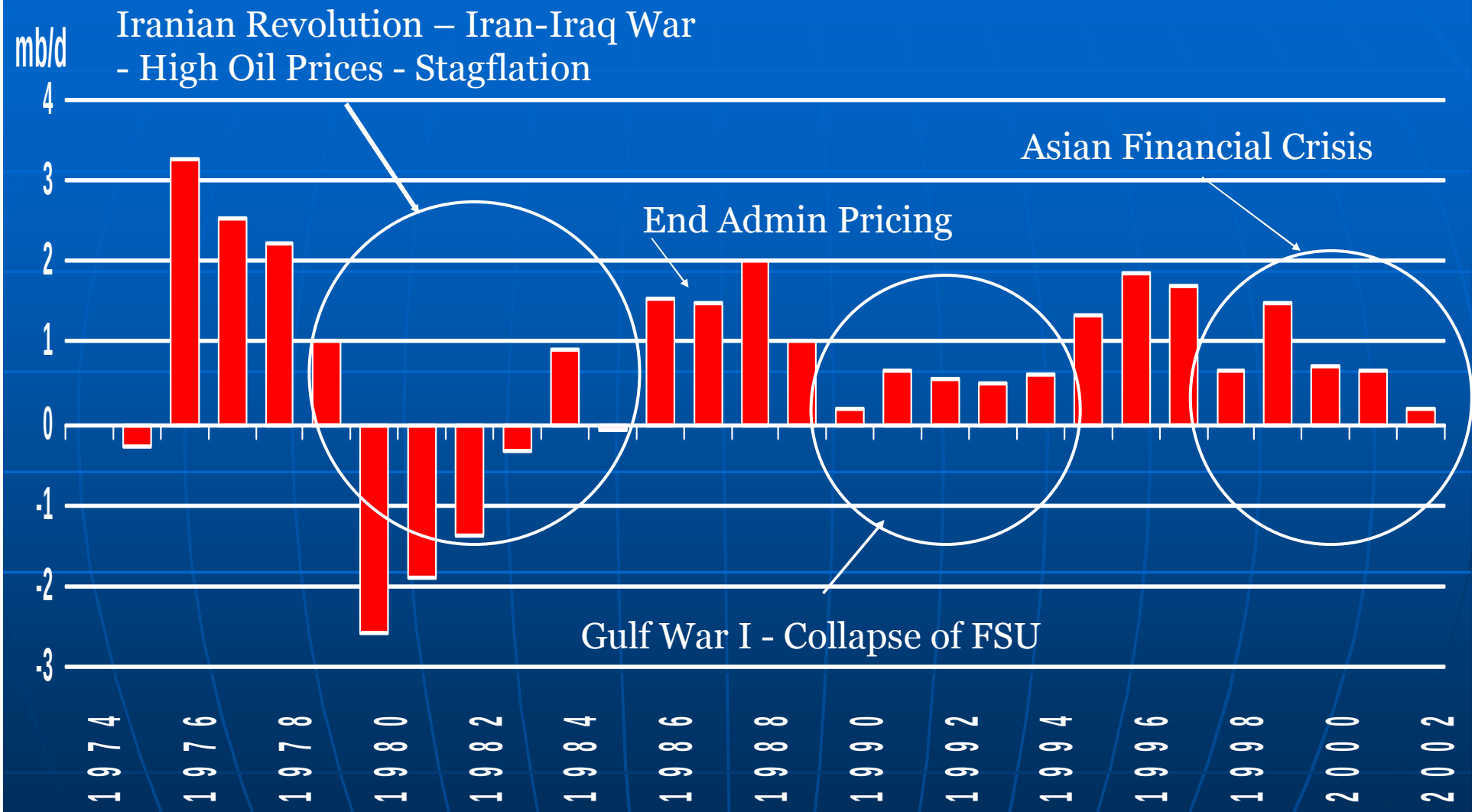
A "Third" Oil Shock?

- "Two" oil shocks:
  - Arab oil embargo
  - Iranian revolution
- What makes these events unique – defining characteristics?
  - Political nature of supply disruption?
  - Supply shortfall?
  - Sharp price adjustment?
- Have experienced other major supply & price adjustments (up, down):
  - End of Administrative Pricing
  - Gulf war II / Invasion of Kuwait
  - Collapse of FSU
  - Asian Financial Crisis
  - Venezuela / Nigeria / Gulf War II

Anatomy of a "Third" Oil Shock?

- Can construct a Middle East doomsday scenario – political oil embargo
- But how likely?
  - Revenue dependency - in everyone's interest to keep oil flowing
  - Trade with communist Russia, China happened during the Cold War
  - Iran still struggling to recover lost oil revenues, development
  - Will take years to regain confidence in Venezuelan oil industry
  - Permanent loss of demand:
    - High prices and supply insecurity promote policies to encourage fuel efficiency, fuel substitution, development of alternative fuels
    - Individuals change behavior if perception of structural shift
    - Once developed, technologies will not go away (oil sands; GTL, coal-to-liquids; fuel cells; solar; CNG; combined cycle; hydrogen)

Roller Coaster of World Demand Growth



What is "NORMAL" demand growth?

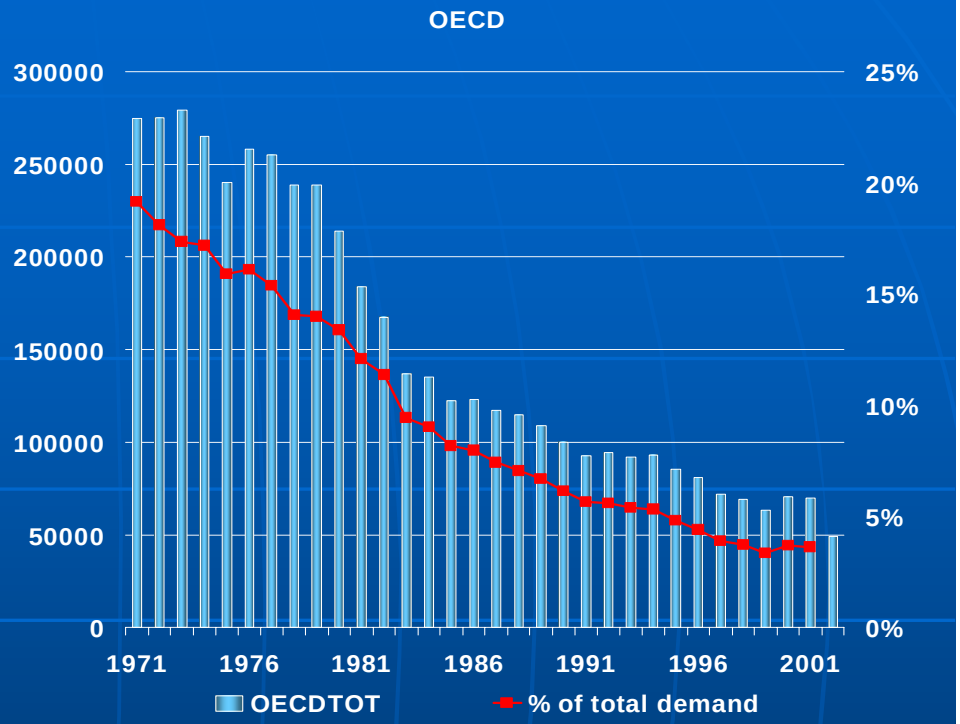
Traditional rule of thumb: 0.4 to 0.6 of GDP growth

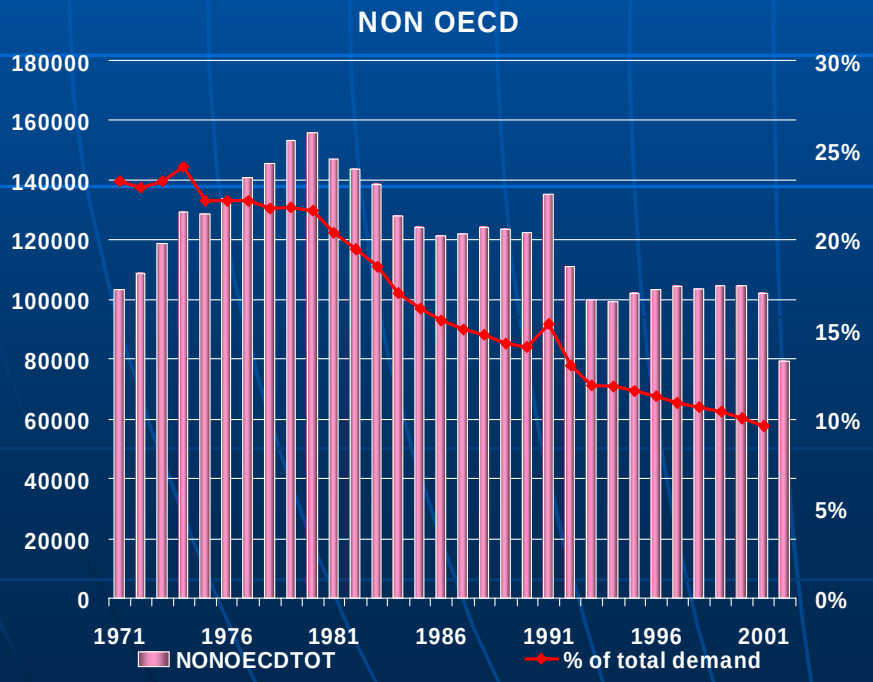
Structural Changes in Fuel Oil Demand (Mtoe)

- IEA countries committed not to build any further oil generating facilities

- Steady OECD decline - fuel oil demand plummeted from 18% to under 5%

- Problem for refiners – how to dispose of bottom of the barrel?

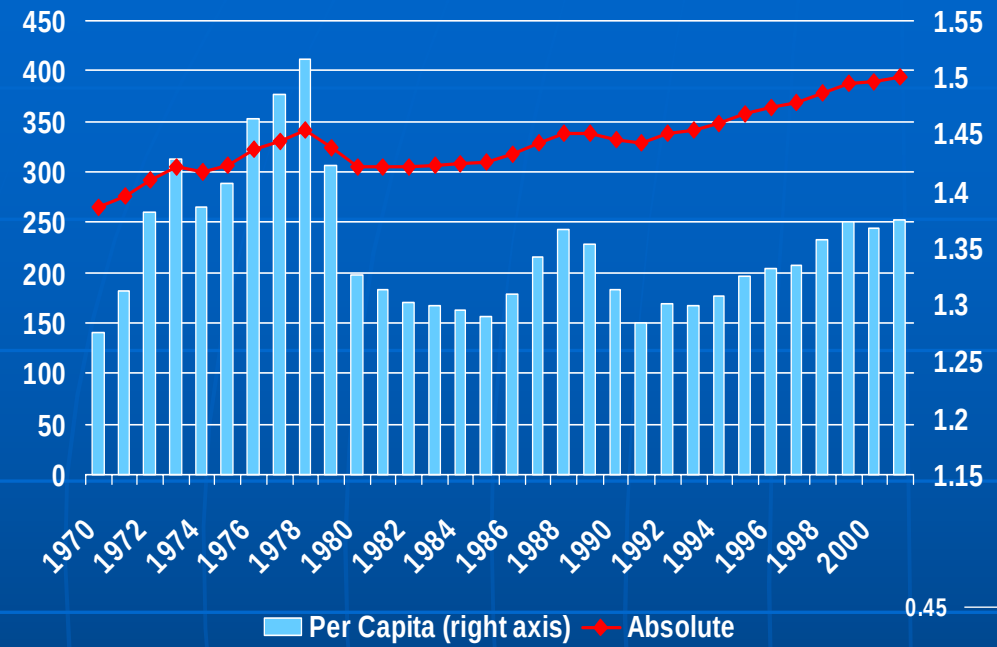




- Fuel oil much larger component of overall non-OECD demand – 10% of barrel

- Demand may increase over the short-term with rapid economic expansion and limited alternative power generation infrastructure

Us Gasoline Prices & Consumption

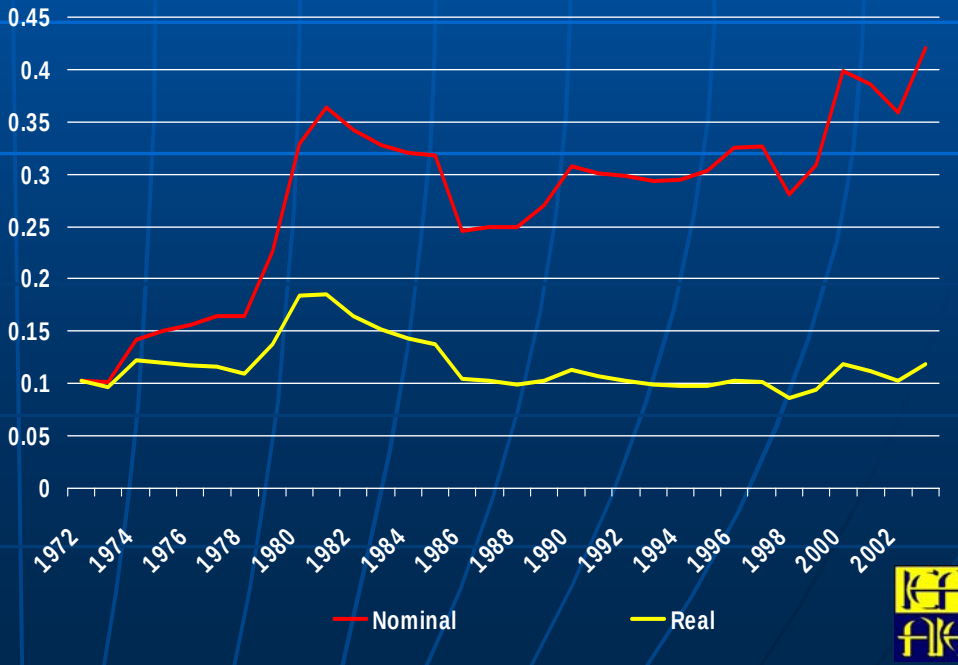


US Gasoline Consumption (Mtoe)

Climbing in absolute terms, reasonably steady on a per capita basis

Nominal vs. real US gasoline prices – base 1972, US$ per litre

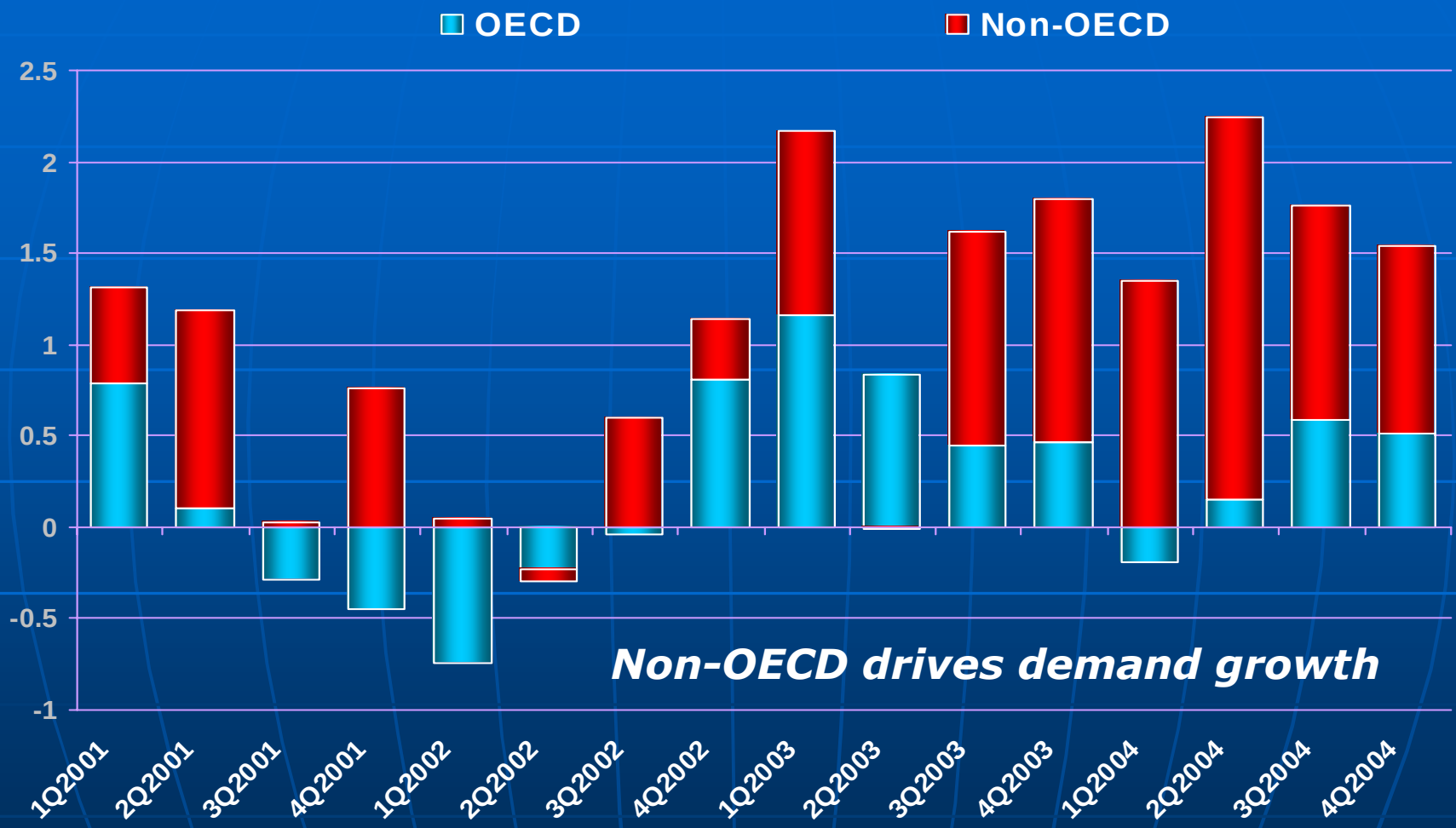
Leaded regular from 1972 to 1979 unleaded regular from 1980



A "Third" Oil Shock?

