Megaprojects update: Just how close to Peak Oil are we?

Chris Skrebowski: Trustee of the Oil Depletion Analysis Centre and Editor of Petroleum Review, Energy Institute, London

Who am I?

Chris Skrebowski has spent half his working life in the oil industry and the rest as an oil journalist

Free of corporate or political pressure he brings a healthy scepticism to the problem

Not pessimistic by nature, not anti-Oil

Basic approach to Peak Oil analysis

Don’t guess, assume or hope - let the numbers talk

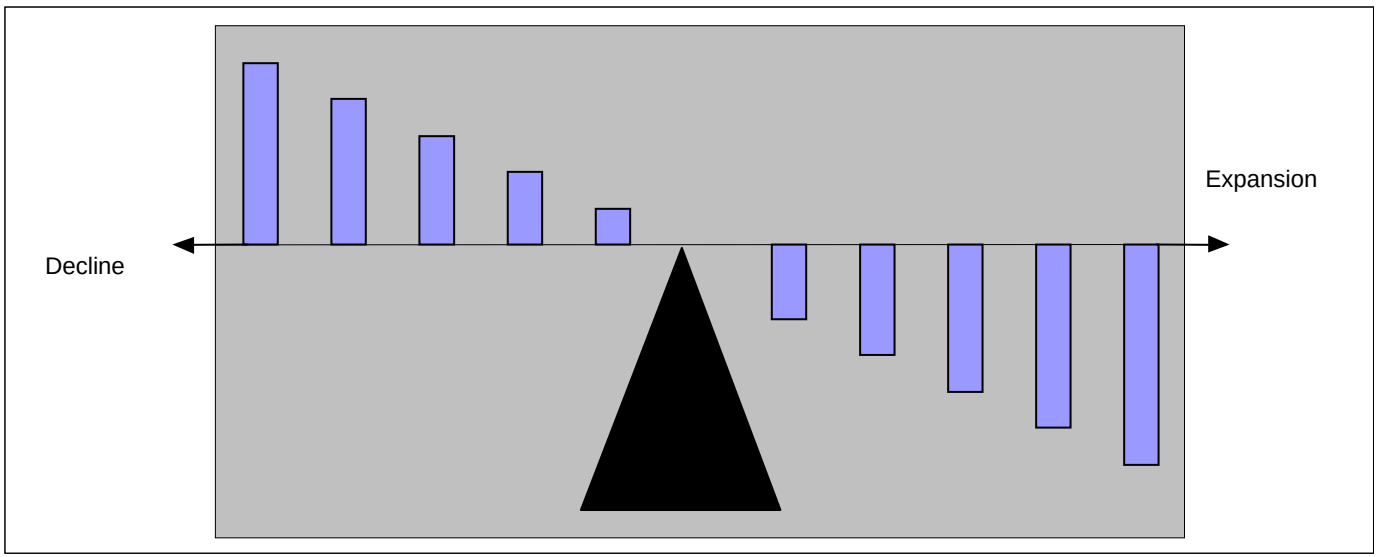
Observe what companies do, not what they say

So what is ‘Peak Oil’?

