

‘Power Politics’

The Dash For The World’s Energy Resources



Mark Griffiths

BSc FRICS FAAV

RICS Conference: ‘Built To Last – Energy And The Built Environment’

RICS, 12 Great George St, Parliament Sq, London

12 June 2007

The Importance Of Energy And Chartered Surveyors To Each Other

40% Of EU Energy Is Consumed By
Buildings

Energy and property advice
are likely to have a rapidly intensifying
relationship crucial to the future of society

Climate Change

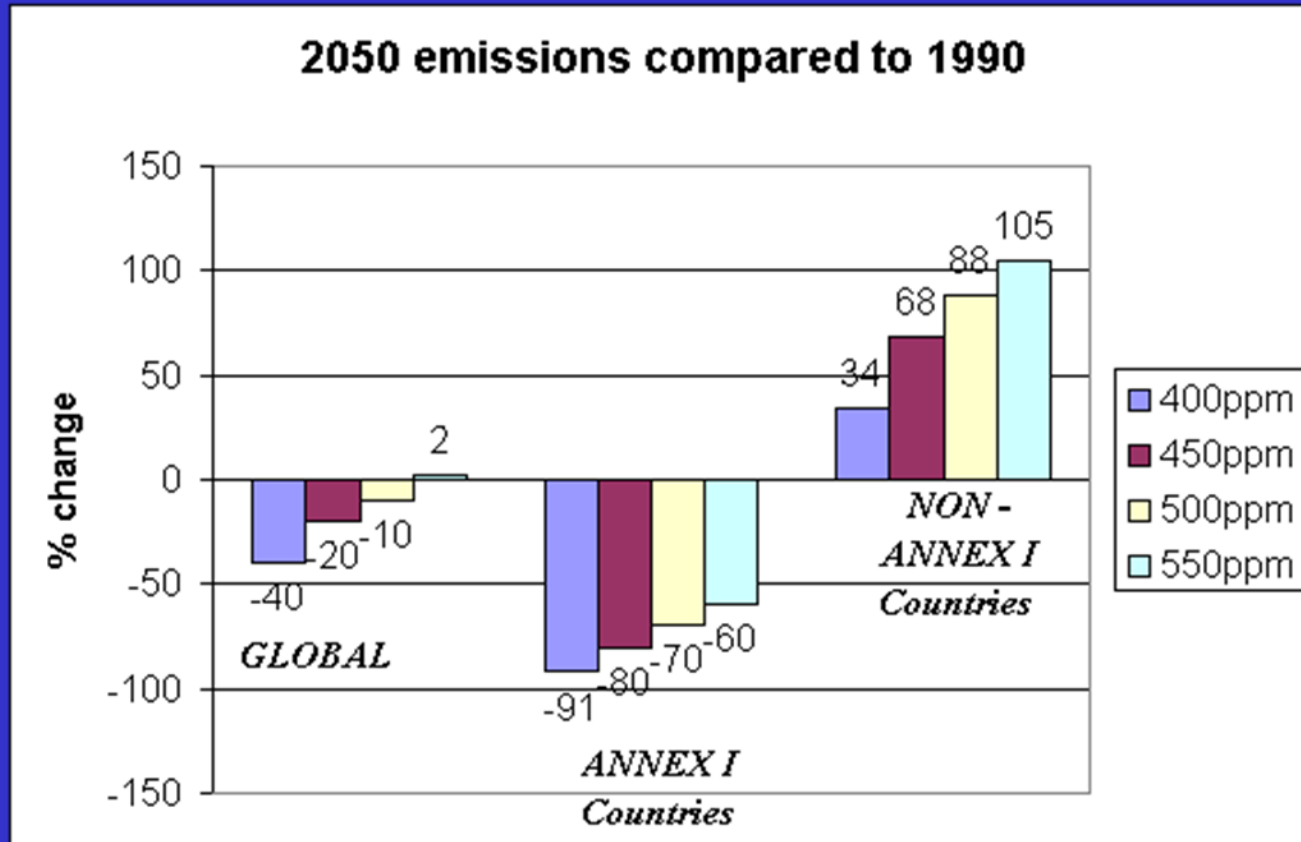
Kyoto – How are industrialised countries doing with greenhouse gas reductions from 1990 baseline?

Data: United Nations, 19.10.06	Target 2008/12 (% Change)	Actual 2004 (% Change)
Kyoto (Industrialised Countries, 40 No)	- 5.2	- 3.3
UK	-12.5	- 14.3
EC	- 8.0	- 0.6
Japan	- 6.0	+ 6.5
US (Has not ratified treaty)	- 7.0	+ 15.8
Canada	- 6.0	+ 26.6

1. The position has deteriorated since 2003 when the overall Kyoto 'actual' figure for industrialised countries was ahead of target at minus 5.9%
2. Figures exclude carbon off-sets/carbon sinks

The Real Climate Change Challenge

80% Reductions For Industrialised Countries By 2050?



Source: Institute For European Environmental Policy, 2005

Annex 1 = Industrialised Countries

(2007 Greenhouse Gas emission concentrations in region of 430 ppm CO₂ equivalent)

EU policy aims to limit warming to not more than 2 degrees C,

but to achieve that there is now evidence that stabilisation of accumulated emissions at 450 ppm is required

Energy Challenges – Climate And Supply

IEA 'Business As Usual' Global Forecast To 2030

'IN THE ABSENCE OF NEW GOVERNMENT ACTION'

- CO2 emissions to rise by 55% (from 2004)
- Global energy requirement to **increase** by **53%**
- **83%** of **increase** from fossil fuels
- **Over 70%** of **increase** from developing countries (30% China)
- Total energy investment required **\$20** trillion
(\$ Trillion - electricity 11.3, oil 4.3, gas 3.9, coal 0.6)