- Two questions:
  - If political embargo unlikely, could something else cause a 3rd oil shock?
  - Would the severity of the impact be the same today as before?
- Undoubtedly, prices pressured during an oil shock, but …
- But current prices high … at the same time, robust economy growth
  - Lower energy intensities in global economies?
  - Reduced price elasticity?
  - Lagged price effects?
- Structural changes in economy reduce potential impact of oil shock?
  - Oil plays less all pervasive role in overall economy
  - Oil effectively becoming a transportation fuel
- Or unique set of circumstances:
  - Liquidity - income effects (temporarily) swamp price effects?

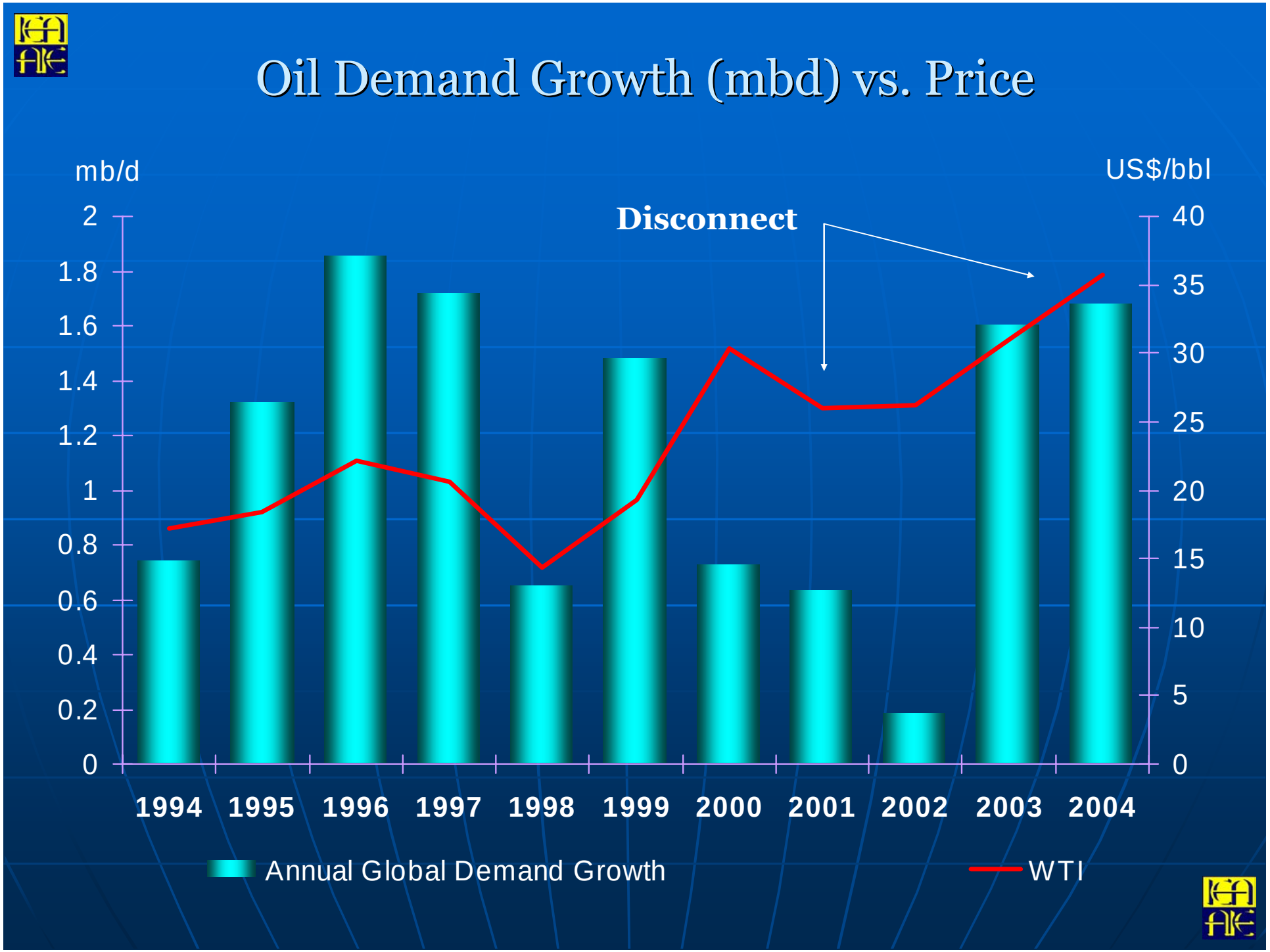
Oil Demand Recovery: OECD Vs Non-OECD (Mb/d)



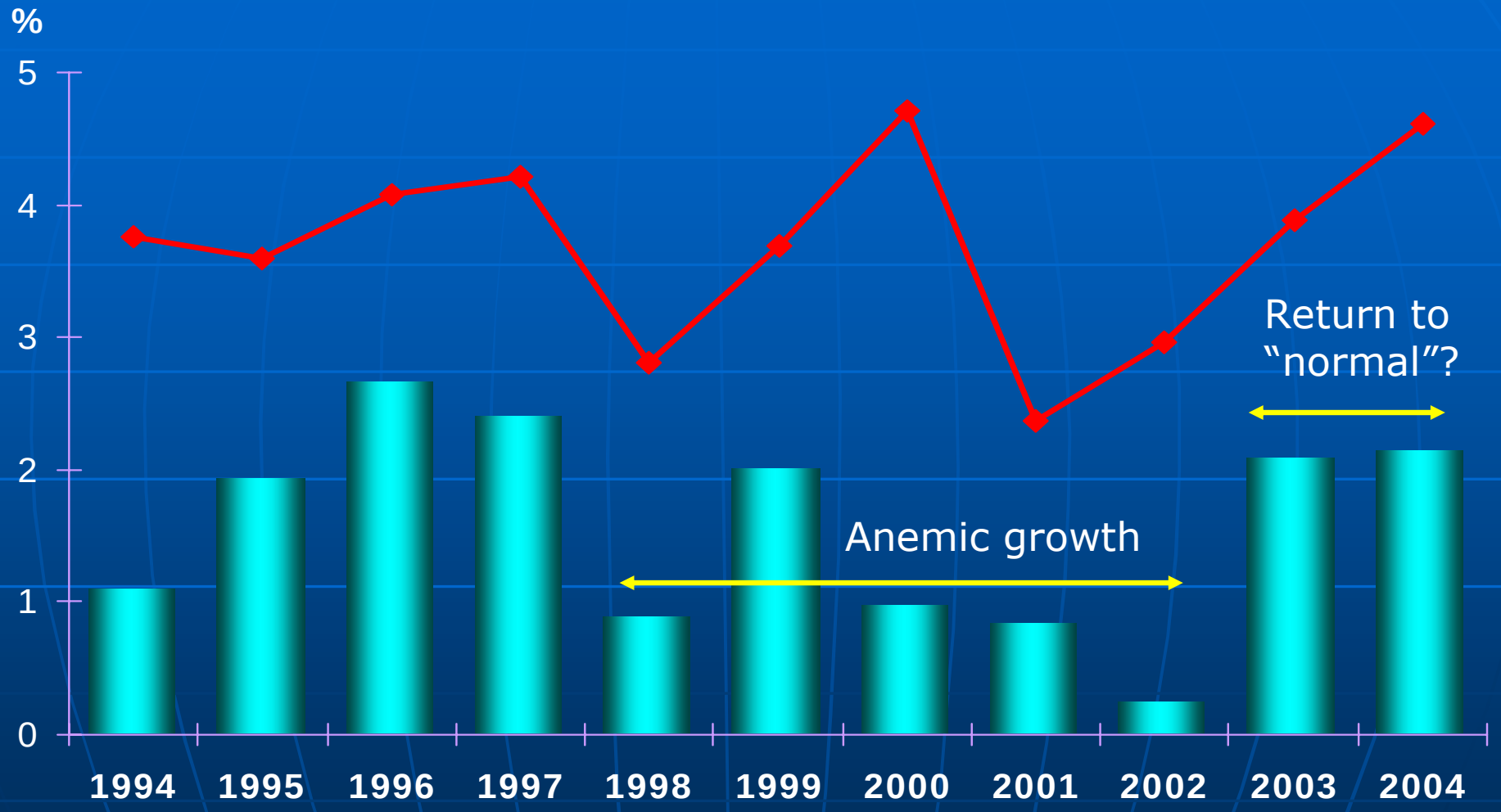
2003: OECD leads demand growth, driven by economic recovery and one-off events (weather, fuel switching); non-OECD hit by SARS

2004: non-OECD takes lead, spurred by Chinese economy

Oil Demand Growth (mbd) vs. Price

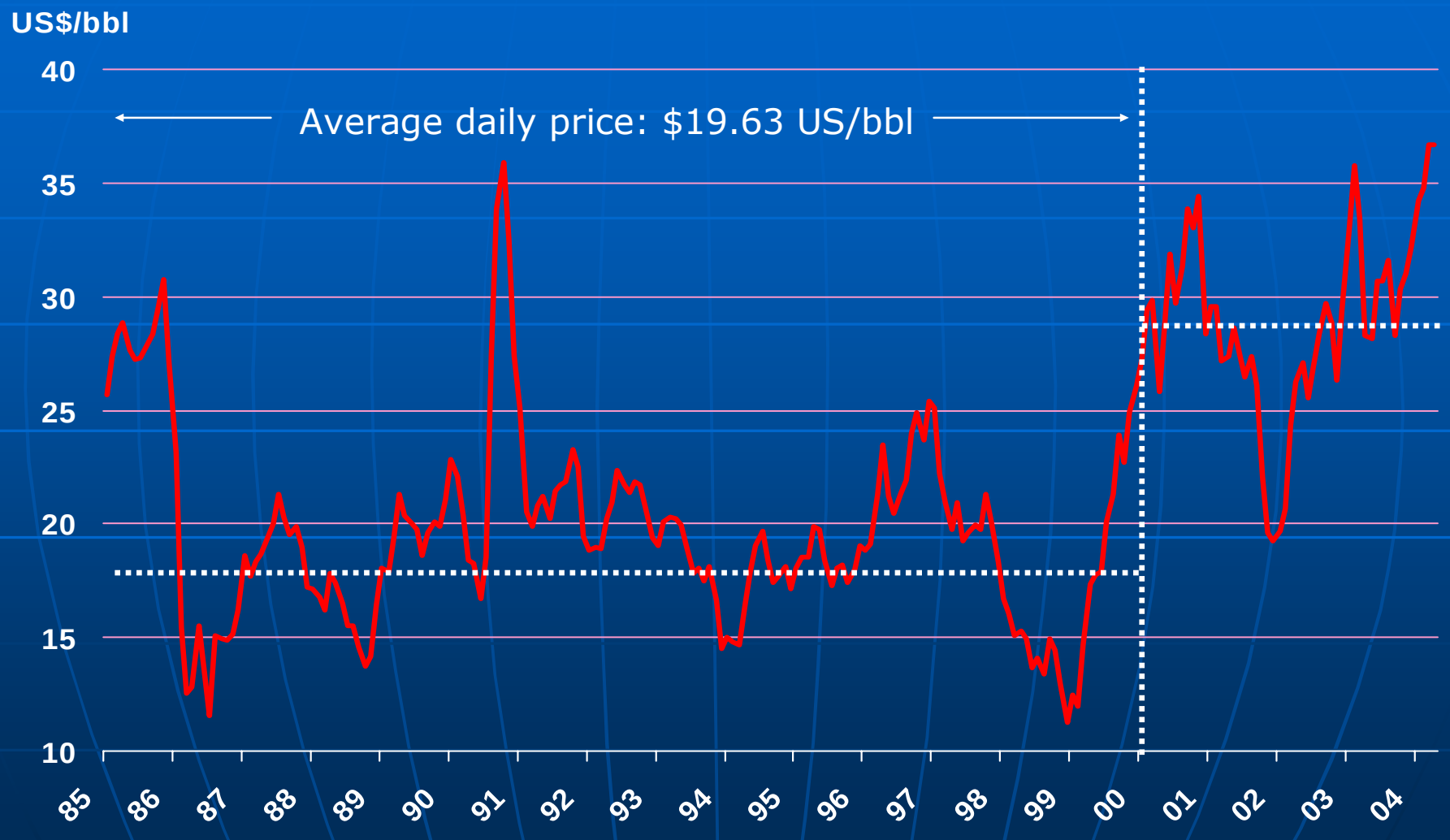


Oil Demand growth (%) vs. GDP growth



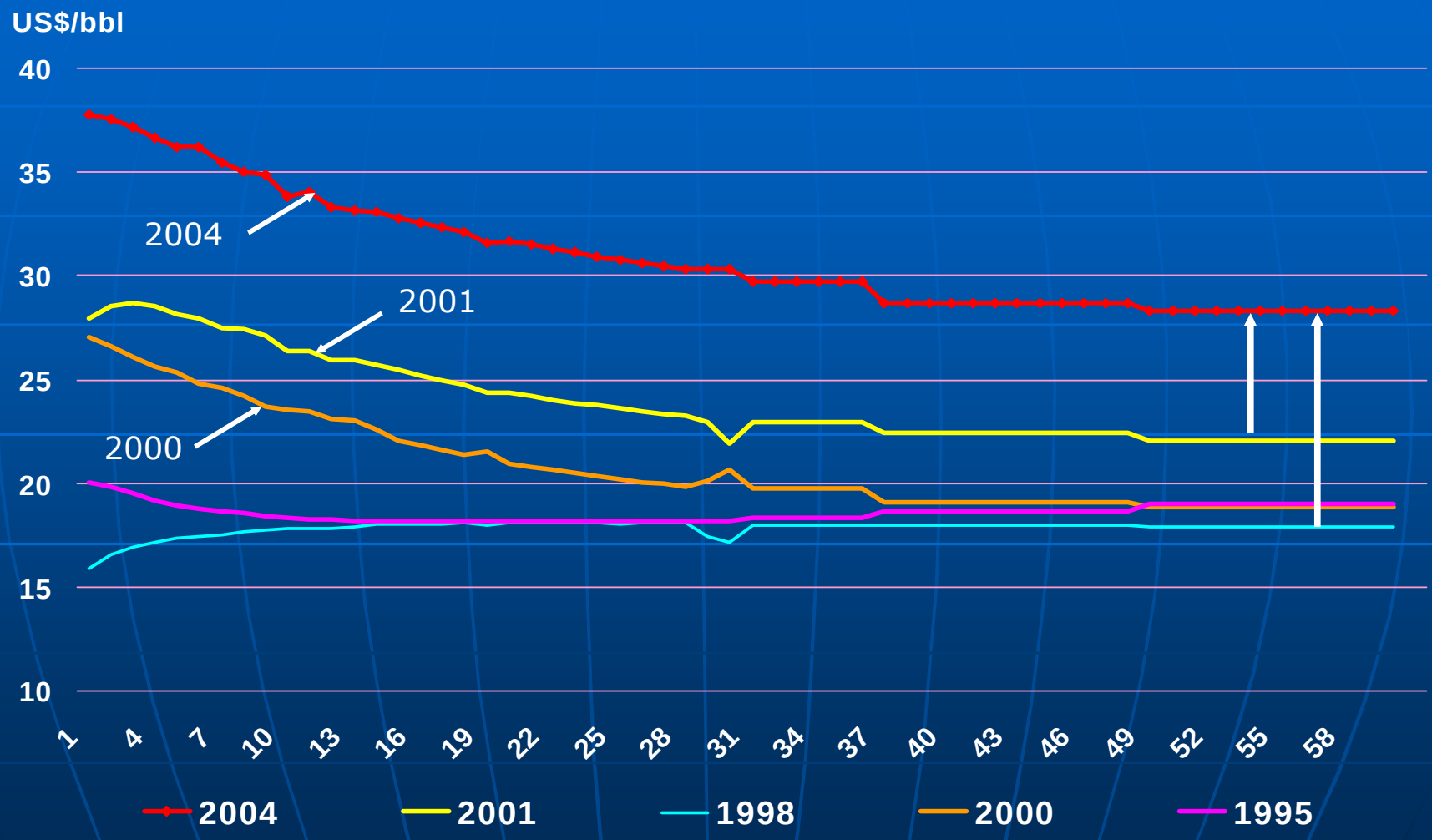
What is normal??? A forecaster's nightmare