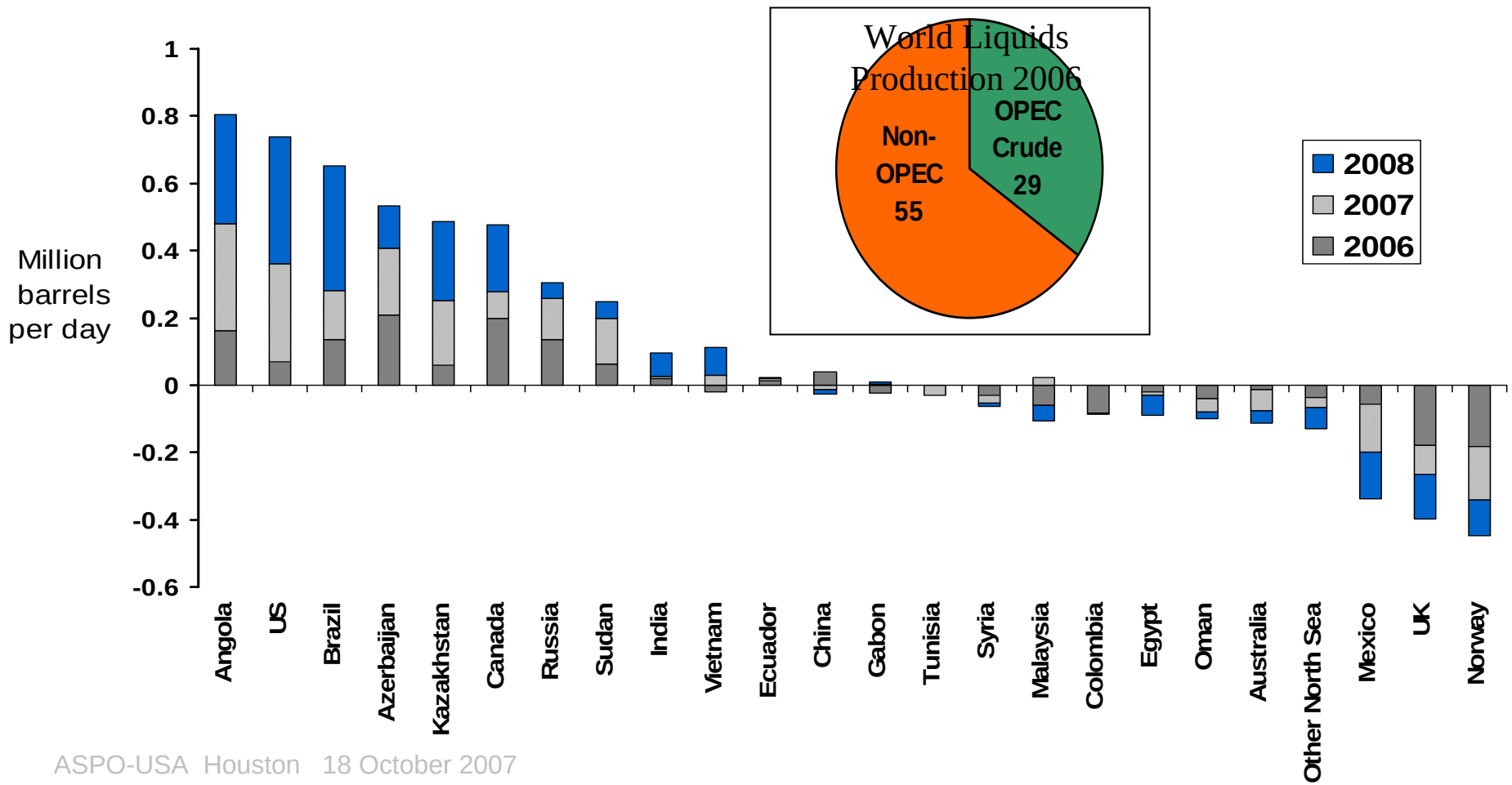
- It is the point when further expansion of oil production becomes impossible because:
- New production flows are fully offset by production declines (depletion)
- You never run out of oil
- You do run out of incremental flows
- The world needs oil products to support growth