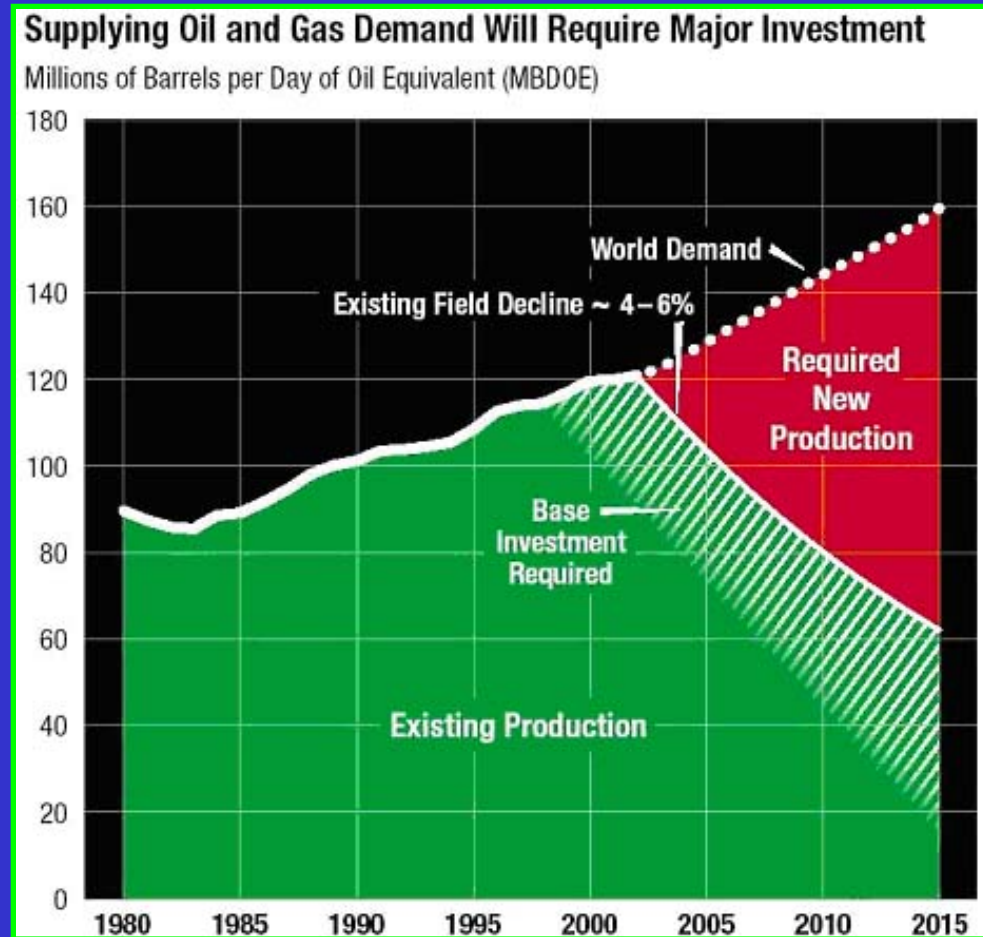
Security Of Supply

"In the future, energy security will be almost
as important as defence "

Tony Blair

On the opening of Langeled gas pipeline from Norway, October 2006

Can The Oil and Gas Sector Deliver?



Source: Exxon Mobil

“In other words, by 2015, we will need to find, develop and produce a volume of new oil and gas that is equal to eight out of every 10 barrels being produced today.”

John Thompson, President of ExxonMobil Exploration, 2003

International Energy Agency

CHIEF ECONOMIST

*“The threat to the world's energy security, especially on oil and natural gas, will reach **serious dimensions** in the **next 10 years**”*

Fatih Birol

*Commenting on IEA 'World Energy Outlook 2006' Report
Press Conference, Istanbul, 22 December 2006*

IEA is the principal energy adviser to the 30 industrialised nations of the OECD
(79% of UK energy comes from oil and gas
plus 14% coal, 4% renewables and 3% nuclear)

Supply Risk Factors

- **Geopolitical** – increased dependence on energy imports from unstable countries, particularly the Middle East

(By 2030 OECD will import 2/3rds of its oil from ME, up from 56% in 2004)

- **Economic** – insufficient timely investment
- **Geological** – depleting natural resources

GEOPOLITICAL RISK

Foreign Office
International Energy Strategy, 2004

"By 2020, we will probably be importing three-quarters of our primary energy needs – and we will need to adapt to that ... I will be tasking our Ambassadors and High Commissioners in priority posts overseas to take personal charge of implementing this Strategy ..."

Jack Straw, Foreign Secretary

Main Dash For Energy

USA and China

- Increasing oil imports 2003 – 2030 (US Dept Energy)
 - ‘**North America**’: 20 M bpd (from 14M)
 - **China**: 11M bpd (from 3M); HALF from Gulf
- **China** now 2nd largest importer behind US (moved ahead of Japan 2003)
- **China** strengthening strategic energy alliances with major oil and gas producers – e.g. **Canada, Iran, Saudi Arabia, Russia, and Venezuela**
- **China** and **USA** are also competing strongly in Africa and Central Asia

“The rising dependence of China on Middle Eastern oil supplies has geopolitical implications both for relations between the two regions and for the oil-consuming world as a whole... in 2003, the OECD countries imported ...11.3 million barrels per day ... from the Persian Gulf region...”

International Energy Outlook
US Department Of Energy 2006

CHINA'S APRIL 2007 OIL IMPORTS
WERE UP 23% ON APRIL 2006 DUE TO STOCKPILING
(Wall St Journal, 15 May 2007)

Global Situation?

Oil And Gas Geopolitics



Strategic Ellipse

Source: German Federal Institute for Geosciences and Natural Resources

“For how much longer can countries like ours allow the security of our energy supply to be dependent on some of the most unstable parts of the world?”

Tony Blair, Labour Conference 2005

Post 'Berlin Wall'

Energy Related Geopolitical Developments

- The deterioration of the west's relations with the **Islamic world** as a result of Gulf War I in 1991
(precipitating Bin Laden's Fatwa against US)
- The emergence of **China** in 1996 as a net importer of oil
- The 'success' of efforts to expand NATO in pushing **Russia** into the arms of **China**
(first ever Sino-Russian joint military exercises August 2005)
- Entering an era of resource wars
Paddy Ashdown, Bill Clinton, Senator Joe Lieberman, etc

Senator Joe Lieberman

(2000 Vice Presidential running mate to Al Gore)

Council on Foreign Relations, 1 December 2005

US and China must collaborate on energy
research and development...

“before the race for oil becomes as hot
and dangerous as the nuclear arms race
between the US and the Soviet Union”

ECONOMIC AND GEOLOGICAL RISK

GAS

‘Heat And Power’

Critical To Built Environment

Moving From UK Gas Self-Sufficiency To Import Dependency

“The facts are stark. By 2025, if current policy is unchanged.... we will become... 80-90% dependent on foreign [gas] imports, mostly from the Middle East and Africa and Russia.”