NYMEX WTI Monthly Price



Average daily price (2000- 2004): $28.87 US/bbl

WTI NYMEX Futures - 60 months



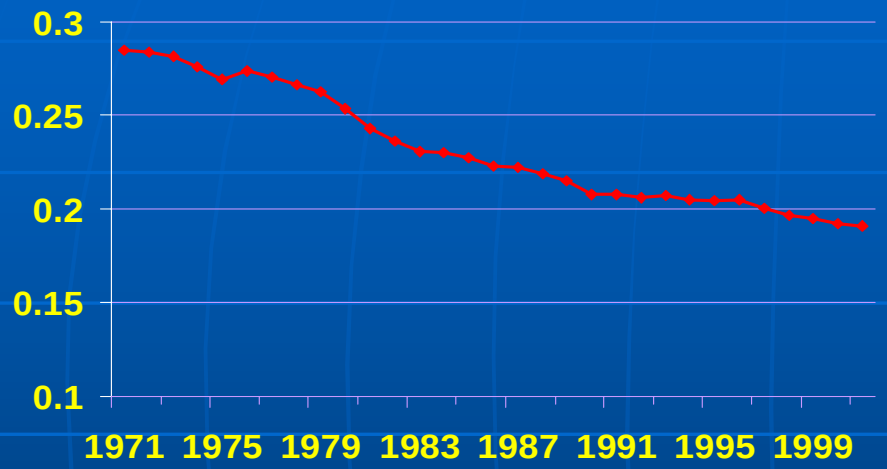
Current Expectation: higher average long-run prices

Regional OECD Oil and Energy Intensity 1971-2001

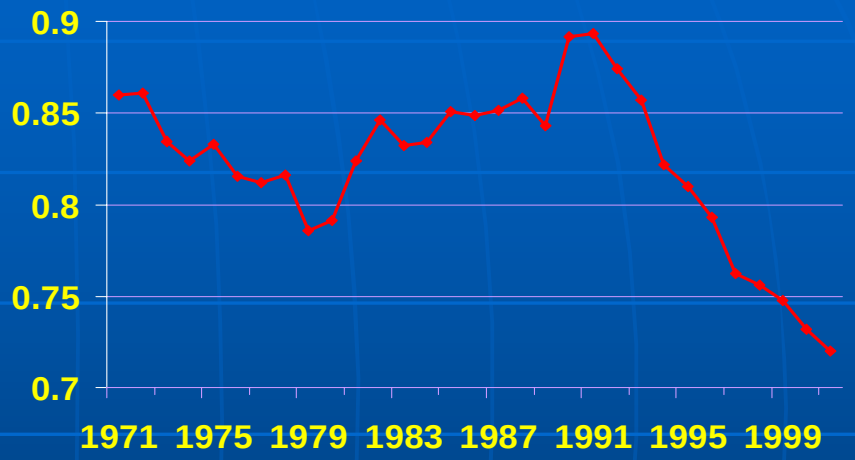
Oil Intensity (metric tonnes per thousand 95 US$)

Energy Intensity (toe per capita)

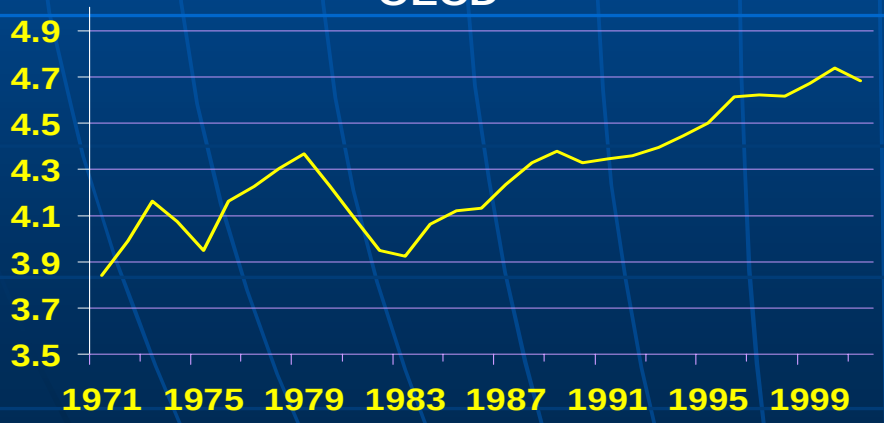
OECD



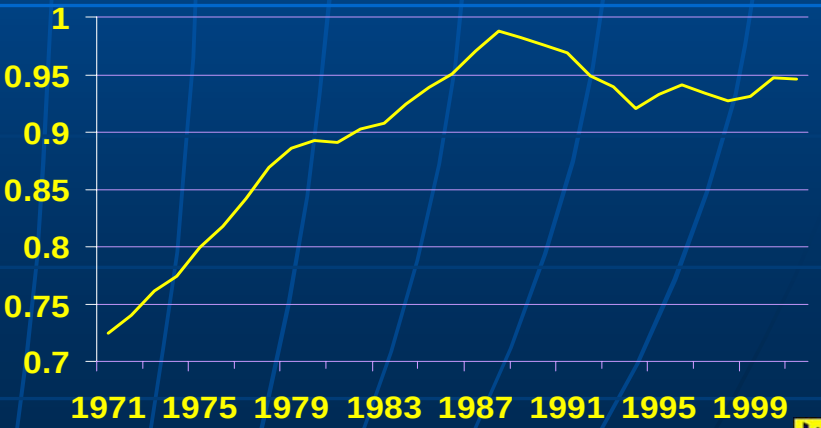
Non OECD



OECD



Non OECD



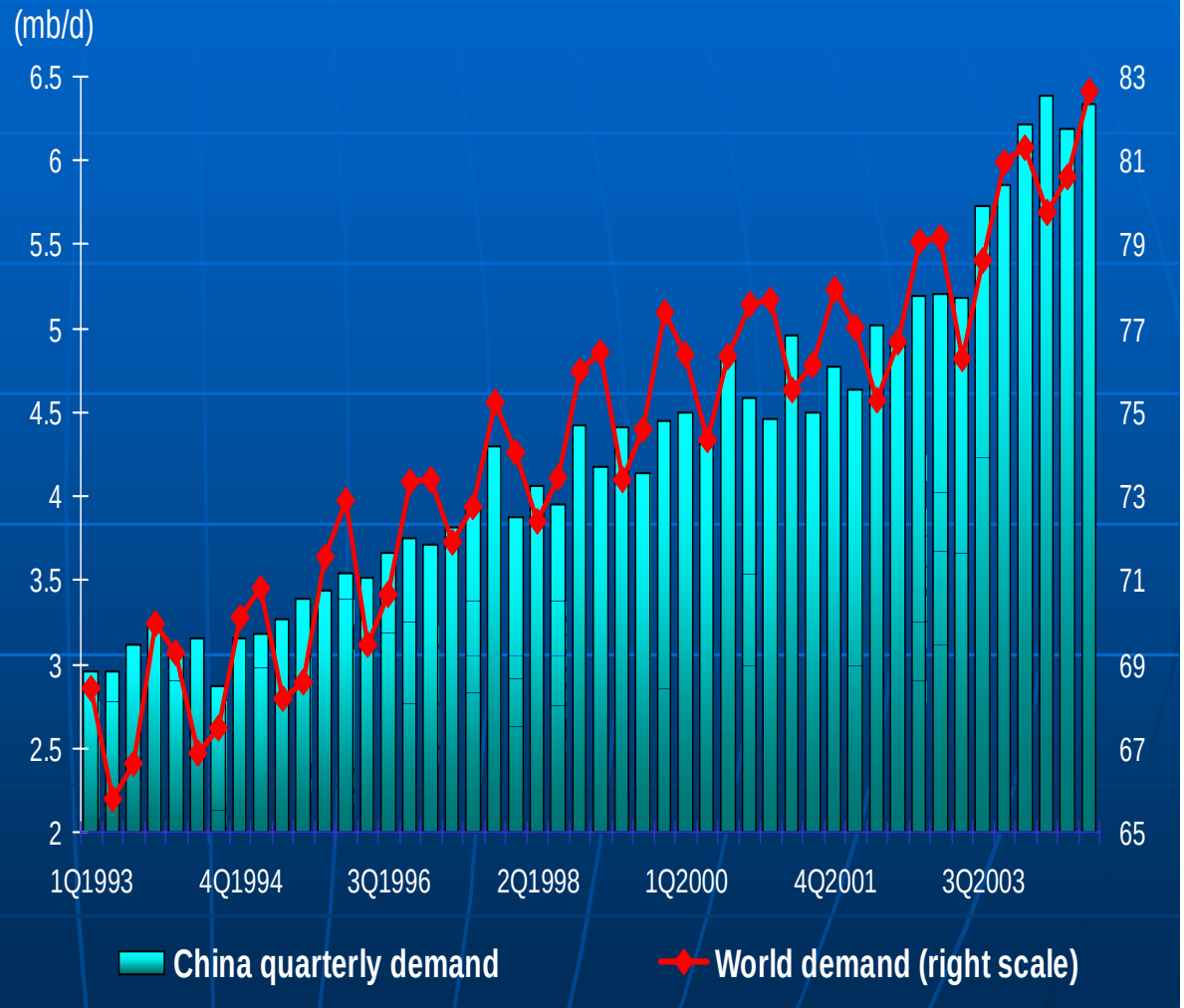
Source: IEA Oil Information 2001, IEA Energy Balances of OECD Countries

Unique Circumstances – GDP & Oil Demand Growth

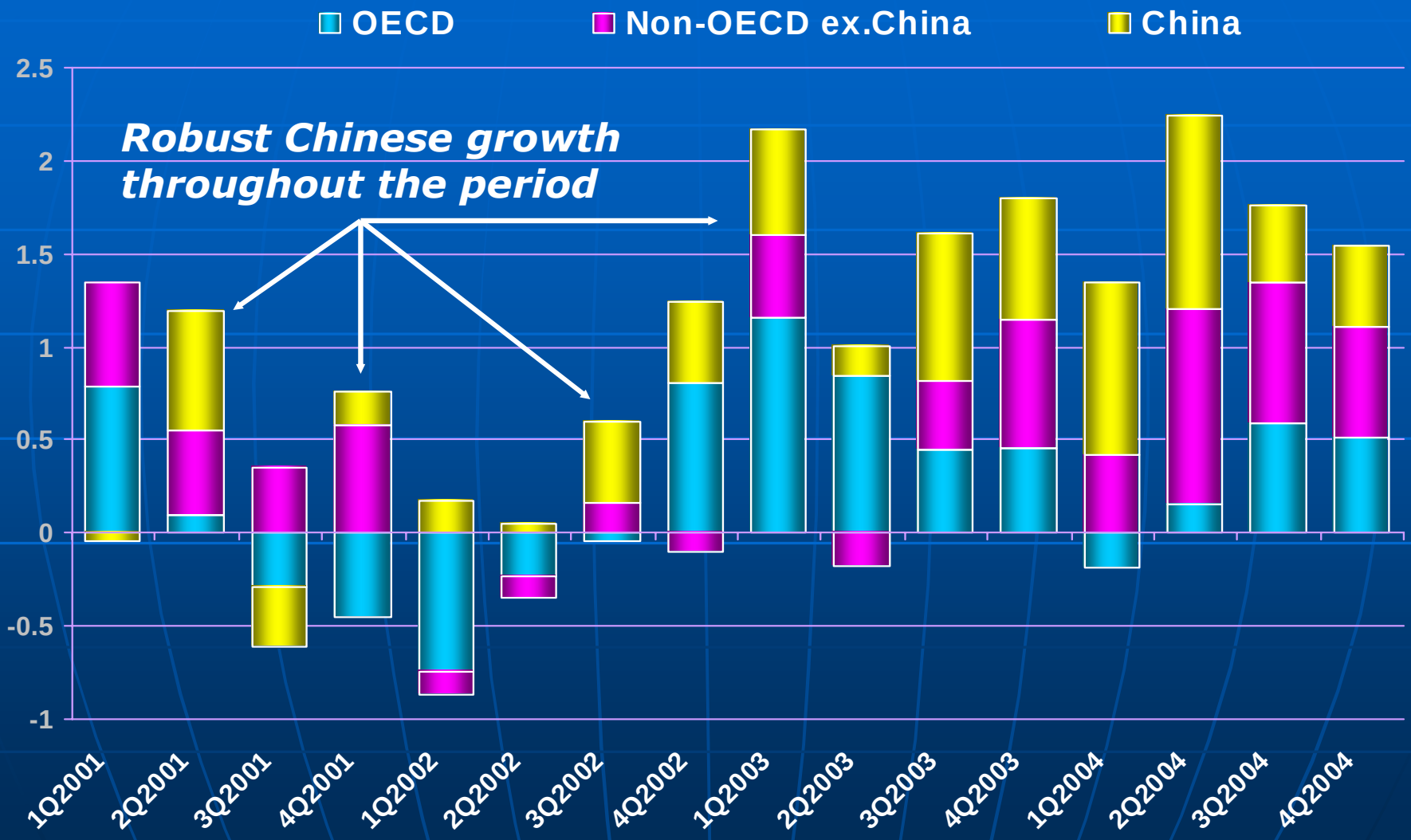
- Global economic recovery and strong demand growth driven by United States and China
- United States:
  - Liquidity infusion – low interest rate policy & tax cuts
  - Depleted industrial inventories
  - Efficiency gains (outsourcing)
  - Burgeoning trade deficit
  - Increased car travel – reduced short-haul air traffic
  - High natural gas prices - electricity brown outs
- China:
  - Liquidity infusion – inexpensive and widely available credit
  - Major infrastructure development programs
  - Strong industrial and manufacturing trade developments
  - Managerial class with significant disposable income
  - Rising income level for growing urban population
  - Power generation shortfall
  - Rural & urban road construction
  - SARS