A simple observation -- or why peak will be earlier than most people expect

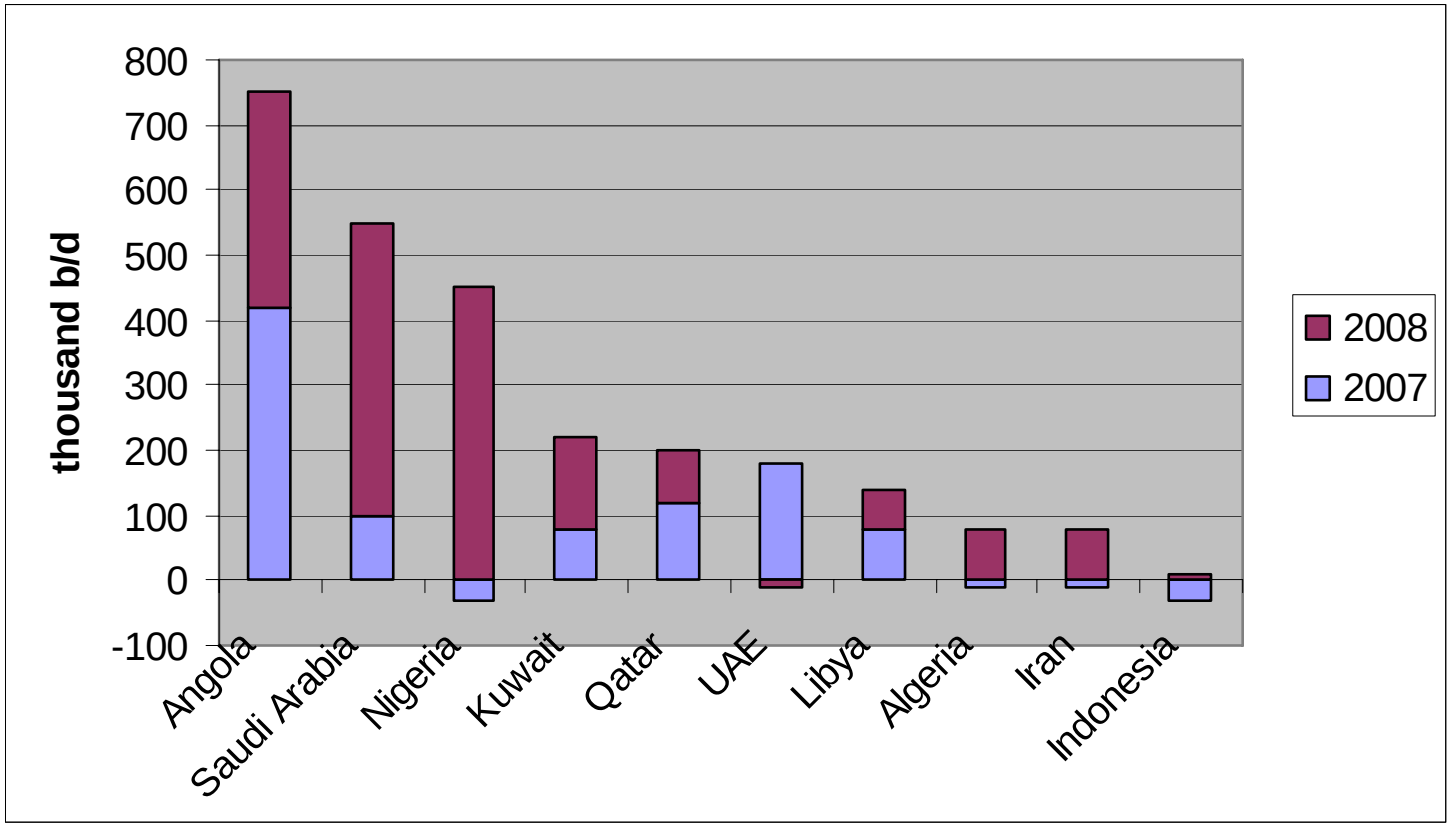
‘Global production falls when loss of output from countries in decline exceeds gains in output from those that are expanding.’



World non-Opec Oil Supply Growth (2006 - 2007 - 2008)