Tony Blair

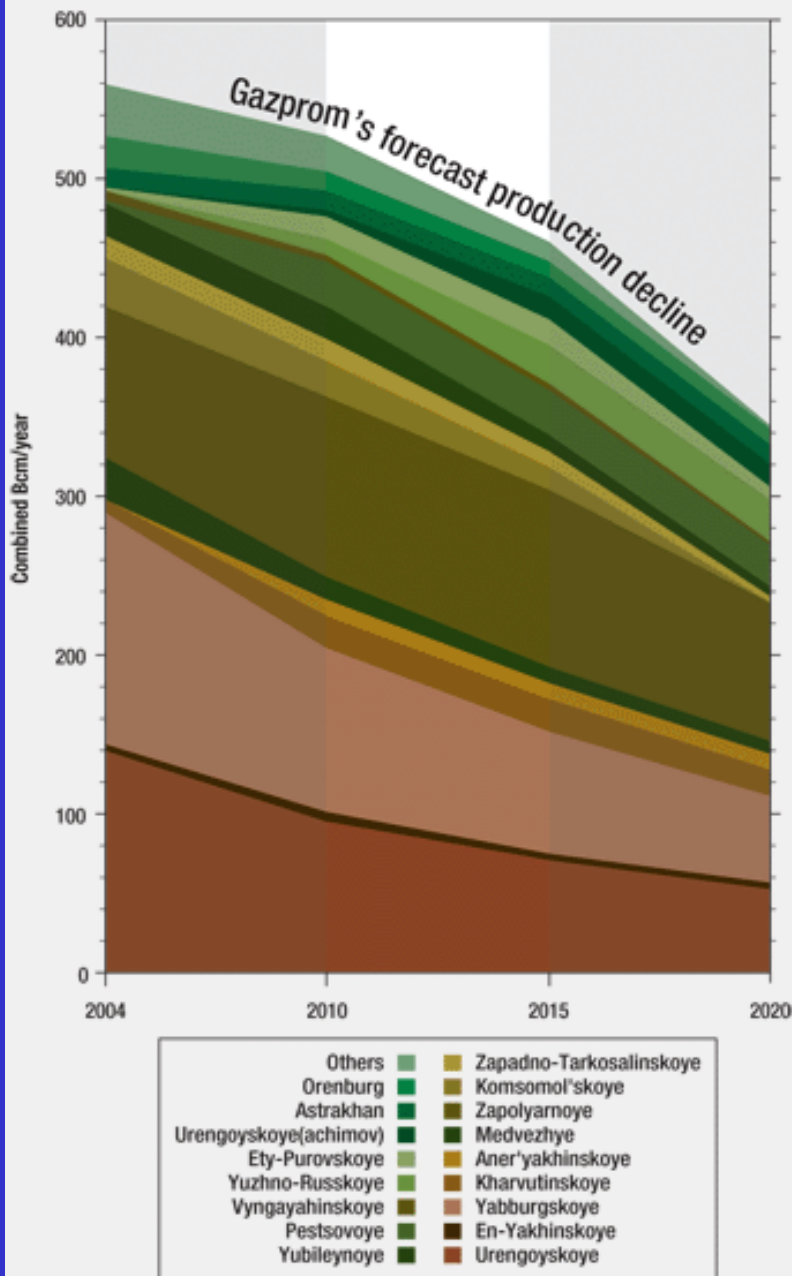
Speech to CBI, 16 May 2006

Current UK False Sense Of Security

- Current reduced gas prices are largely due to new **Norwegian** pipeline coming on stream 2006 – but this **only a temporary reprieve**
- Fast depleting UK **North Sea** fields will mean **Norwegian supply is not sufficient after 2010**
- So how dependable **are Russia, Middle East,** and **Africa** as alternative suppliers?

70% of Russia's Gas Comes From Fields Which Are In Decline

Russia's 4th largest field only came on stream in 2001 and has already peaked (IEA)



*Selected Gazprom fields production forecast
Bcm/year to 2020
Institute of Energy Policy, Houston, 2006*

Who Says Russia May Not Be Able To Match EU Gas Needs In Next Decade?

- Gazprom – \$600 billion investment required (not happening)
- Oxford Institute for Energy Studies
- European Bank For Reconstruction And Development
- European Commission
- International Energy Agency
- Dissenting voices? – Difficult to find

And Gas Supplies From The Middle East And Africa?

“... A particular concern is whether the projected increase in [gas] exports in some regions, especially the **Middle East**, is achievable in the light of institutional, financial and geopolitical factors and constraints... **it is far from certain that all investment needed beyond 2010 will in fact occur...**”

World Energy Outlook
International Energy Agency, 2006

Gas from the Middle East?

(Primarily Liquefied Natural Gas Shipped From Iran and Qatar)

Lack of investment means ME cannot keep up with demand

- Its priority is Gulf domestic demand - rising by 10% pa and supply deficit to Gulf countries may reach 7 billion cubic feet per day by 2015 (BP, 2007)
- “Getting incremental gas supplies from Iran and Qatar will be very challenging” (Wood Mackenzie, 2007)
- There is not a single LNG project being built in Iran (Wood Mackenzie, 2007)
- Centrica has approached Iran but British government has warned it not to (Observer, March 2007)

Overall Gas Picture - IEA

“Total gas output in IEA countries is falling, while demand is rising... by 2015 LNG is set to provide almost a quarter of OECD gas demand... Investment in the gas sector is a serious cause for concern... investment to 2015 is considerably below the amount required.... Forecasts of tight supply underpin high gas price expectations...”

IEA Natural Gas Market Review 2007

NUCLEAR

Provider of Electricity

And

‘Global Warming Saviour’?

How Much Nuclear Can We Do?

IEA assessment –
as % of rising global energy demand

2004 – 6.3%

2030 – 6.9% (Max assuming policies currently under consideration adopted)

To meet even this level “investment in [uranium] mining capacity and nuclear fuel manufacture must increase sharply”

Global Uranium Requirements

2005 – 68,000 T pa

2030 – 100,000 T pa

(this assumes 6.9% of world energy supply comes from nuclear, and note: fast breeder or fusion technology unlikely to be commercial before circa 2050)

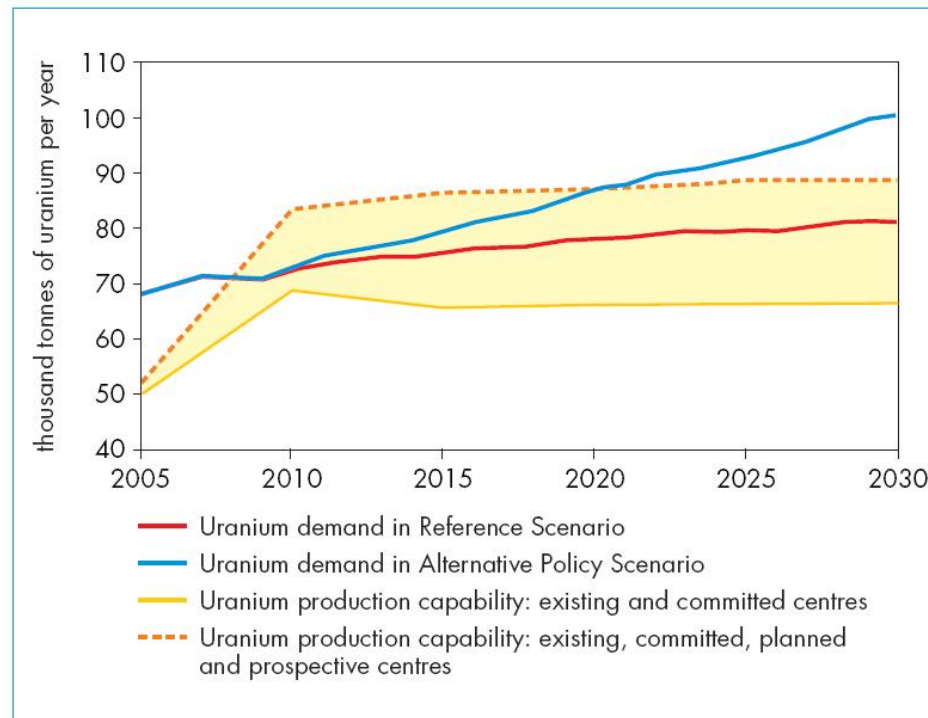
BUT....

- Uranium supply from nuclear weapons decommissioning “Megatons to Megawatts” programme comes to an end in 2013
- Current projected mining capacity by IEA is not sufficient to meet uranium requirement for 6.9% nuclear supply in 2030
- Substantial doubts about bringing additional mining capacity online in time – global production fell 4.9% in 2006

URANIUM SUPPLY

Targets Are Vulnerable

Figure 13.15: World Uranium Production Capability and Reactor Requirements in the Reference and Alternative Policy Scenarios (tonnes per year)



Source: IEA calculations for uranium demand and NEA/IAEA (2006) for production capability.