China, The Engine of Demand growth

- Since the early 1990s, oil demand in China has grown faster than anywhere else
- Ever-growing share of global oil demand
- Leading driver of global demand growth
- Net importer since 1993 - so oil demand fluctuations affect global oil market & trade flows in a big way
- Impact on world market stability / oil security
- Yet Chinese oil consumption remains exceptionally low – lots of room to grow

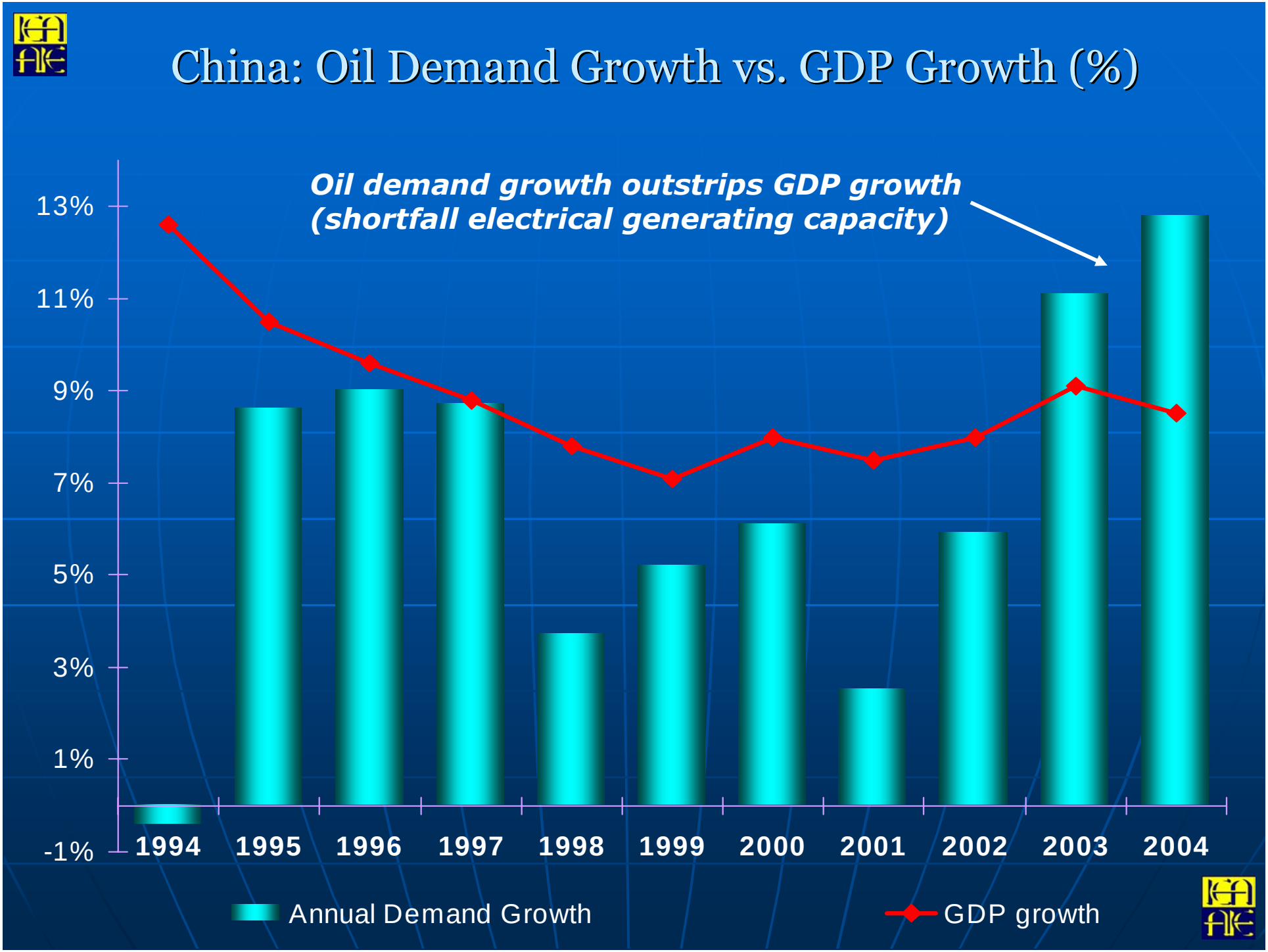


Oil Demand Recovery: Emergence of China (Mb/d)

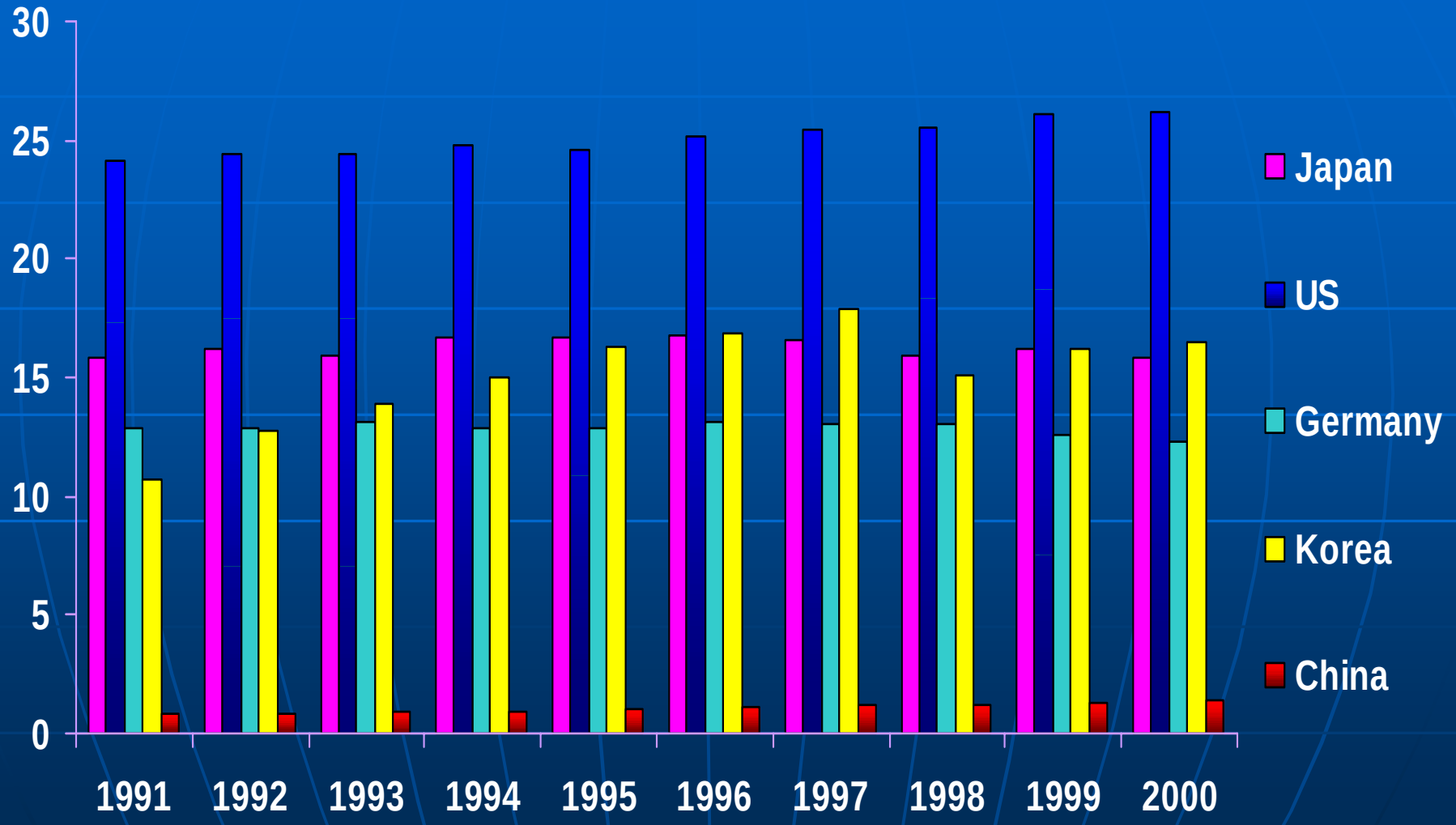


Strong economic growth + power shortages fuel Chinese oil demand growth

China: Oil Demand Growth vs. GDP Growth (%)

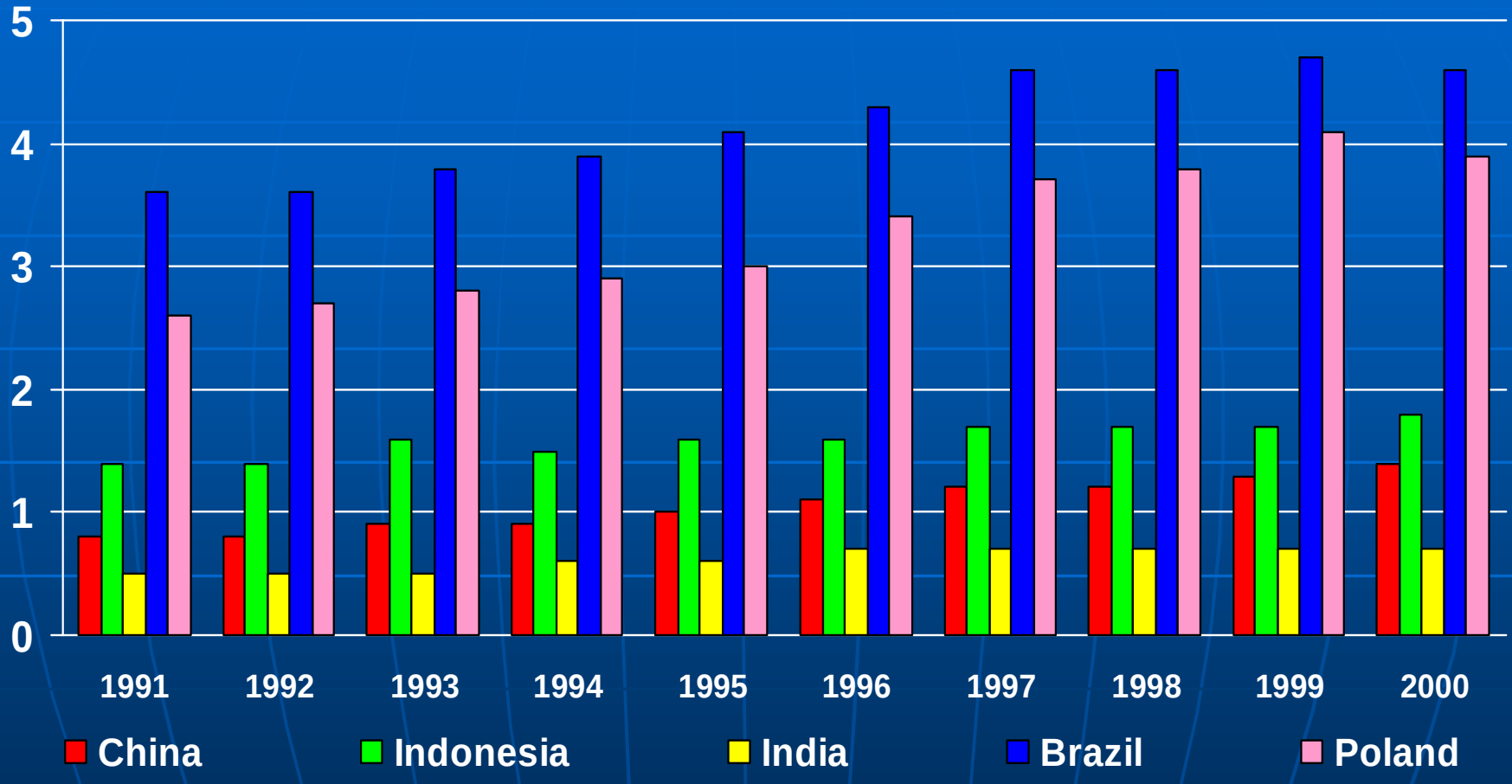


Chinese *per capita* Oil Demand vs. Other Large Consuming Countries (barrels/year)



Long way to grow on a per capita basis

Per Capita Oil Demand in China vs.Peer-Group Economies (barrels/year)



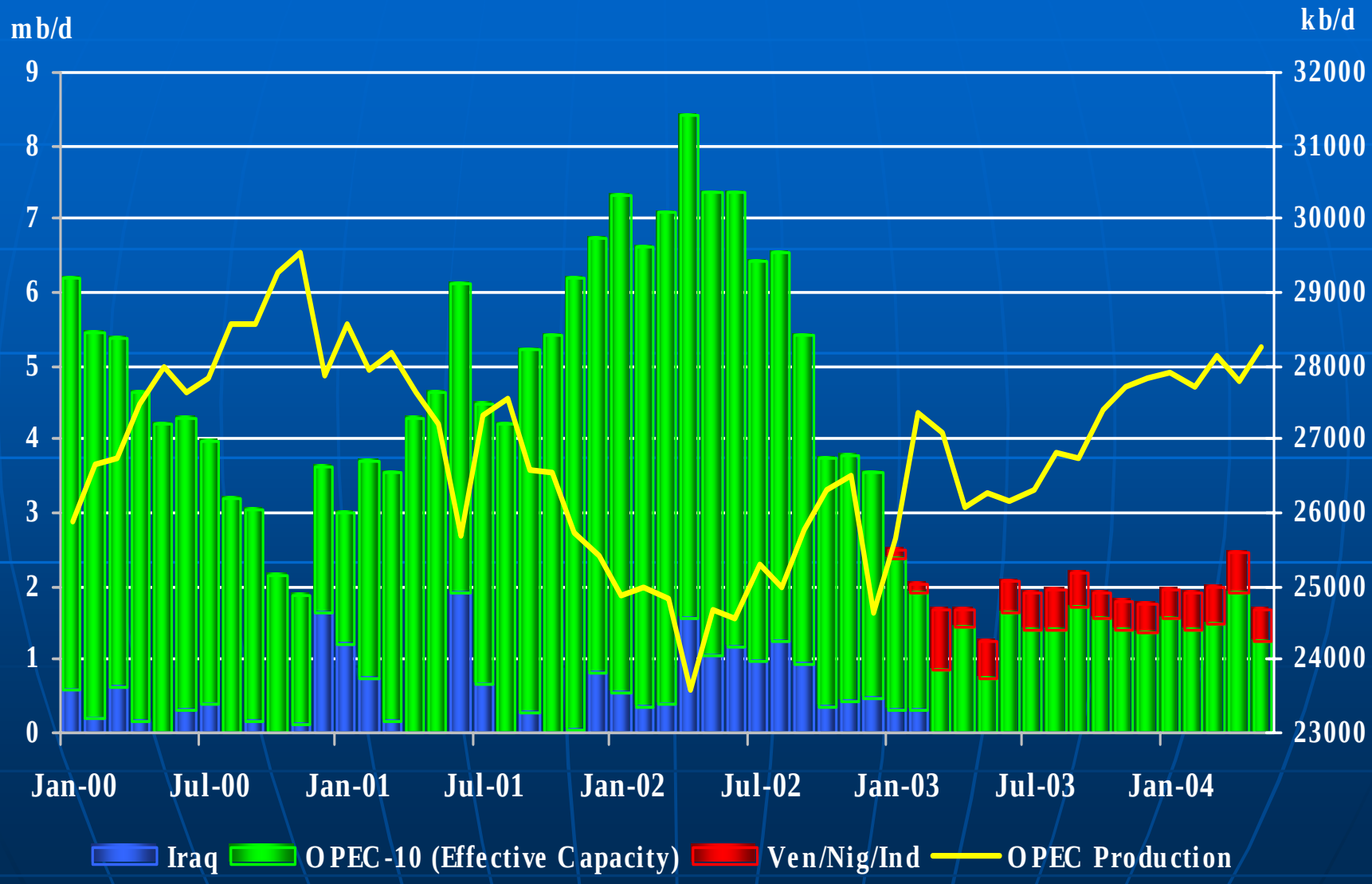
- Chinese oil demand per capita grew 78% from 1991-2000, faster than other large emerging economies – oil consumption still less than 1.5 b/y at bottom of range of peer emerging economies

Variables Effecting an “Oil Shock?