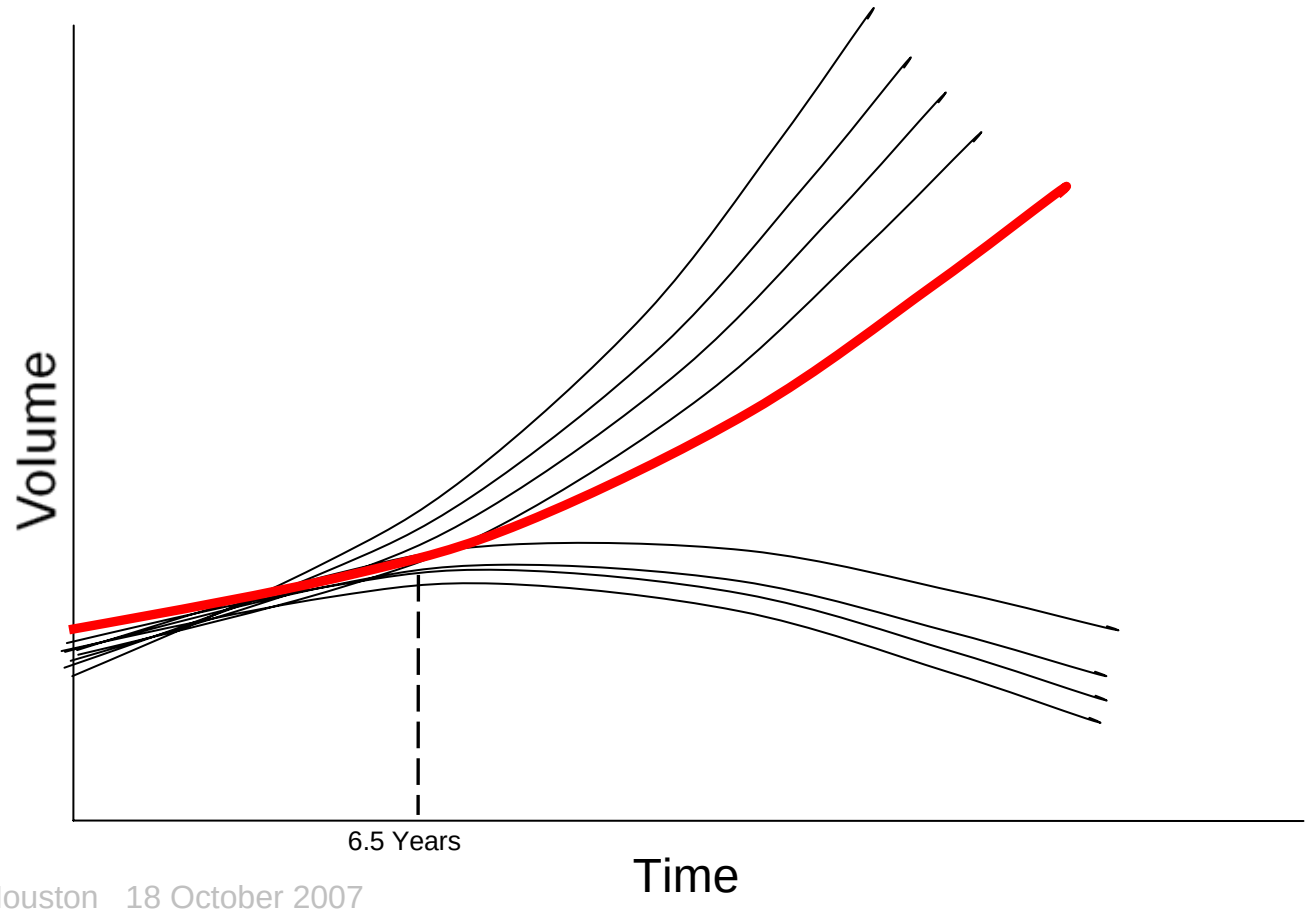
New Opec capacity 2007 & 2008 (IEA)



What the presentation will show you

- Peak Oil is real and Peak Oil is imminent
- Consumers need delivery *flows*
- Reserves are only useful as ***flows***
- Peak oil is when ***flows*** *can't* meet the demand
- The oil industry is slow moving and predictable
- **Many** talk of **reserves and forgets flows**
- **Peak Oil is most likely to occur in 2011**
- **There are now just 1200 days to Peak**

The Flower Vase



Slowing supply flows matter because oil dominates its markets

- 80-95% of all transport is fuelled by oil products
- 50-75% of all oil is used for transportation
- All petrochemicals are produced from oil
- 99% of all lubrication is done with oil products
- 95% of all goods in the shops get there using oil
- 99% of our food involves oil or gas for fertilisers, agrochemicals, tilling, cultivation and transport
- Oil is the most important source of primary energy on the planet accounting for 36.4% of all energy