A target of 6.9% nuclear by 2030 (blue line) gives a uranium shortage by 2020 if no major development of additional uranium production

Challenges To Increased Uranium Supply

- Large investment required for timely delivery
- Just two countries, **Canada and Australia**, account for 50% of global production, with highest grade ores in Canada
- Important increases in Canadian production currently stalled due to serious flooding problems at **Cigar Lake** mine (world's 2nd largest high grade deposit; 8000 T pa capacity at full production; off-line until at least 2010)
- The **China** demand factor
(and even Russia may become uranium importer
Mining Weekly, 16 March 2007)

.... China Factor...

- 2005 – China’s deal with Australia for long term supply of uranium up to 20,000 T pa - i.e. equivalent to:
 - More than twice Australia’s total output (2006)
 - Half world mined output (2006)
(BBC/AFP, March 2006)
- Can Australia really deliver this, and what happens to their existing customers if they do?
(Despite steeply rising prices **Australia’s uranium output fell 20% in 2006**, and Canada’s by 15% - World Nuclear Association, May 2007. UK imports most of its reactor uranium from Australia, Energy White Paper 2007)

Will There Be A Uranium Shortage?

Likely Or Possible

- CAMECO, world's largest uranium producer (2007)
- Massachusetts Institute Of Technology (2007)
- Kurchatov Institute, Russia's leading nuclear institute (2007)

Ambivalent

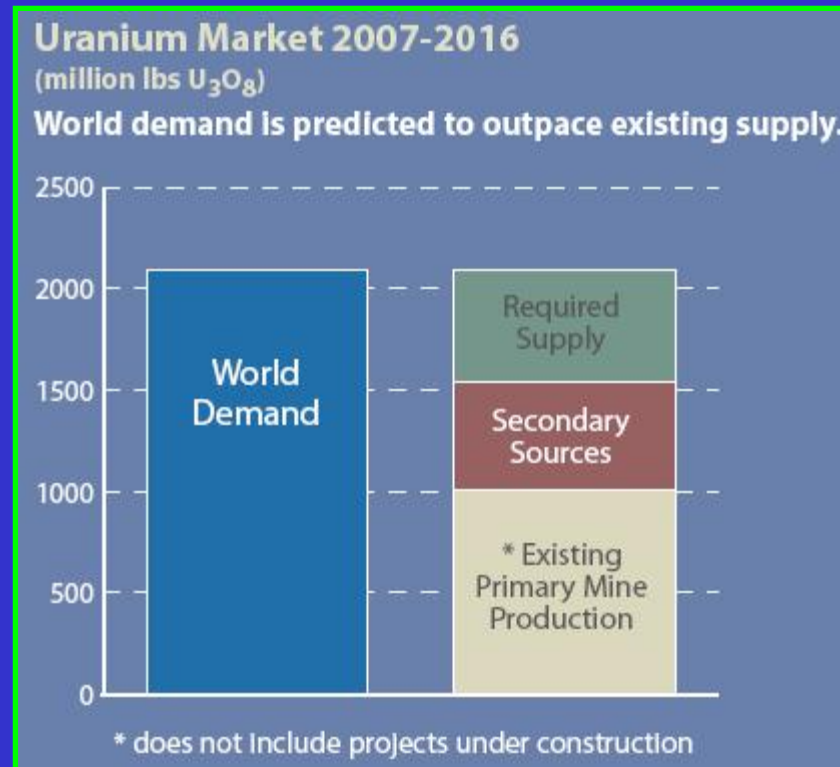
- IEA – mining investment 'must rise sharply' (2006)
- IAEA – 'assuming the industry keeps moving ahead with exploration and new mines' (2006) - 'one crucial consideration is ... the time needed to develop new production capability... historically in the order of one to two decades' (2004)

'No'

- DTI Energy White Paper (2007) – but based on IAEA figures
- Nuclear Energy Institute, USA (2007) – "adequate supplies for the next 5 or 10 yrs and well into the future"

"Uranium demand is expected to increase by 50% in the next 25 years and will exceed supply within the next decade.."

Executive director of the Australian Uranium Association
Michael Angwin, March 2007



"No new production anywhere near the amount Cameco has under water at Cigar Lake will enter the market for years, **mining forecasts show....**"

Bloomberg, 20 April 2007

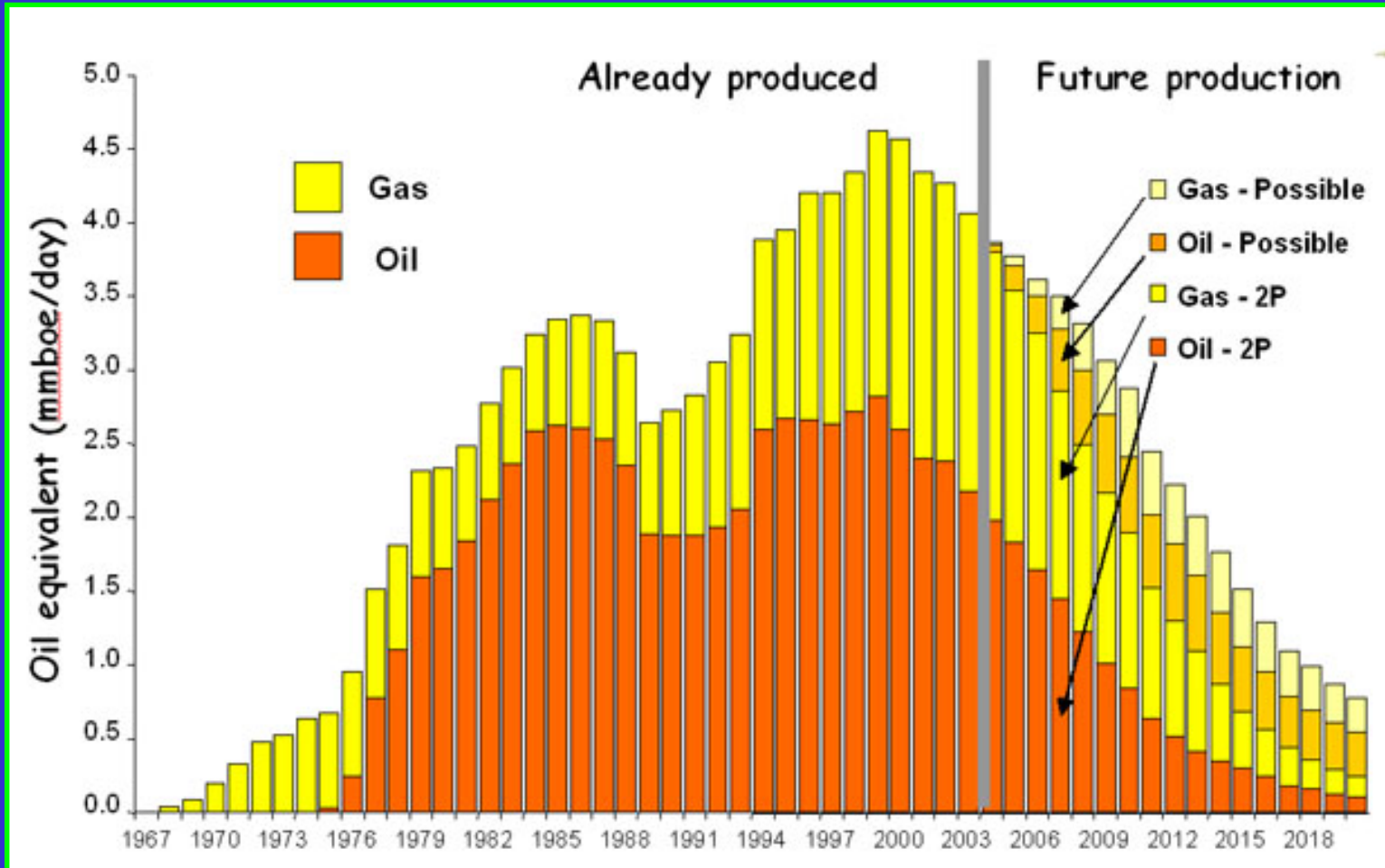
OIL

Critical To Transport

‘Road, rail, air, and marine fuel’