- Duration of supply disruption
- How much oil is lost
- Timing of the loss (slack or peak demand)
- Strength of the underlying economy
- Government policy reactions (monetary, fiscal)
- Level and availability of spare production capacity
- Level of industry stocks
- Emergency coordination and preparedness
- Availability of strategic stocks

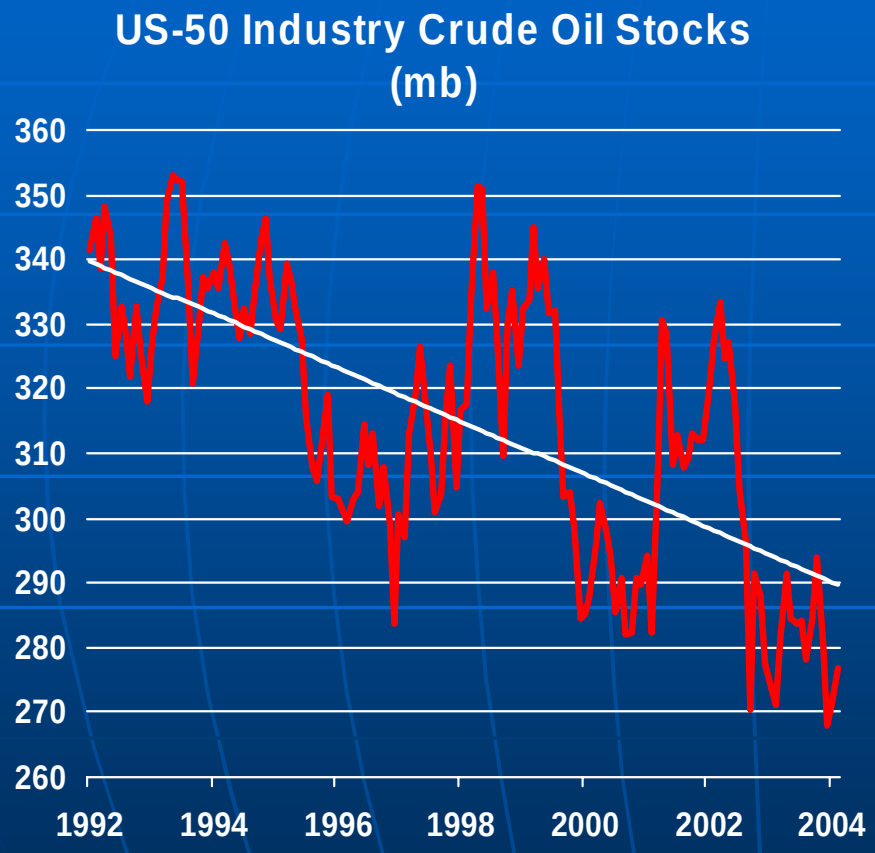
OPEC Spare Production Capacity *

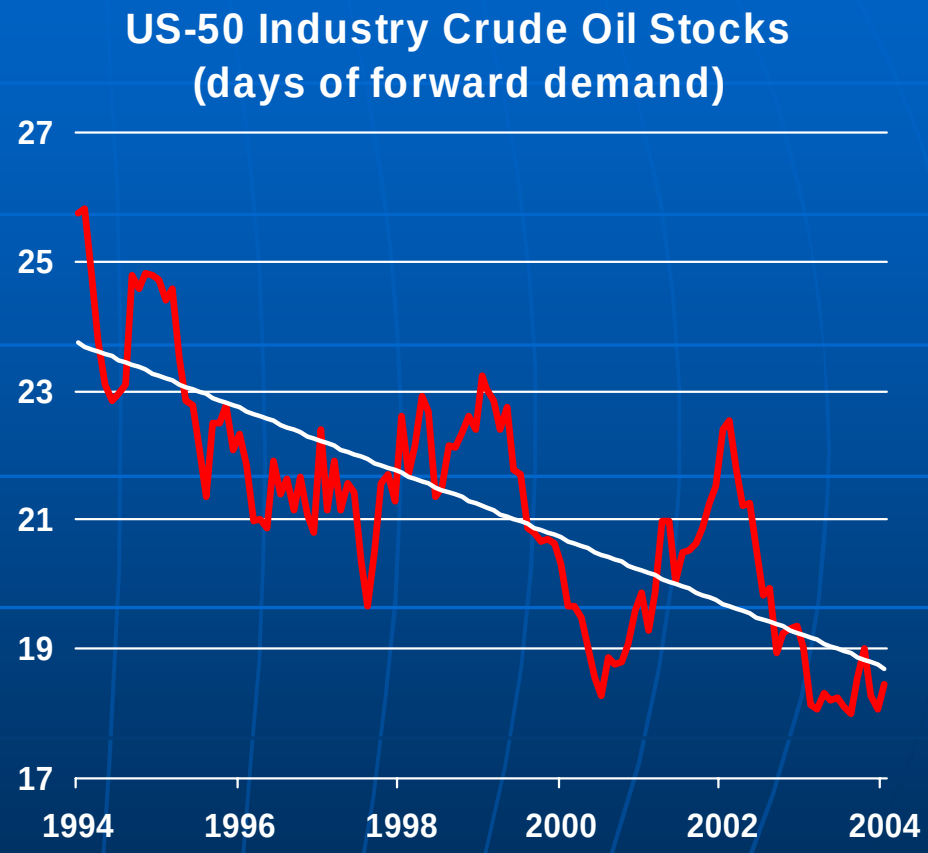
Effective spare capacity of less than 1 mb/d



* **IEA definition: available in 30 days and sustainable for 90 days**

Unmistakable Downward Trend
- US-50 Crude Stocks -

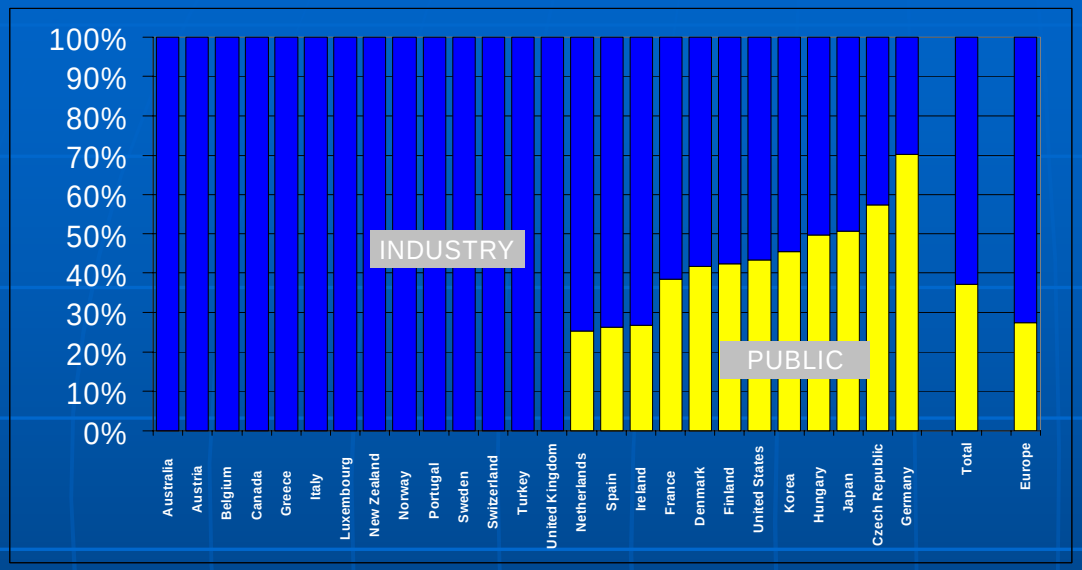




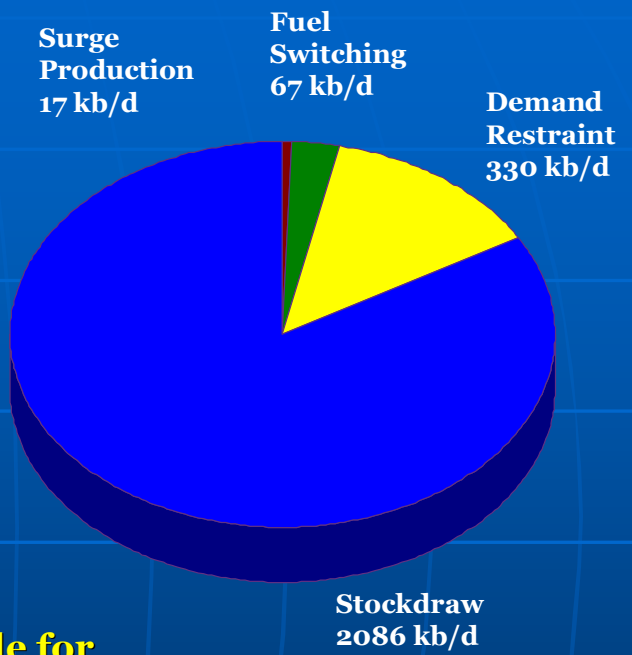
Industry more efficient (mergers & acquisitions, information technology, just-in-time inventory management practices)

IEA Strategic Stocks & Emergency Response

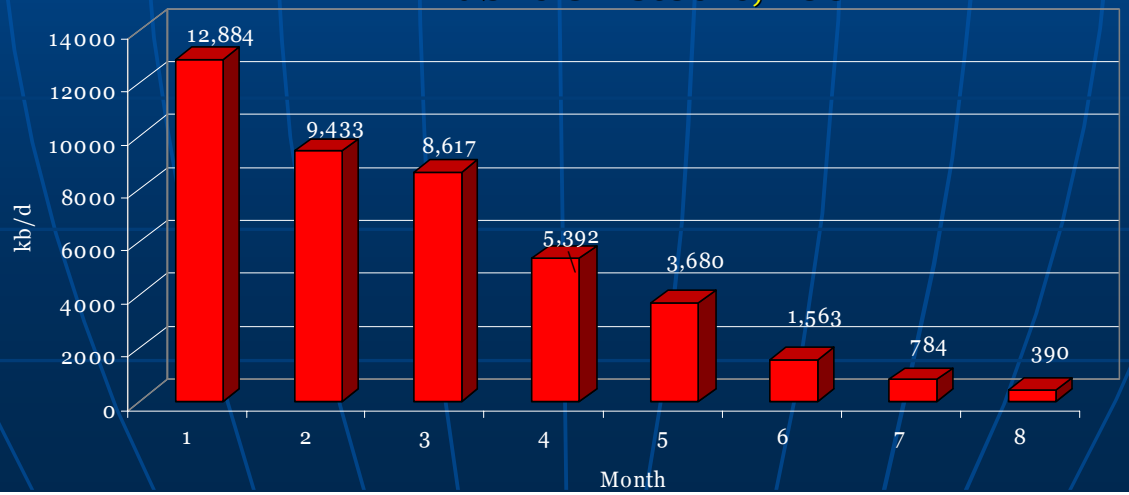
Industry vs. Public Stocks



IEA Gulf War Contingency Plan



Maximum Drawdown Profile for IEA Public Oil Stocks, 2002

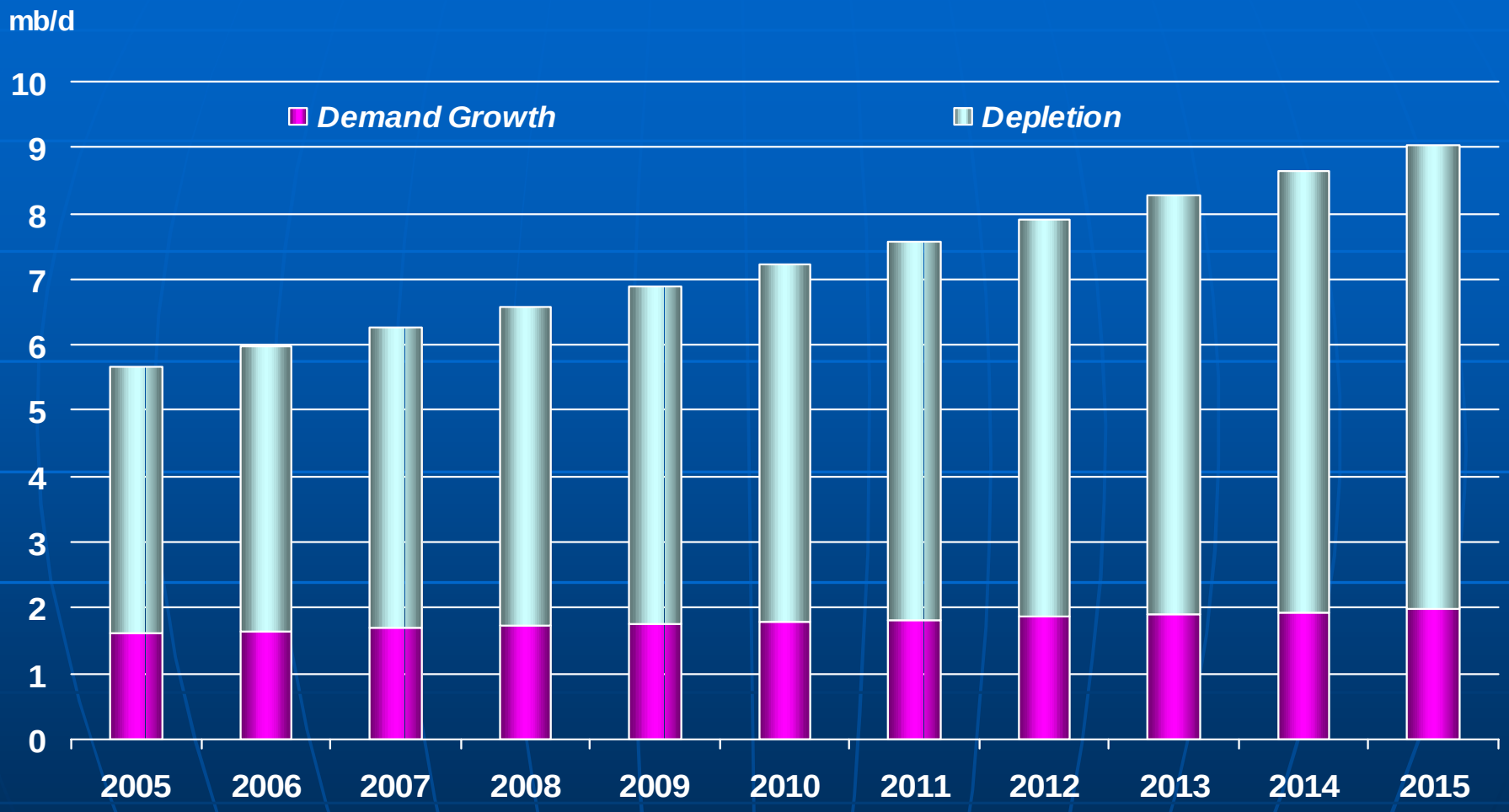


Supply Crunch – The Coming "Oil Shock"?

- While political oil embargo less likely some argue global economy faced with supply crunch ("peak oil") with similar devastating results
- Critical issue is on of reserves and depletion rates
  - Older fields are mature, declining
  - New discoveries smaller fields
  - Industry forced to produce-out more quickly
  - Global reserves over-stated for political reasons
  - Shift to more expensive, risky non-conventional areas
  - Have to run harder just to tread water (offset depletion)
- Resource constraints – already captured low-hanging fruit
- Supply constraints will push up price, limit demand growth, negatively impact & curtail economic growth

Where is the Oil (& Money) Coming From?