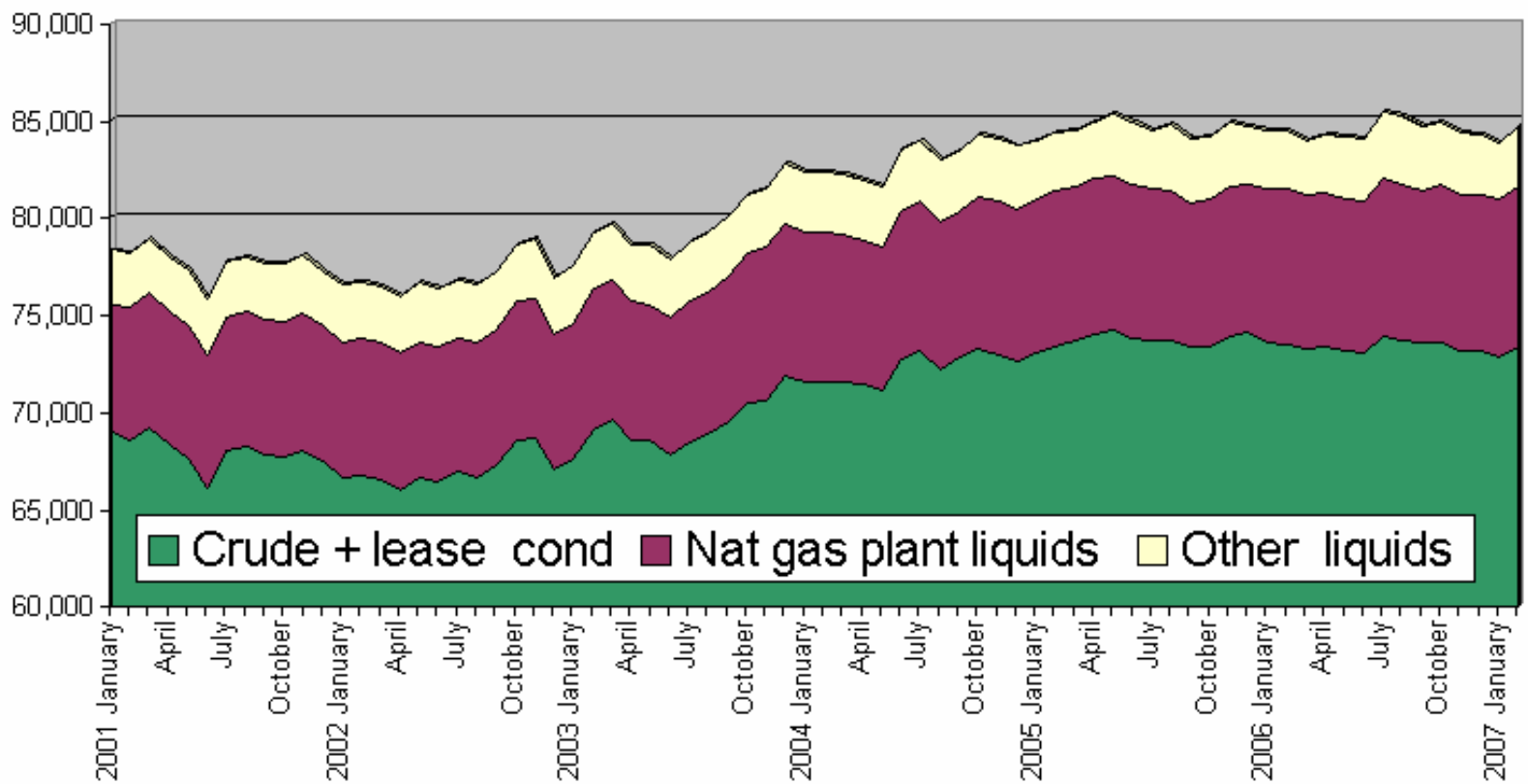
Seven key pieces of evidence suggesting we are close to Peak

- Falling discovery rate, few large discoveries
- Ever more countries in sustained depletion
- Companies struggling to hold production
- Non-geologic threats future oil supply
- The current lack of incremental flows
- Few countries with real growth potential
- Sustained high oil prices