ENERGY SUPPLY A GROWING CONCERN - UK

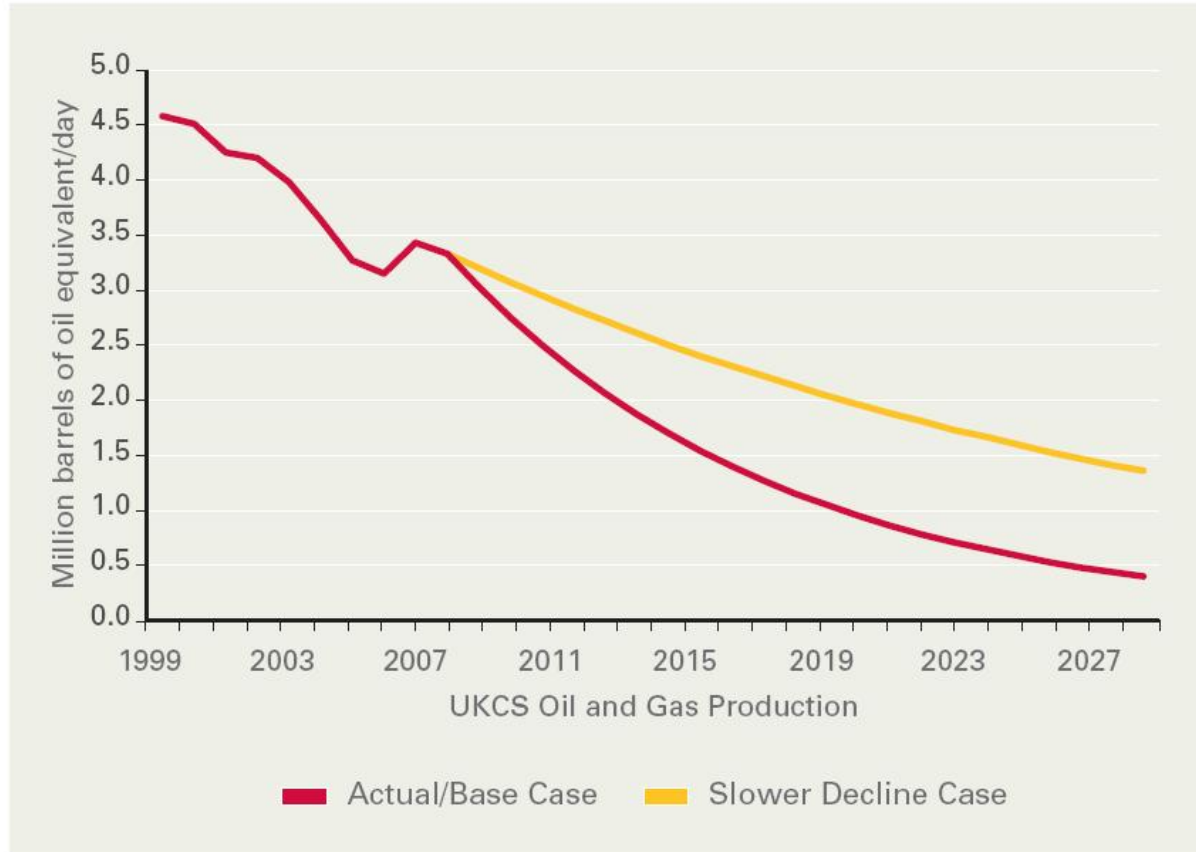
North Sea oil and gas will be mostly gone in ten years



Source: DTI/Association for the Study of Peak Oil (ASPO)

UK Energy Review 2006

CHART 12. TOTAL UK CONTINENTAL SHELF OIL AND GAS PRODUCTION (TO 2030)



Source: DTI – United Kingdom Offshore Operators Association, 2006

UK Offshore Operators Association [2007](#)

1999 - UK oil and gas production peaked at 4.5m barrels oil equivalent per day

2006 – production fell by 9% to 2.9m boe a day

2010 – production expected to be down to just 2.6m boe/d due to inadequate investment