Incremental Barrels Needed to Offset Depletion & Meet Demand Growth



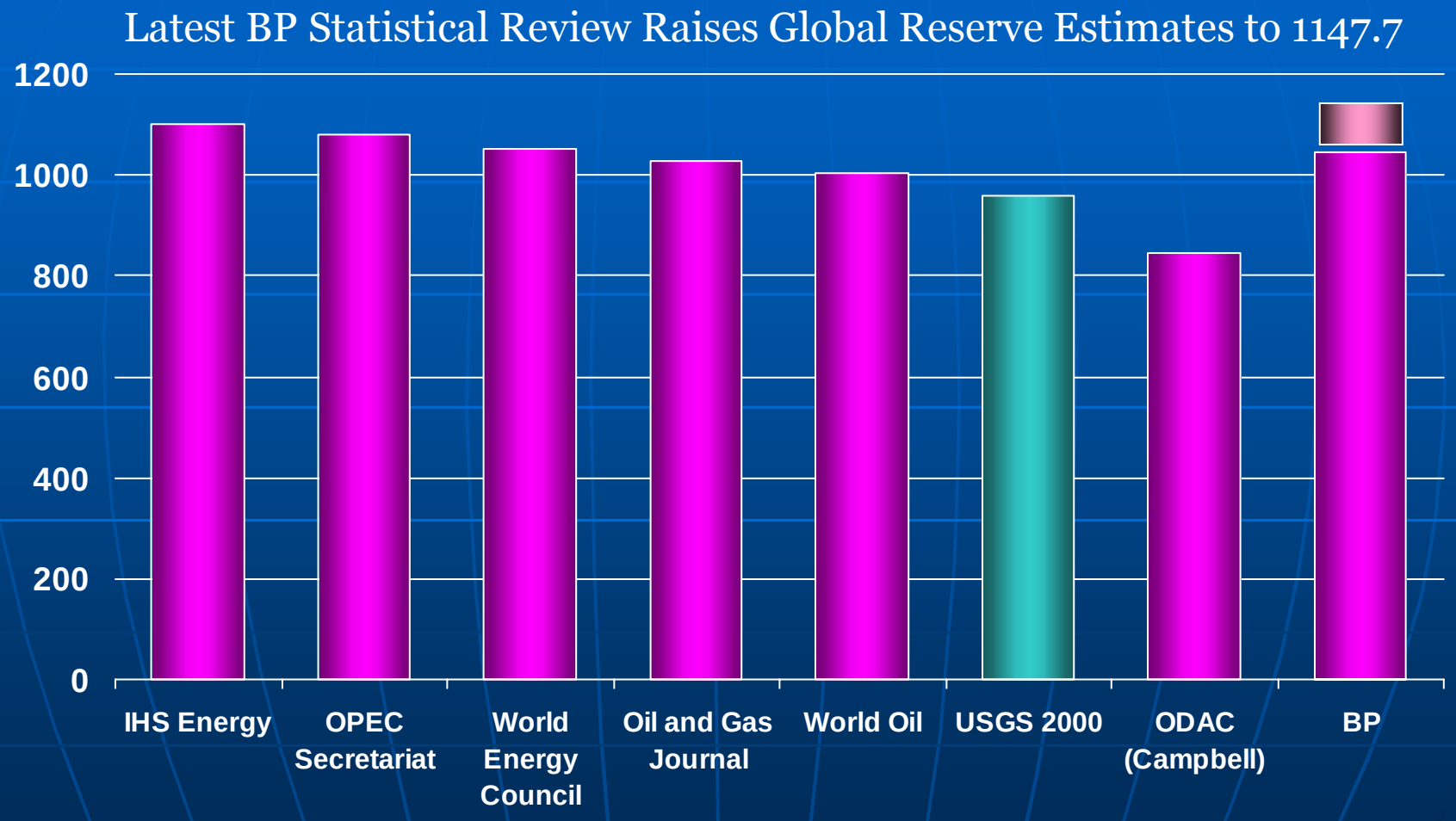
Assumptions:

- 2004 demand at 81.1 mb/d – 2% per annum demand growth
- 70% of filds in decline - depletion rates from 7% in 2005 rising to 10% in 2015

Challenge of Depletion

- Depletion is real, represents a significant challenge
- But depletion is NOT something new, something unheard of
- Offsetting trends:
  - Technology (3D, 4D, offset drilling)
  - Information revolution (computing power)
  - Tie-ins (established infrastructure)
  - Re-definition of “non-conventional”
  - Ignores non-conventional reserves (oil sands, liquids, GTL)
- IEA expect continued growth in non-OPEC supply
- Issue over short- medium-term:
  - Not want to understate problem, but …
  - Immediate problem is access to reserves vs. running out of oil

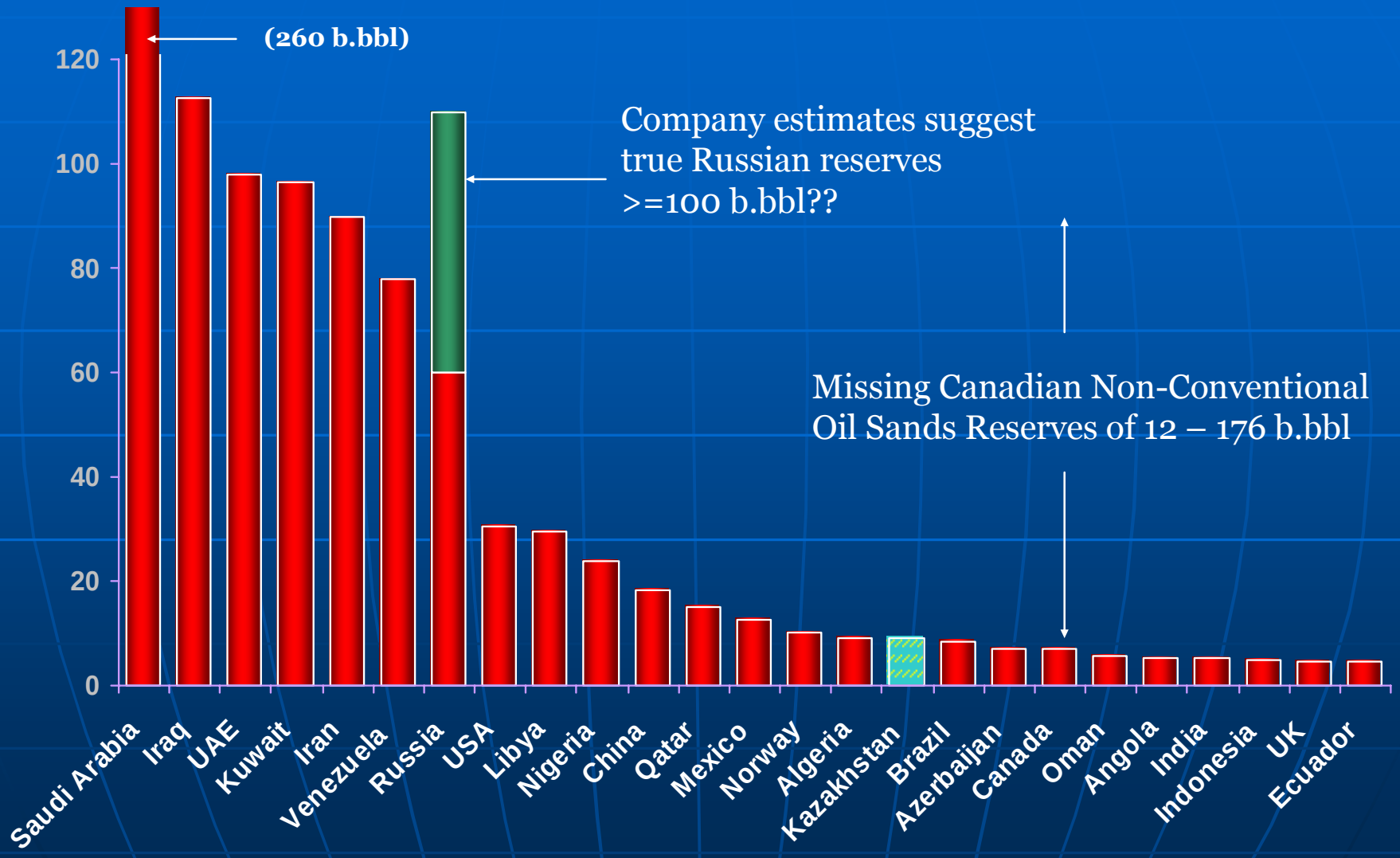
Proven Crude Oil and NGL Reserve Assessments*
(billion barrels)



Source: WEO 2001 , BP statistical Review 2002

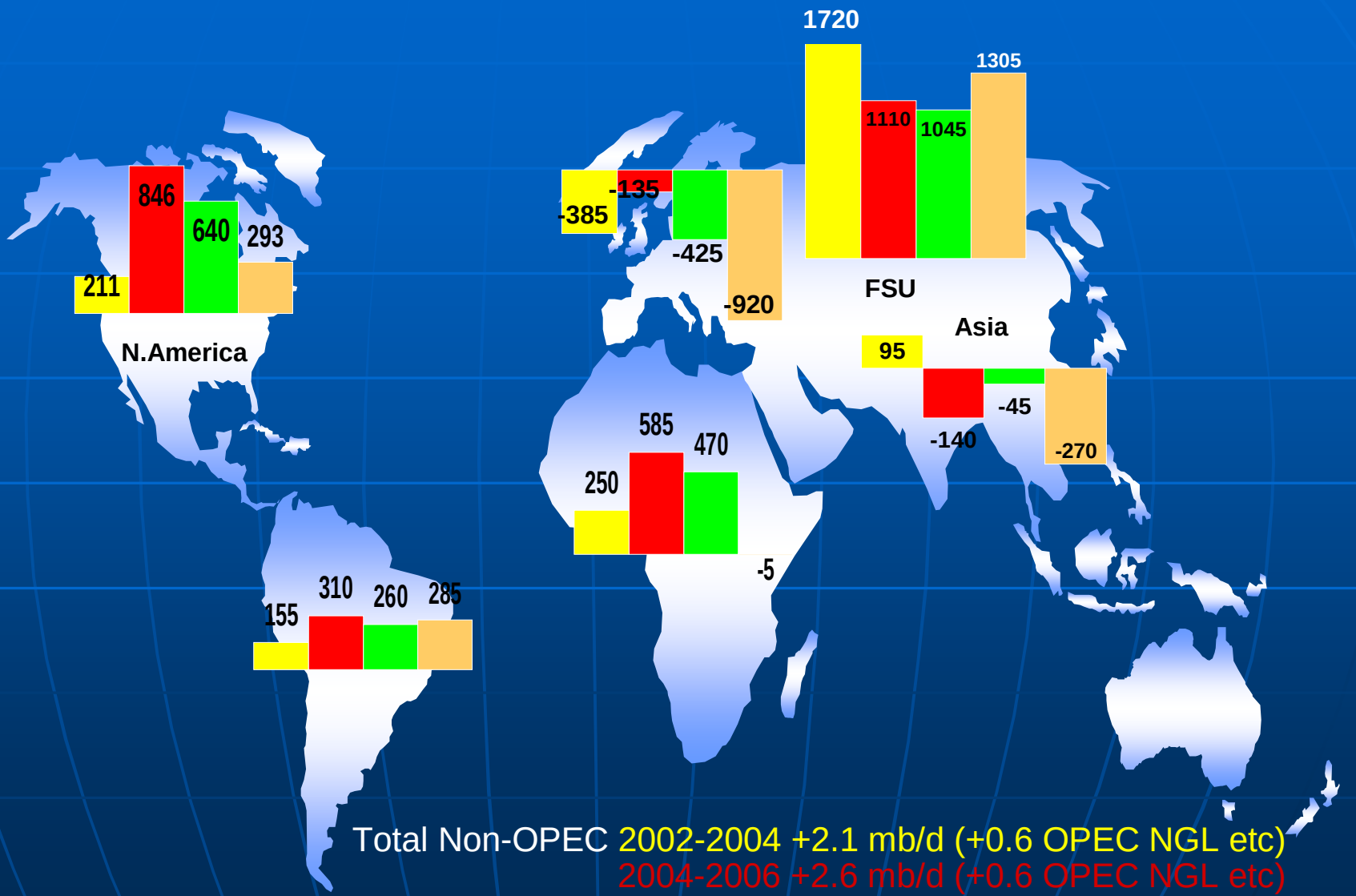
*Effective Date: WEC end 1999, USGS end 1996, all others end 2000

The Reserve Base is Substantial
(World proven reserves, b.bbl, start-2003)