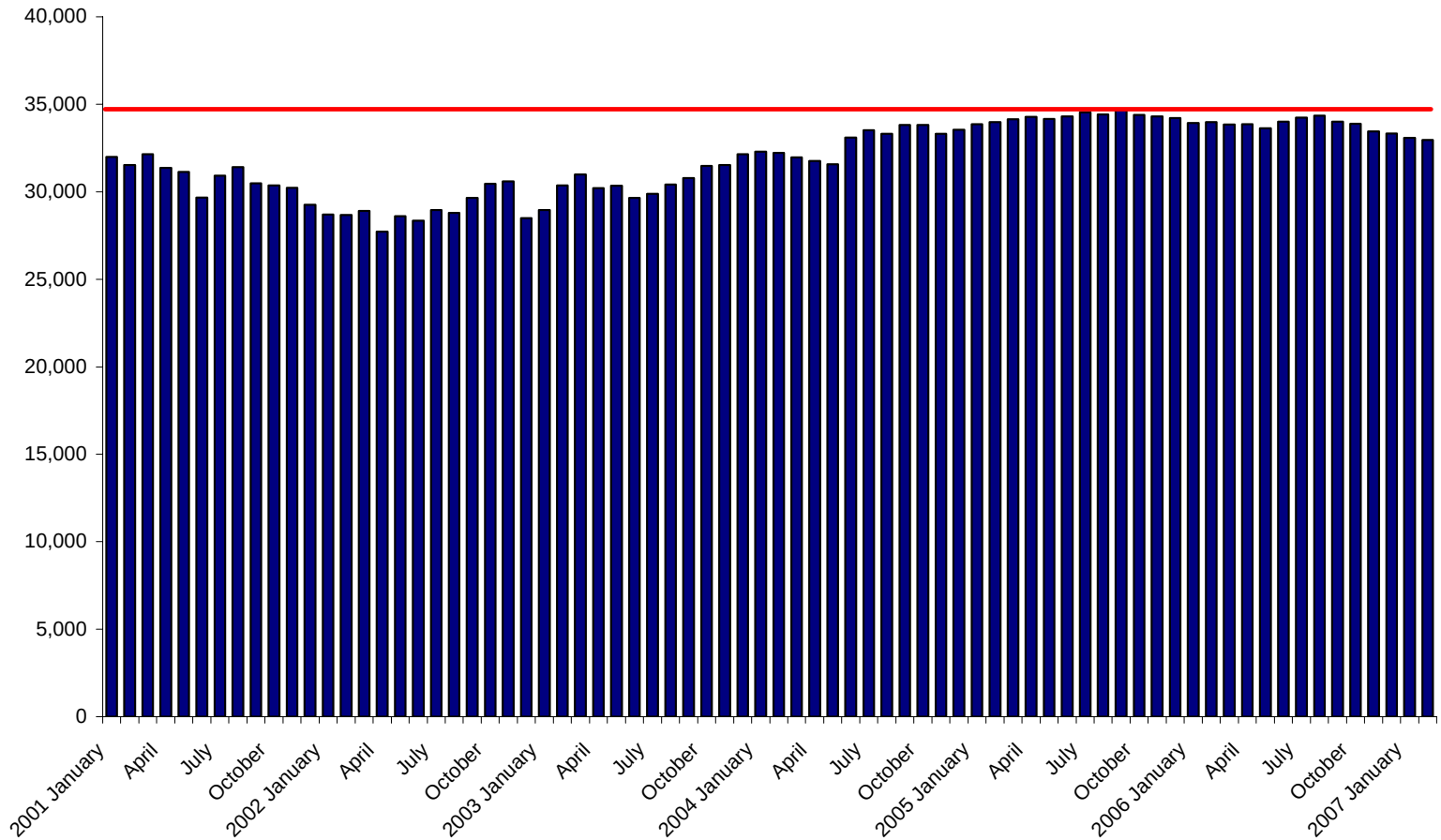
Getting it all in proportion (million barrels/day) Source: IEA

Year	2006	2007	2008
Demand	84.50	86.00	88.20
Supply	85.15	85-86	87-88
Opec	35.73*	35.05**	35.4
Non-Opec	49.42	50.03	51.0
Biofuels	*0.90*	*1.10*	*1.45*
Tar Sands	*1.15*	*1.25*	*1.38*
Ven Hvy	*0.60*	*0.60*	*0.60*

Could this be Peak flows? (Latest EIA data)



Opec 11 crude oil supplies (EIA)



The oil companies are already struggling to hold production

(24 quoted co.'s account for 24% of global production)

- For the last 12 quarters oil production:
- Has drifted down for the 5 Supermajors
- Has flatlined for the 10 largest quoted companies
- Has flatlined for the 24 largest quoted companies
- The quoted companies share of global production is now declining, notably for the Supermajors
- Annual decline rates up to 5%, quarterly 8%
- Supply shortfalls deplete existing fields faster

Non-Geologic threats to supply flows

- Resource nationalism - Russia, Venezuela, Bolivia, Ecuador - more to follow?
- Tighter terms and conditions - all with oil
- Civil insurrection - Nigeria, other Africa?
- And - cost inflation, ageing infrastructure, lack of skilled people, refinery constraints
- How likely is improvement in these?
- Who will cap or ration production?