Gordon Brown's 2007 budget

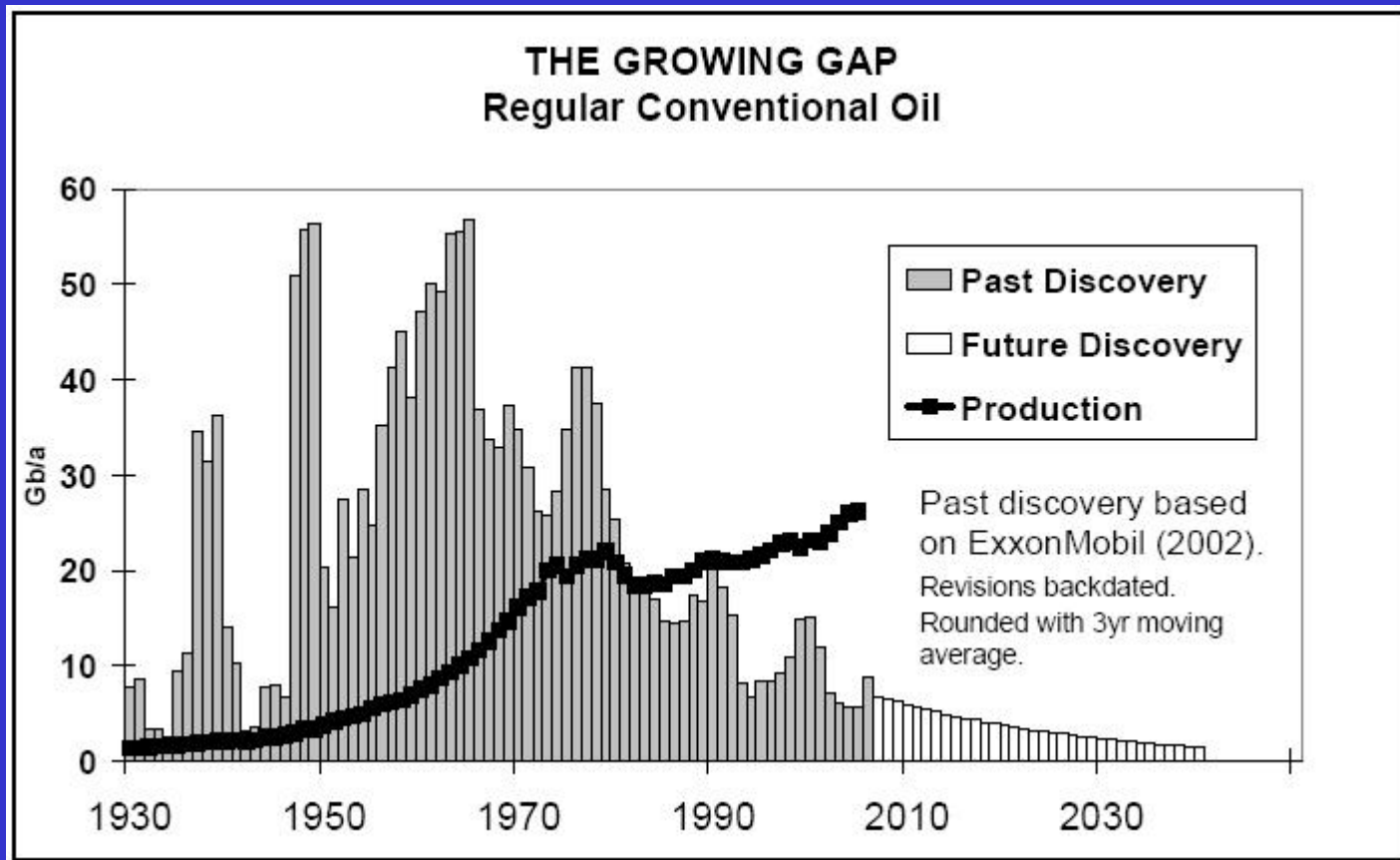
Reuters, 21 March 2007

“....the sharply lower levels of production and yet higher costs in the North Sea have this year reduced tax revenues from £13 billion to £8 billion and for each year into the future cut them by an average of £4 billion a year.”

Q: If North Sea Production Has Peaked
When Will Rest Of World Peak?

Production in 60 of the world's 99 oil
producing countries has already peaked
(Energy Files, 2003)

Oil Discovery Peaked In 1960s And Consumption Has Been Ahead of Discovery For Last 20 Yrs



Source: ASPO/ExxonMobil

When Is The Earliest Global Oil Production Will Peak?

Most current estimates fall within a 15 year window

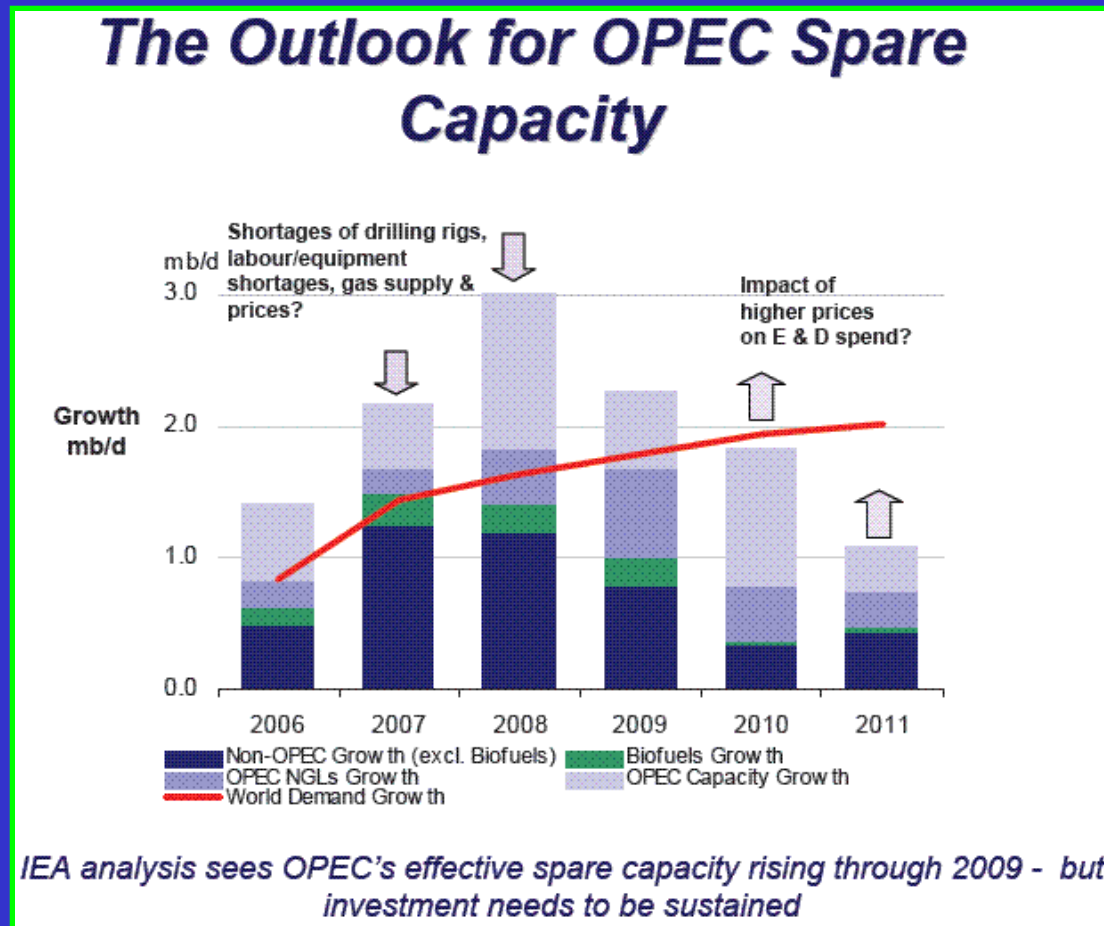
i.e. 2010 – 2025

However:

IEA and Exxon say a resource based peak is unlikely within this period provided sufficient investment

(IEA says **non-OPEC conventional oil will peak after 2010** with increasing reliance on unconventional oil and the Middle East, particularly Saudi Arabia and Iraq in the longer term)

IEA Sees Rate Of Growth In Oil Supply Falling Behind Rate Of Growth In Demand After 2009



David Fyfe, IEA Senior Oil Analyst,

Centre for Global Energy Studies 'Oil and the World Economy' conference, London, 21 March 2007

Earliest Date For Global Peak And Amount (M bb/day)?

2030 +	CERA	Consultants	130
2025	Wood Mackenzie	Consultants	110
2020	Total	Oil Company	105
2020	American Assn Petroleum Geologists (Conference Papers/Oil & Gas Journal)	Professional body	95
2016	Wells (ex Shell & BP)	Analyst	93
2015	PFC Energy	Consultants	100
2010	BP (Harper)	Oil Company	?
2010	Skrebowski (Editor Petroleum Review)	Analyst	94

Average – (excluding CERA) is 100 M bb/ day compared with 2006 consumption of 85 M bb/day

Sir David Manning

British US Ambassador

And Foreign Policy Adviser To The Prime Minister 2001-2003

Speech at Stanford University, 13 March 2006

*"The scarcity of energy supplies and the energy imbalance between nations is a threat to our prosperity and **national security**. As resources contract, oil-hungry economies will compete for dwindling supplies of hydrocarbons. **Competition for fossil fuels will increase....** Energy resources have long been a major strategic concern: access to secure sources, control over supply lines: these are issues of **national security** The energy challenge is now more pressing than ever.... **Global oil production is apparently nearing its peak....** current estimates seem to be converging on some point between **2010 and 2020....** [there] are five factors which are changing the energy landscape: rising demand; dwindling supply; greater concentration of resource in the hands of a few; limited spare capacity; and the environmental impacts of energy use.....**This is not a problem that can wait ten years.**"*

Projected Demand

‘Business As Usual’

(2006 - 85 m barrels/day)