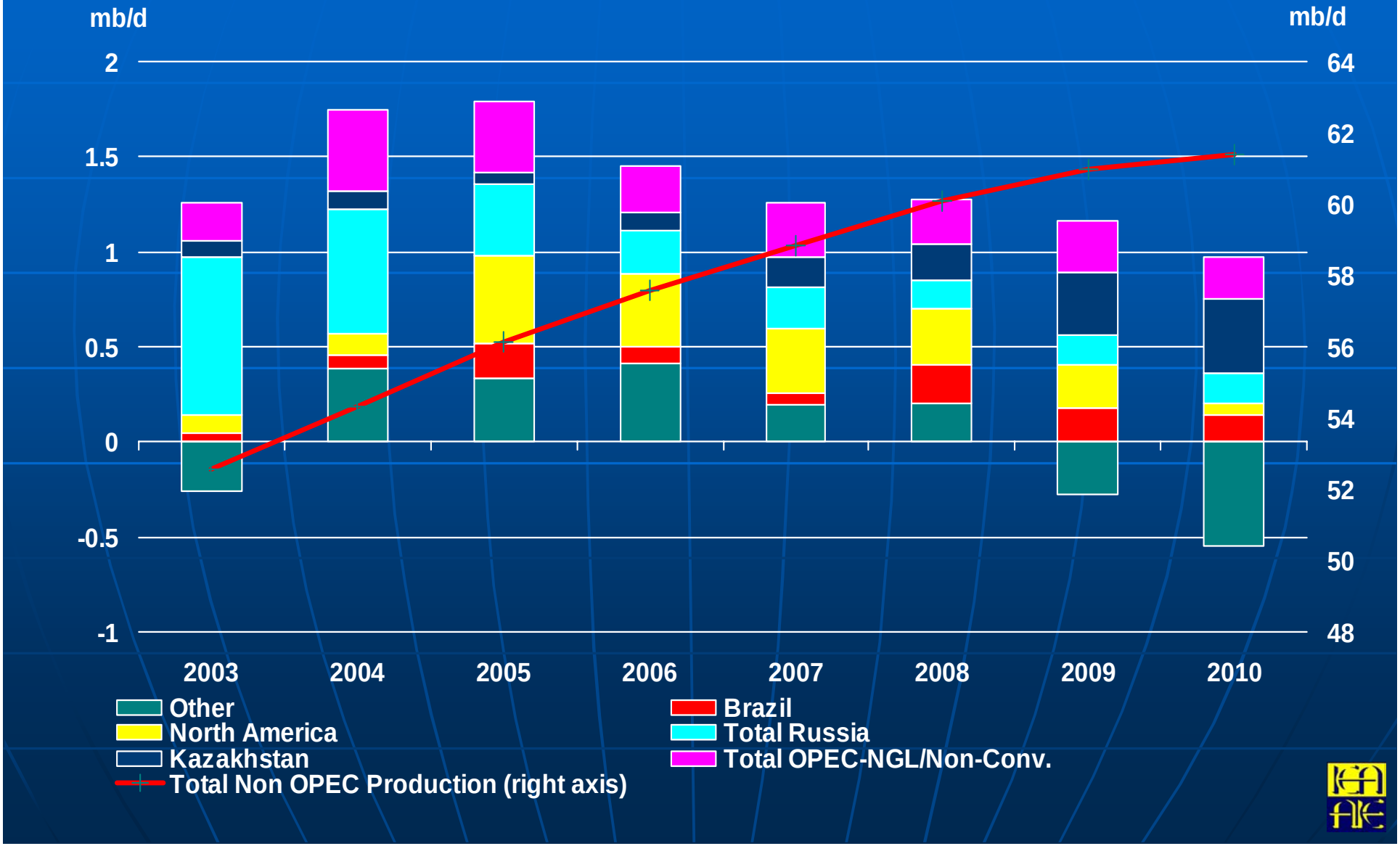
Missing non-conventional reserves

Main Non-OPEC Supply Changes 2002-2010

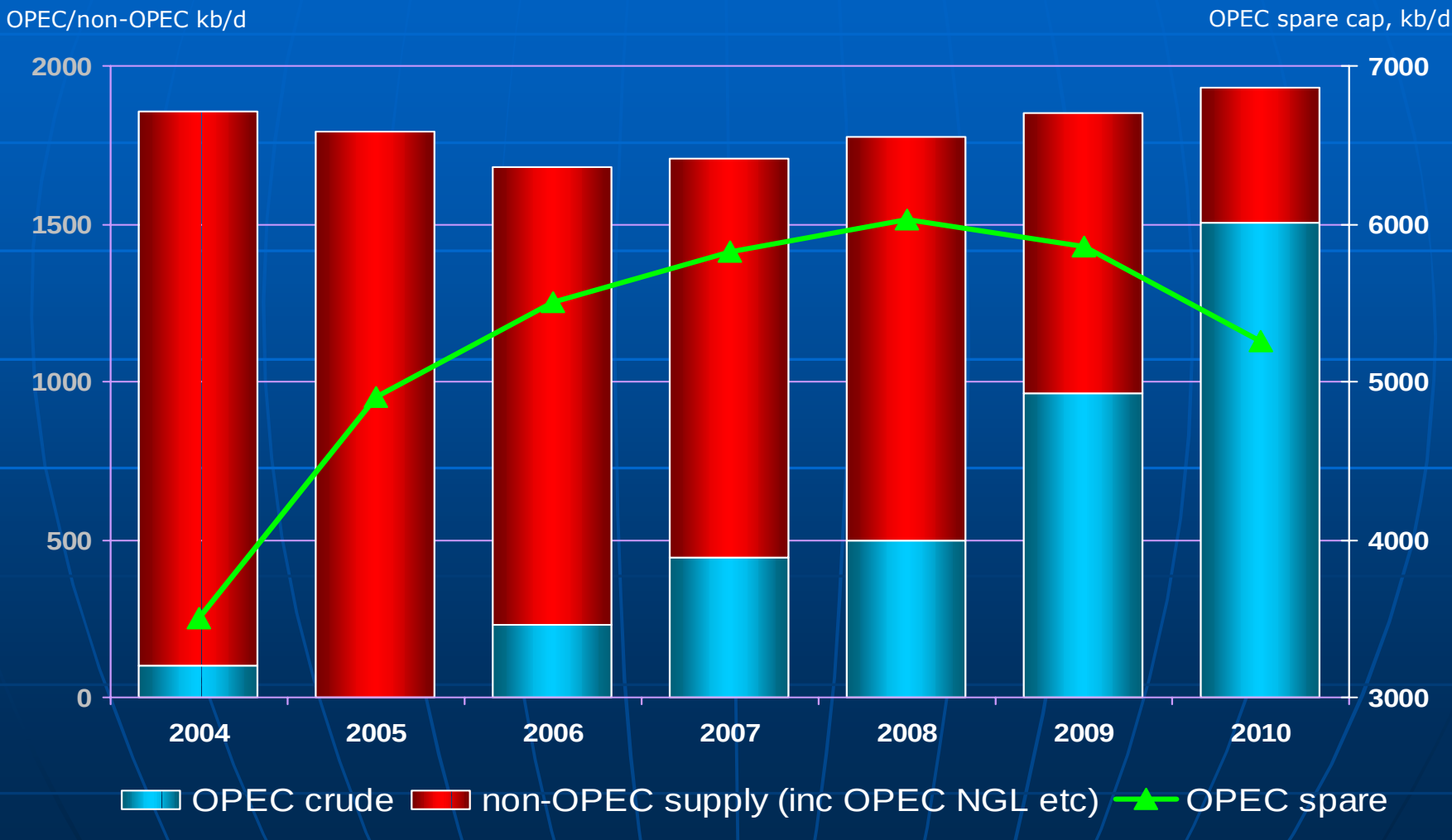


Total Non-OPEC 2002-2004 +2.1 mb/d (+0.6 OPEC NGL etc)
2004-2006 +2.6 mb/d (+0.6 OPEC NGL etc)
2006-2008 +2.0 mb/d (+0.5 OPEC NGL etc)
2008-2010 +0.8 mb/d (+0.5 OPEC NGL etc)

Non OPEC Incremental Supply Growth 2004-2010

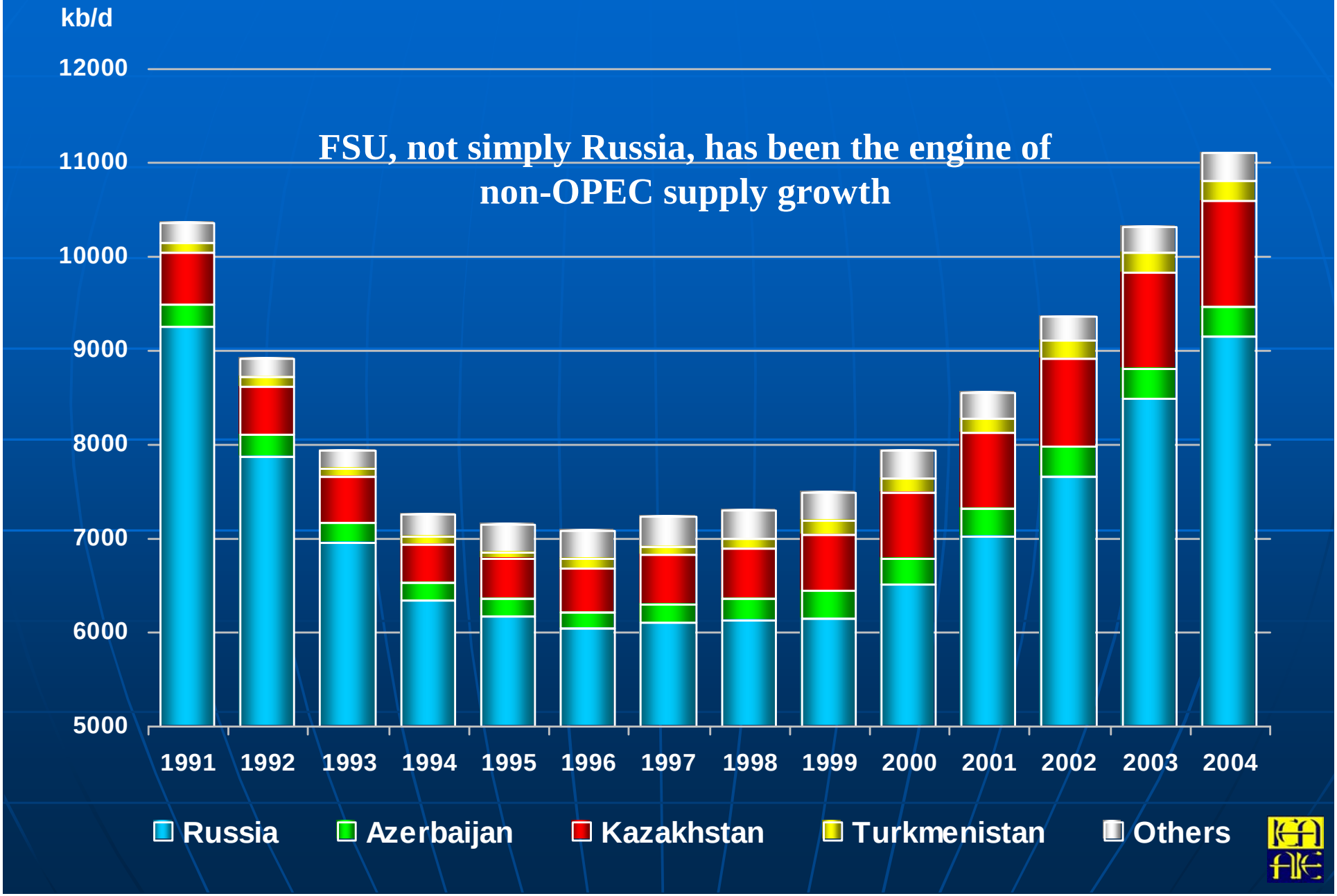


Strong Non-OPEC Supply Growth Until Late Decade?

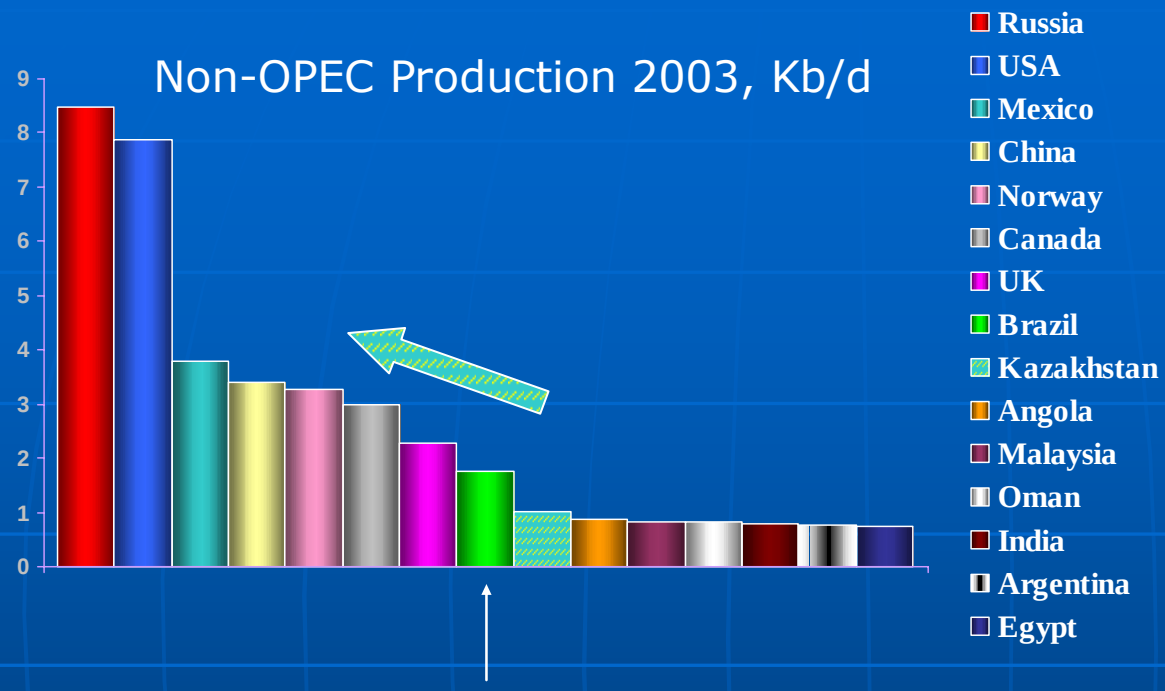


Assumes demand growth of 2% pa

FSU Oil Production 1991-2004

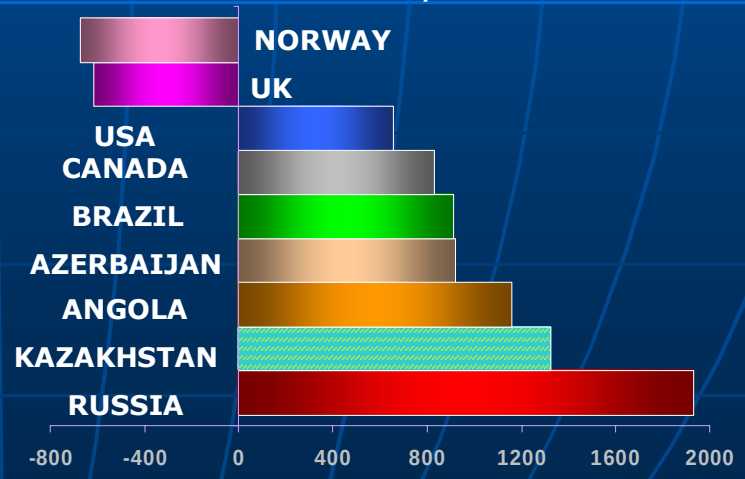


Kazakhstan's Place in non-OPEC Supply



With ongoing investment, Kazakhstan likely to rise in the ranks of non-OPEC producers…

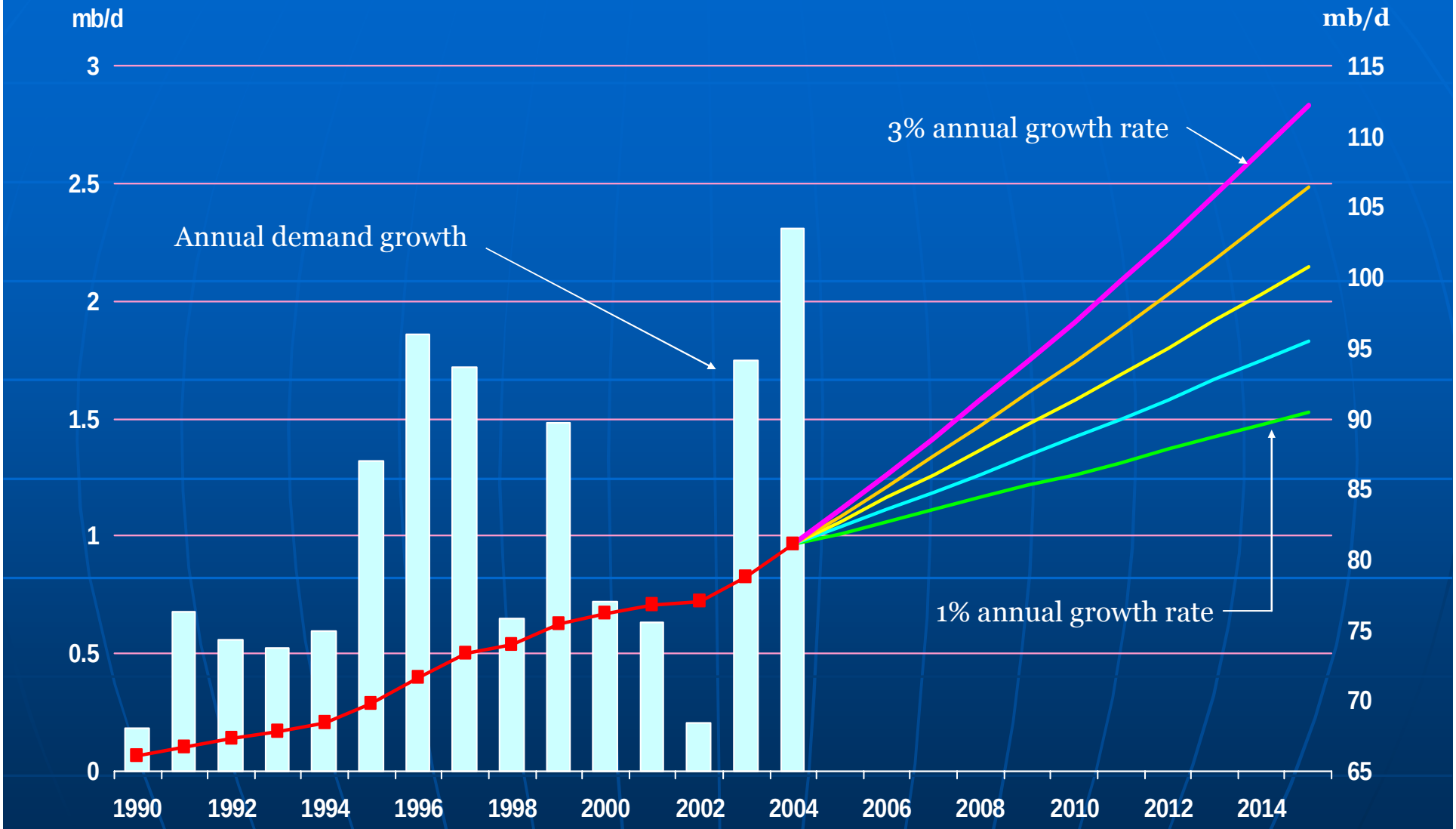
…but potential for non-OPEC growth widespread (15 countries likely to see>100kb/d growth 03-10)



The Challenge of Demand Growth

- Access to reserves
- Where is the money coming from?
- Will we get the timing right?
- R&D is "sexy" but who is going to invest in the downstream?
- Who is going to build "spare capacity" (production, refining)?
  - Security of supply is a "public good"
  - Does focus on ROCE contribute to lower spare capacity?
  - How "plan" in a deregulated, liberalized market
- Can the oil industry attract investment at lower prices?
- Will reduced spare capacity contribute to higher volatility, market instability? Will it frighten away capital?
- Are we over-taxing the system?