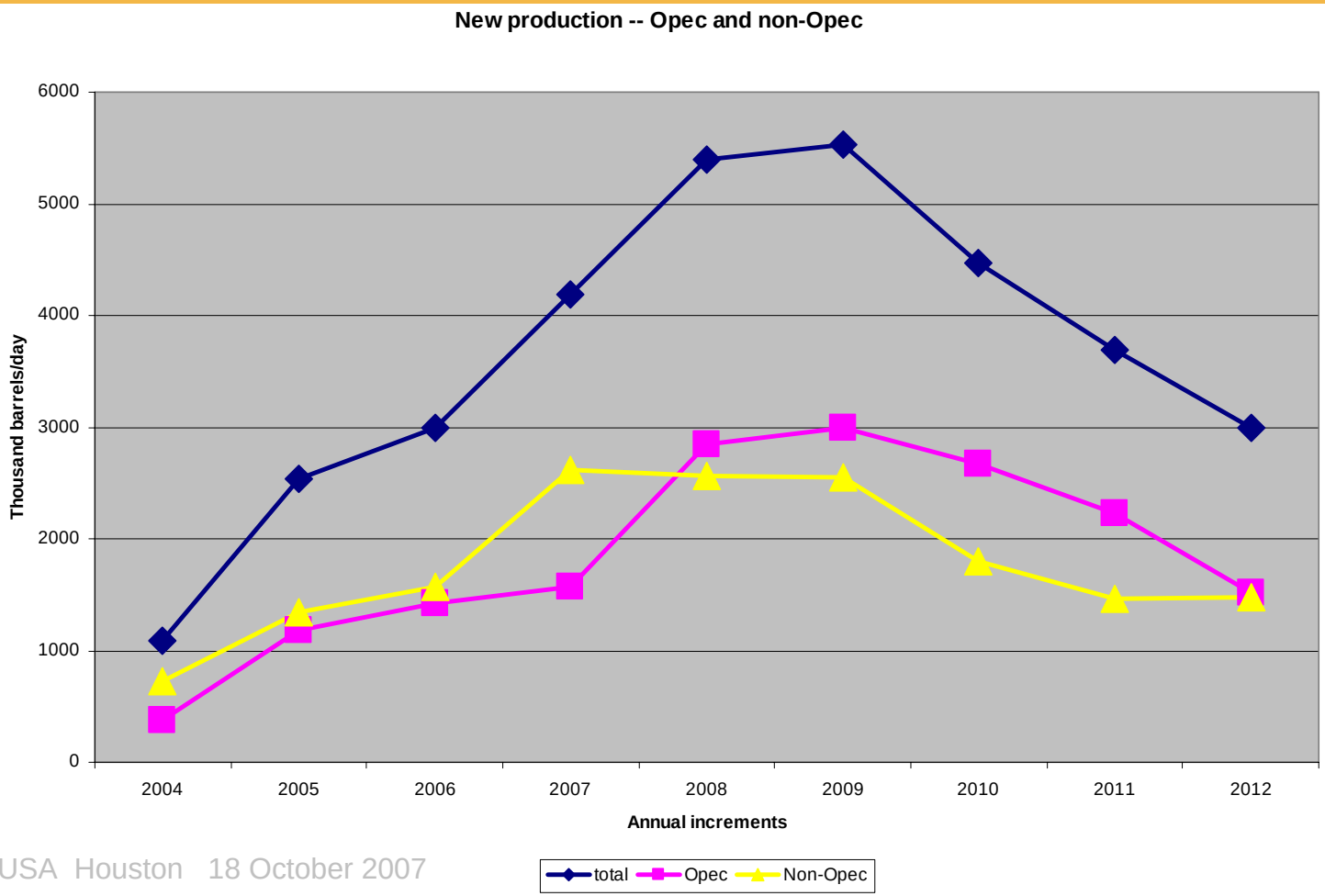
Economics isn’t working very well

- Most non-OECD producers subsidise fuels
- Many Asian countries still subsidise fuels
- Some governments tax fuels very heavily
- Gasoline costs from 20 cents to $9 a gallon
- All the price signals are scrambled
- Producer governments want more tax
- The playing field is very lumpy

The hole in the bucket -- How big and how fast is depletion?

- Around 5%-8% for areas in decline
- Net depletion 4% or around 3.3mn b/d/yr
- Net now **double demand growth**
- How do we know? IEA Medium Term Report
- Is depletion accelerating? – Yes slowly maybe 0.1-0.15%/yr
- Can it be ameliorated? – Yes, slow production down

What has been the supply response in terms of new oil supply?