IEA

- 2015 – 99 bb/day
- 2030 – 116 m bb/day

US Department Of Energy

- 2015 – 98 m bb/day
- 2030 – 118 m bb/day

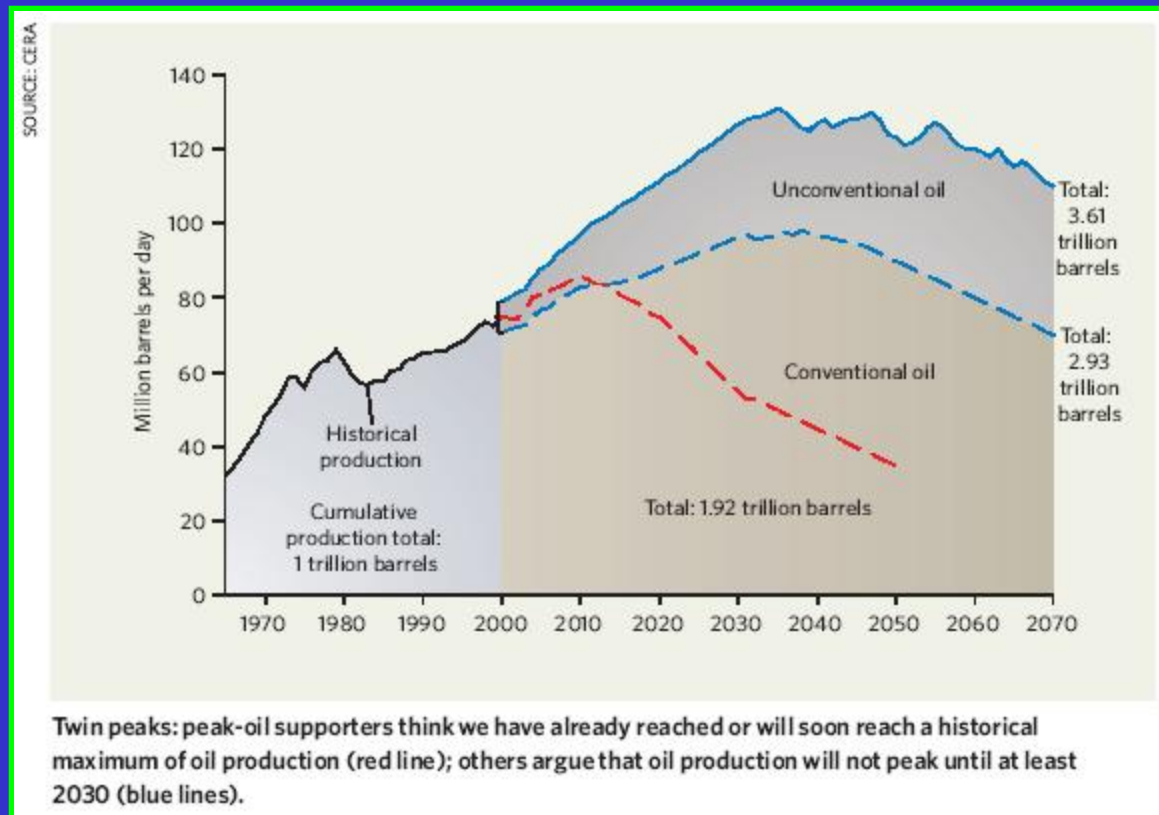
“Numbers like 120 million barrels per day will never be reached, never.”

Christophe de Margerie, Head of Exploration, Total
World ‘Cannot Meet Oil Demand’
Times, 8 April 2006

2007 **KMPG** SURVEY OF 553 OIL AND GAS COMPANY FINANCIAL EXECUTIVES

60% believe trend of declining reserves is irreversible
70% think situation will get worse as China grows

CERA's FORCAST



Graph as reproduced in Nature, Vol 445, 4 January 2007

CERA's forecast heavily dependent on development of
'unconventional oil'

(Total 130m barrels/day, but conventional peaks at under 100m)

What Is 'Unconventional Oil'?

CERA's definition primarily covers:

- **Bitumen/Heavy Oil**
(Orinoco, **Venezuela**)
- **Tar sands, shale**
(solid deposit sources, especially **Canada** and **USA**)
- **Coal-to-liquids**
(as used by Germany in WWII, and now re-emerging in USA and China)

Other definitions can also include:

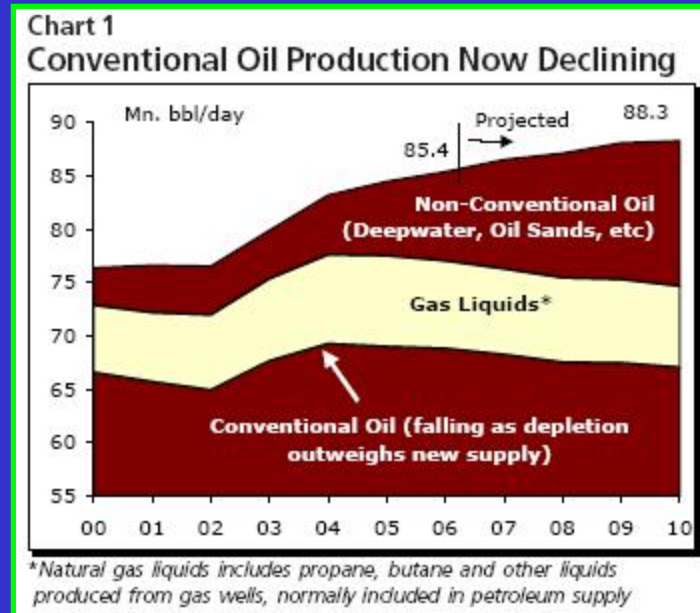
- **Deepwater ocean** (>500m depth)
- **Arctic oil**
- **Natural Gas Liquids (NGL)**
- **Biofuels**

Some Problems With 'Unconventionals'

- **Deepwater** – Speculative
(120 basins explored globally but only 20 identified as economic, - BP 2005)
- **Arctic** – Tough conditions and amounts overstated
(Key North American and Greenland oil basins now thought to be ¼ size of original estimate -Wood Mackenzie 2006)
- **Biofuels** – Constrained by land and water requirements
(IEA forecasts only 4 to 7% of road fuel consumption by 2030; International Panel on Climate Change forecasts 3% of transport demand, or 5 to 10% if cellulosic biomass commercialised and improvements in vehicle fuel efficiency)
- **Heavy Oil And Solid Deposits** – Slow flows and much more energy and CO2 intensive

Canadian Imperial Bank Of Commerce

December 2006



CIBC claims:

- Global conventional oil production peaked in 2004 and is now in decline (as also claimed by CEO of Shell)
- Project analysis indicates deepwater to compensate for conventional output decline until 2009
- Thereafter - “the supply pendulum will swing heavily toward oil sands production”

Where Resource Depletion Meets Global Warming

*“All the world’s extra oil supply is likely to
come from expensive and environmentally
damaging **unconventional** sources within 15
years”*

Wood Mackenzie, January 2007

Unconventional 'Solid' Oils

The Face Of The Future?
Dream Or Nightmare?



Tars Sands And Shale

Good Idea Or Not?

Dream?

- Huge resource
- Mainly located outside OPEC
(e.g. North America, Australia)

Nightmare?

- Expensive to develop and bring to market
- Slow to bring on stream
- Large consumption of natural gas and water for extraction and processing
- Much greater implications for global warming than conventional oil – high CO₂ emissions during extraction and processing (x 5 – Nyboer and Tu, 2006)

Global Warming Ultra?