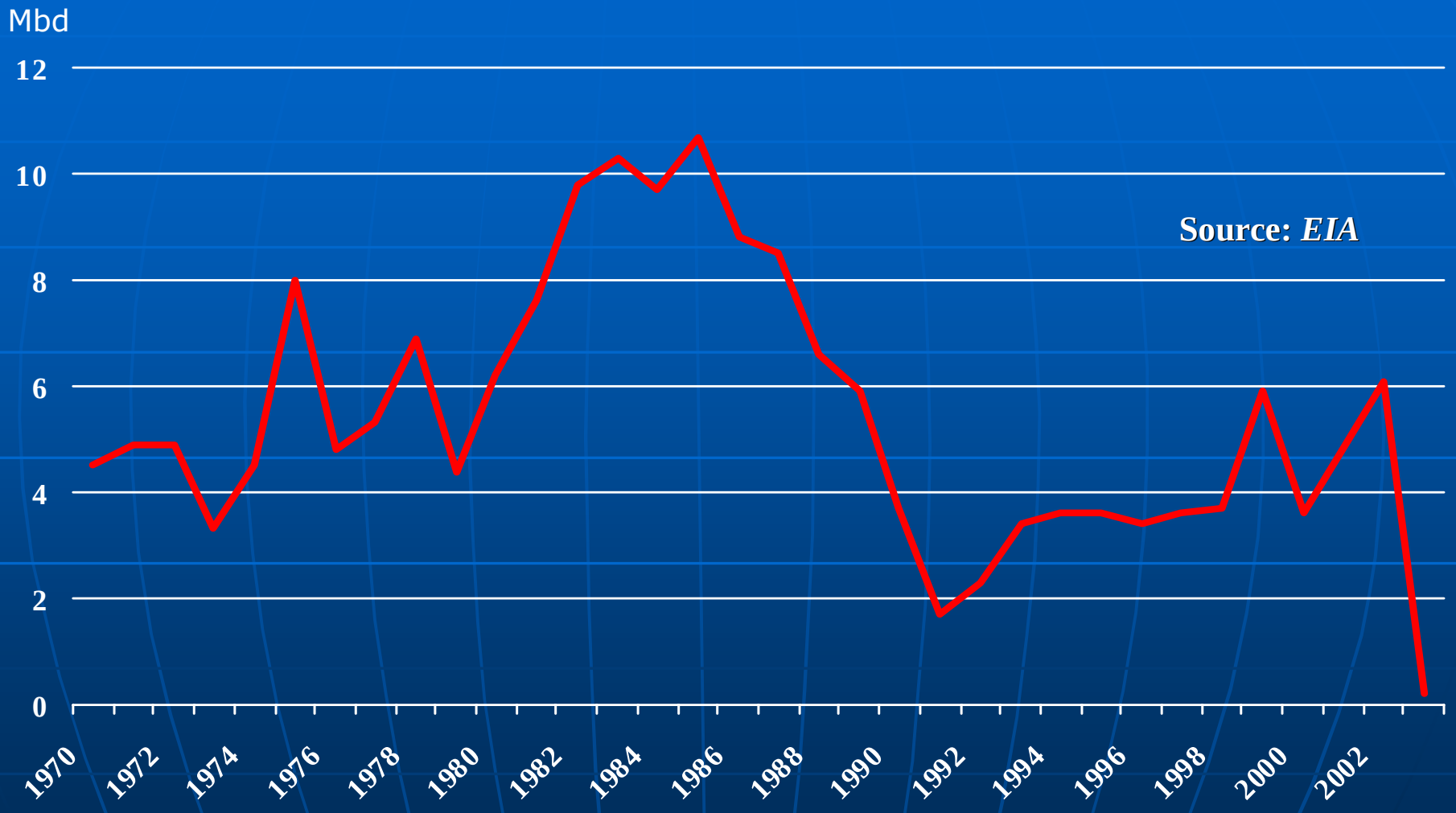
Keeping Up With Demand Growth



Will high prices dampen future demand growth?

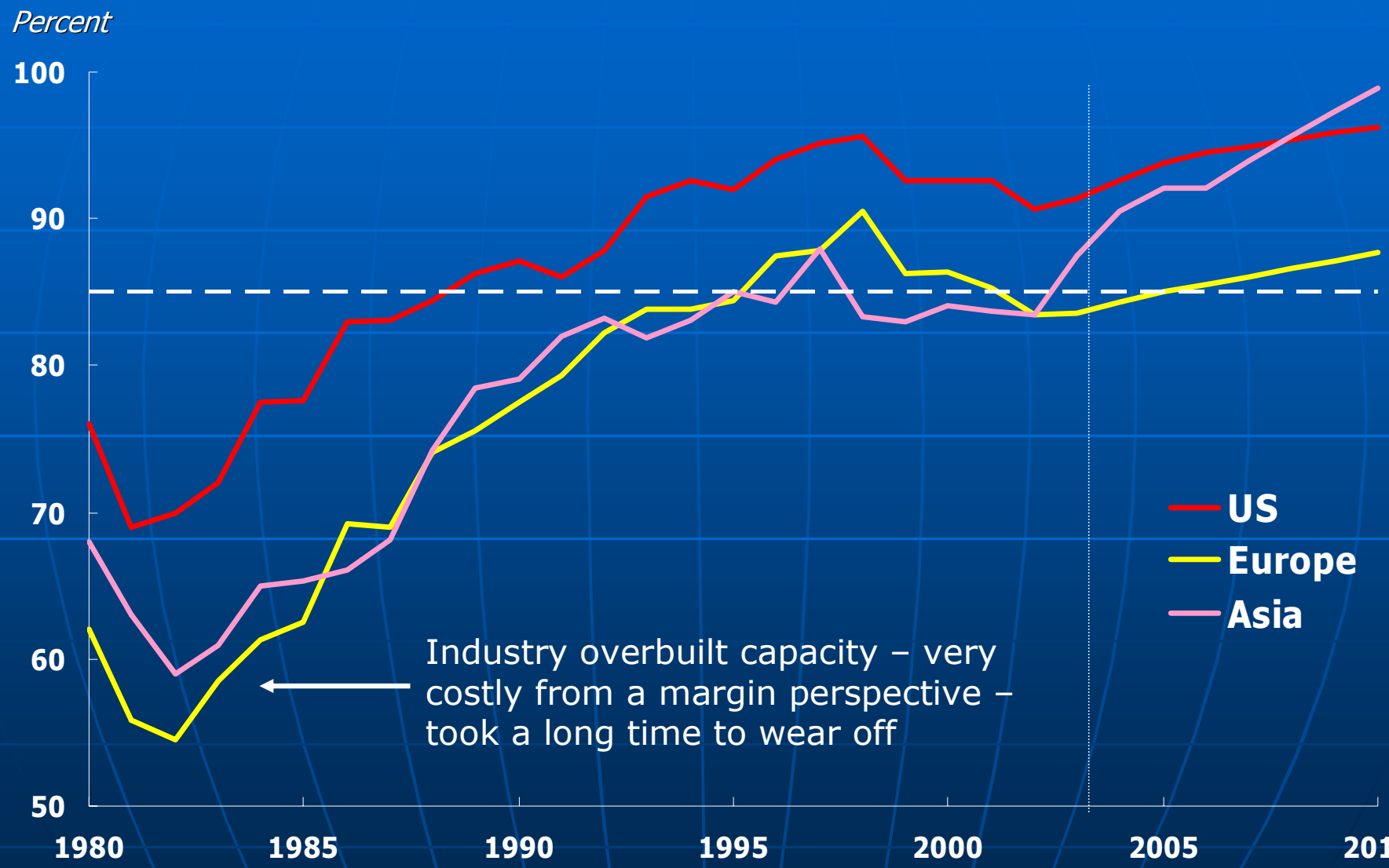
Historical OPEC Spare Production Capacity

- Current Spare Capacity Less Than 1 mb/d -



Costs money to build & maintain spare capacity. Given internal OPEC policies, may contribute to market tension and potential downward pressure on price.

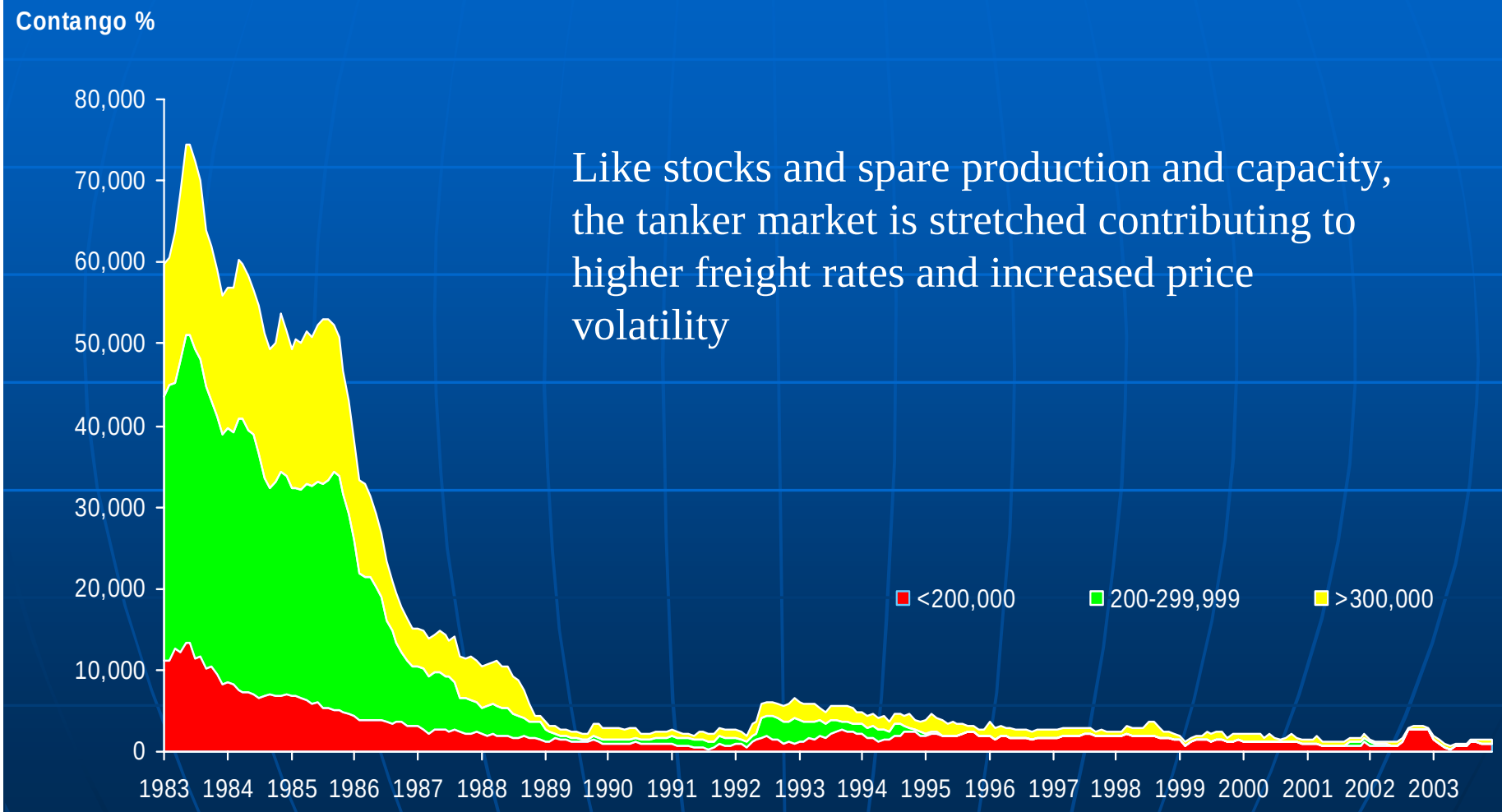
Refinery Utilization Rates Already High in U.S. & Europe, Set to Improve in Asia . . .



Who will process incremental crude?

Source: Purvin and Gertz INC.

Limited Surplus Tanker Capacity
Oil Tankers in Lay-Up – Waiting For Contract



Like stocks and spare production and capacity, the tanker market is stretched contributing to higher freight rates and increased price volatility

Who will ship incremental barrels (primary yards full)?

Source: Kearney

Conclusion – Third Oil Shock

- Political oil embargo possible, but unlikely
- More likely to be challenged by mobilizing investment – gaining access to reserves
- Structural changes in the global economy could shift price and income elasticities
- Strong non-OPEC supply growth through to end of the decade
- Faced with tighter spare capacity (stocks, production, refining, shipping, supply logistics)
- Tighter capacity reduces buffer and contributes to higher overall prices, greater price volatility market instability and fosters speculation
- Strong oil demand growth could eventually over-tax the system
- Strategic stocks are a stabilizing factor - important insurance
- Not “running out of oil” just yet

IEA Organization Structure

Energy Statistics

Information Systems

Administrative Unit

Executive Director
Special Assistant
Deputy Executive Director
Special Assistant

Public Information Office

Internet/Library

Legal Counsel

Non-Member Countries

- Central & Eastern Europe
- Africa
- Asia
- Latin America
- Middle East

Energy Efficiency Technology and R&D

- Energy Efficiency Policy Analysis
- Energy Technology Policy
- Energy Technology Collaboration

Oil Markets & Emergency Preparedness

- Oil Industry & Markets
- Oil Market Report

Long Term Co-operation and Policy Analysis

- Economic Analysis
- Energy & Environment
- Energy Diversification
- Country Studies

IEA Members

- Australia (1979)
- Austria
- Belgium
- Canada
- Czech Republic (2001)
- Denmark
- Finland (1992)
- France (1992)
- Germany
- Greece (1977)
- Hungary (1997)
- Ireland
- Italy (1978)
- Japan
- South Korea (2001)
- Luxembourg
- The Netherlands
- New Zealand (1977)
- Norway participates in the Agency under a special Agreement
- Portugal (1981)
- Spain
- Sweden
- Switzerland
- Turkey (1981)
- United Kingdom
- United States

EC

15 in 1974 → 26 member countries in 2004

IEA Formation & Aims

The International Energy Agency (IEA) was established in November 1974 in response to the 1973 oil crisis as an autonomous intergovernmental entity within the Organization for Economic Cooperation and Development (OECD) to ensure the energy security of industrialized nations.

Under the Agreement on an International Energy Program (IEP), IEA Member countries commit to hold emergency oil stocks equivalent to 90 days of net oil imports and to take effective cooperative measures to meet any oil supply emergency. Over the long term, Members strive to reduce their vulnerability to a supply disruption. Means to attain this objective include increased energy efficiency, conservation, and the development of coal, natural gas, nuclear power and renewable energy sources, with a strong emphasis on technology.

In 1993, IEA Members adopted Shared Goals that highlight the importance of ensuring the energy sector's contribution to sustainable economic development, social welfare and protection of the environment. In addition, formulation of energy policies should encourage free and open markets. The IEA is based in Paris and acts as a permanent secretariat to the Member countries, monitors the energy markets, organises the response to emergency situations and keeps energy and environmental policies and practices under constant review to encourage the use of best practices among Members and beyond. The IEA also promotes rational energy policies in a global context through co-operative relations and dialogue with non-Member countries, including major energy producers and consumers, and operates a permanent information system on the international energy market.

...BALANCING **E**NERGY SECURITY, **E**CONOMIC GROWTH & **E**NVIRONMENTAL PROTECTION