Impact Of Tar Sands On Canada's CO₂ Emissions

Kyoto requires 6% **Canadian** cut in 1990 emissions

- But by 2006 Canada was **35 %** points adrift from Kyoto target
(tar sands largest single contributor to Canadian emissions growth)
- 2006 tar sand oil production 1.2 M bpd but set to expand many fold
(US pressing Canada to increase tar sand production five fold, and China is already investing in Canadian tar sands)
- Little compensating carbon sequestration being used

Both For Climate Change And Security Of Supply

The IEA Knows ‘Business As Usual’ Is Unsustainable

Claude Mandil, CEO of IEA

Launch of World Energy Outlook, 7 November 2006

“The key word is **urgent**. The world is facing **twin energy-related threats**: that of not having adequate and secure supplies of energy at affordable prices and that of **environmental harm** caused by consuming too much of it...”

“This energy scenario is not only **unsustainable** but **doomed to failure**.”



What Is Sustainability?

What Is Sustainability?

RICS Version

“.... meet[ing] the needs of today without compromising the ability of future generations to meet their needs. It is about leaving the world a better place than we found it....”

RICS Sustainability Policy, June 2005

What Is Sustainability?
‘Man In The Street’ Version

“Can You Keep On Doing It?”

(Jonathan Porritt, FIG Congress, Brighton 1998)

What Is Sustainability?
Economist's Version

“Living off financial income, not
financial capital”

What Is Sustainability?
Environmentalism's Version

“Living Off Environmental Income, Not
Environmental Capital”

(What is environmental income?)

Sustainability?

Minerals Used As Building Materials

- **Construction minerals** are converted to other assets:
 - Aggregates and ores turned into buildings and equipment
 - The asset resource is not essentially depleted; it is converted
 - After conversion it can be recycled into other assets if well managed

Sustainability?

Minerals Used As Energy Source

- **Energy minerals** are used to create goods and services but are themselves converted into liabilities -

Nuclear Fuel

- High grade uranium is being used up
- Converted to radioactive waste

Fossil Fuels

- Converted to greenhouse gases
- Energy resource is destroyed; **we set fire to it!**
- Eventually we run out (conventional oil first in the queue)

The Biggest Obstacle To Taking Action On Energy Sustainability?

“The problem with people wanting to tussle with energy strategy... is that as long as the lights are on, people are relaxed...”

Tim Eggar, former Energy Minister
BBC, 16 December 2004

Many coal and most nuclear power stations in the UK are scheduled to close by 2020

2007 total UK generation capacity 76 GW – 37% coal, 36% gas, 18% nuclear, 4% renewables, 3% other, 1% oil

22.5 GW (30%) may close by 2020

What Is The Bottom Line?

Two **main options** in the face of tightening oil and gas supplies:

- To try and stay on the oil/gas treadmill and to expand investment in **unconventional sources** (with aggravated global warming impacts if carbon mitigation not successfully applied)
- To invest in energy **conservation** and **alternative technology**

Key Question

Would we be better off:

Transferring IEA projected \$8 trillion oil and gas investment into conservation and alternative energy initiatives?

(\$20 trillion if other energy investments included)

In the case of oil PFC Energy believe:

- Unconventional oil will not deliver enough and in time
- **“Managing demand”** is becoming key strategic issue (i.e. energy conservation)

Living Off Environmental Income A Guiding Principle For The Future?

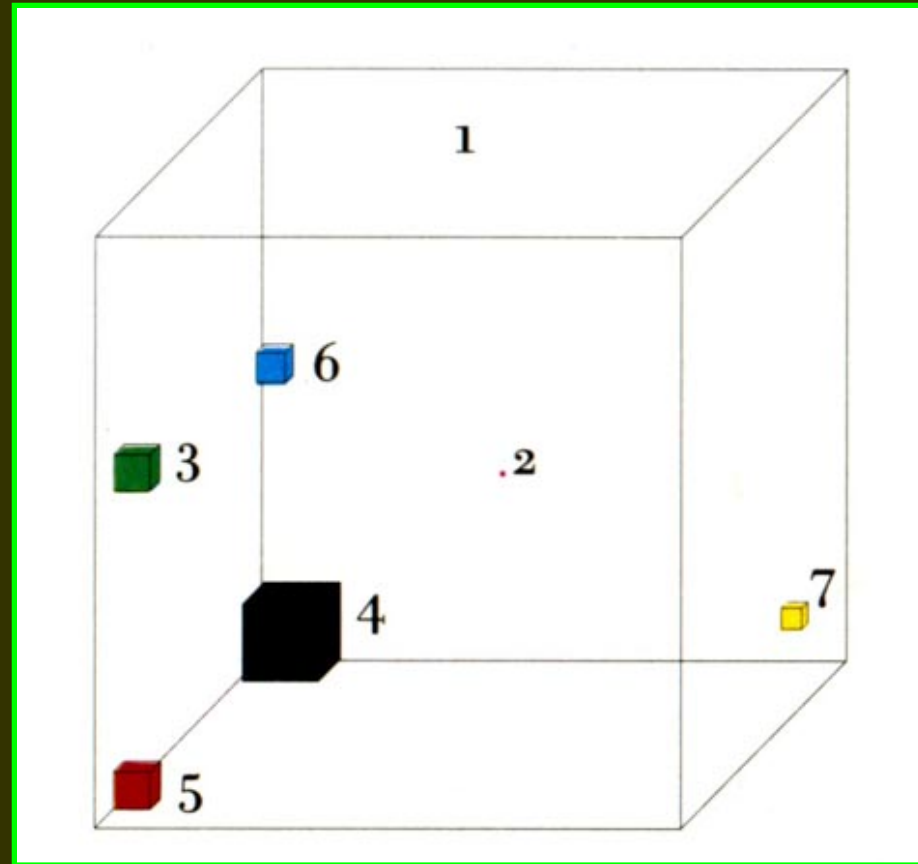
Where Might We Get Tomorrow's Energy From?

Environmental Capital (Total global energy mineral reserves)

3. Natural Gas.
4. Coal.
5. Oil.
6. Uranium.

Environmental Income (Demand and supply)

7. Annual global energy consumption.
2. Annual solar energy use (current).
1. Annual solar energy falling on Earth (i.e. annual planetary solar energy income).



Source: "Energy Saving Now"

Solar related technologies include – wind, wave, hydroelectric, solar photovoltaic, solar thermal, biomass, near surface ground heat, tidal, (gravitational effect with moon)

**This presentation is an update of an earlier RICS conference paper,
the full text of which is available at**

**[www.rics.org/Property/Propertyappraisalandvaluation/
RICS Valuation Conference 2005.html](http://www.rics.org/Property/Propertyappraisalandvaluation/RICS_Valuation_Conference_2005.html)**

‘Power Politics’

The Dash For The World’s Energy Resources

Mark Griffiths BSc FRICS FAAV

Contents

Press Excerpts

- 1. Climate Change**
- 2. ‘Security’ Of Energy Supply**
- 3. The ‘Peak Oil’ Debate**
- 4. Economists V Geologists**
- 5. Non-Conventional Oil**
- 6. Global Warming Ultra?**
- 7. Conservation, Technology, and ‘Demand Destruction’**
- 8. Sustainability**

Further Reading

Annex – The Saudi Question