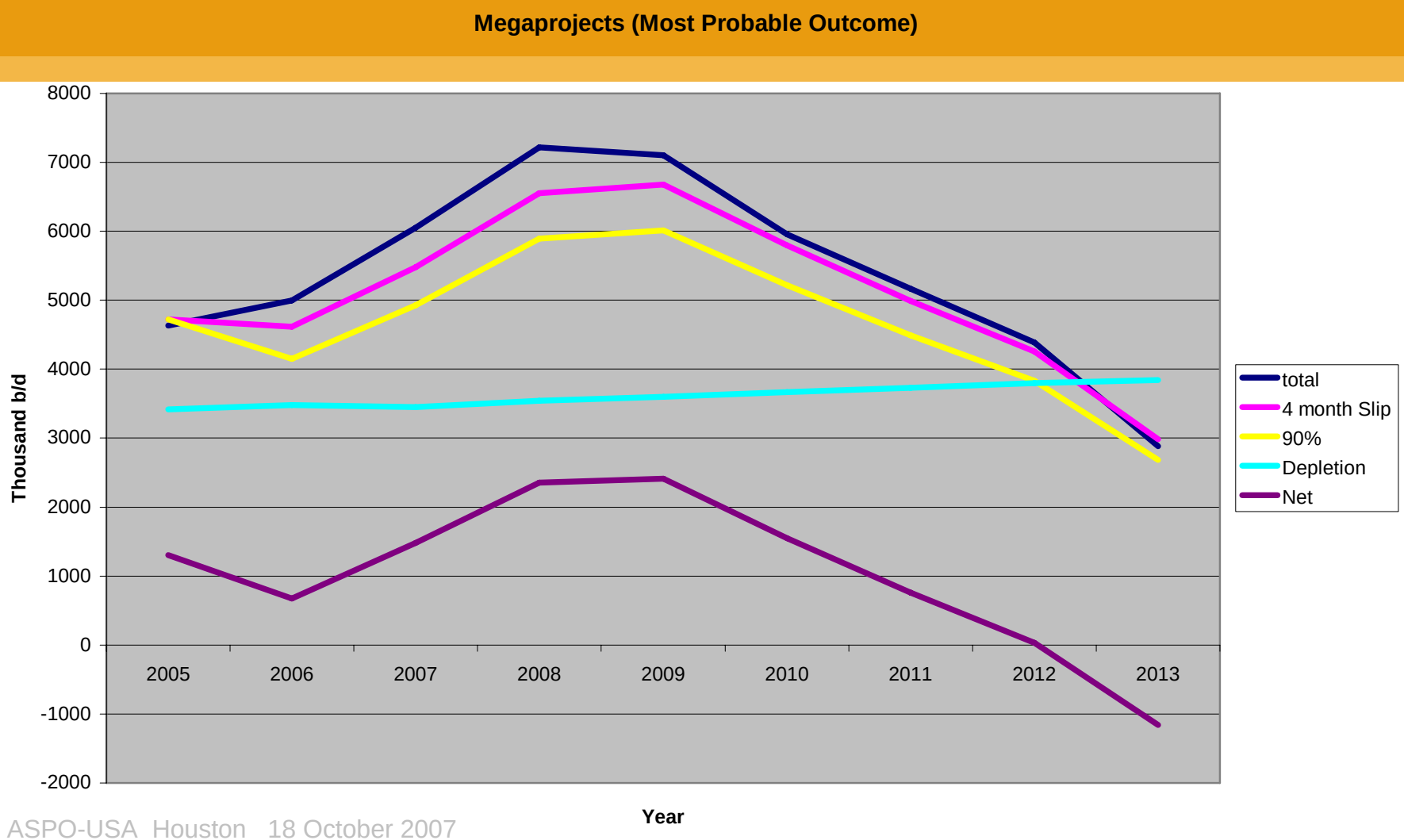
The Megaprojects Analysis
What are the new supply sources?

- Supply from Megaprojects (good data)
- Supply from infill/small projects (no data)
- Loss of supply to depletion (now good data)
- Spare capacity (Opec only) How much?
- Limited additions from discovery (In 2)
- We can calculate 2 and know the rest

The Megaprojects database 2007 on

- 175 projects with dates and full details
- 144 onstream by 2010 and 170 by 2012
- Discovery to first oil averages 6.5 years
- But only 4 projects in 2013 and 2014
- 47 potential projects will only impact 2014+
- Where? 12 FSU, 7 Canada, 6 Iraq & 4 Iran

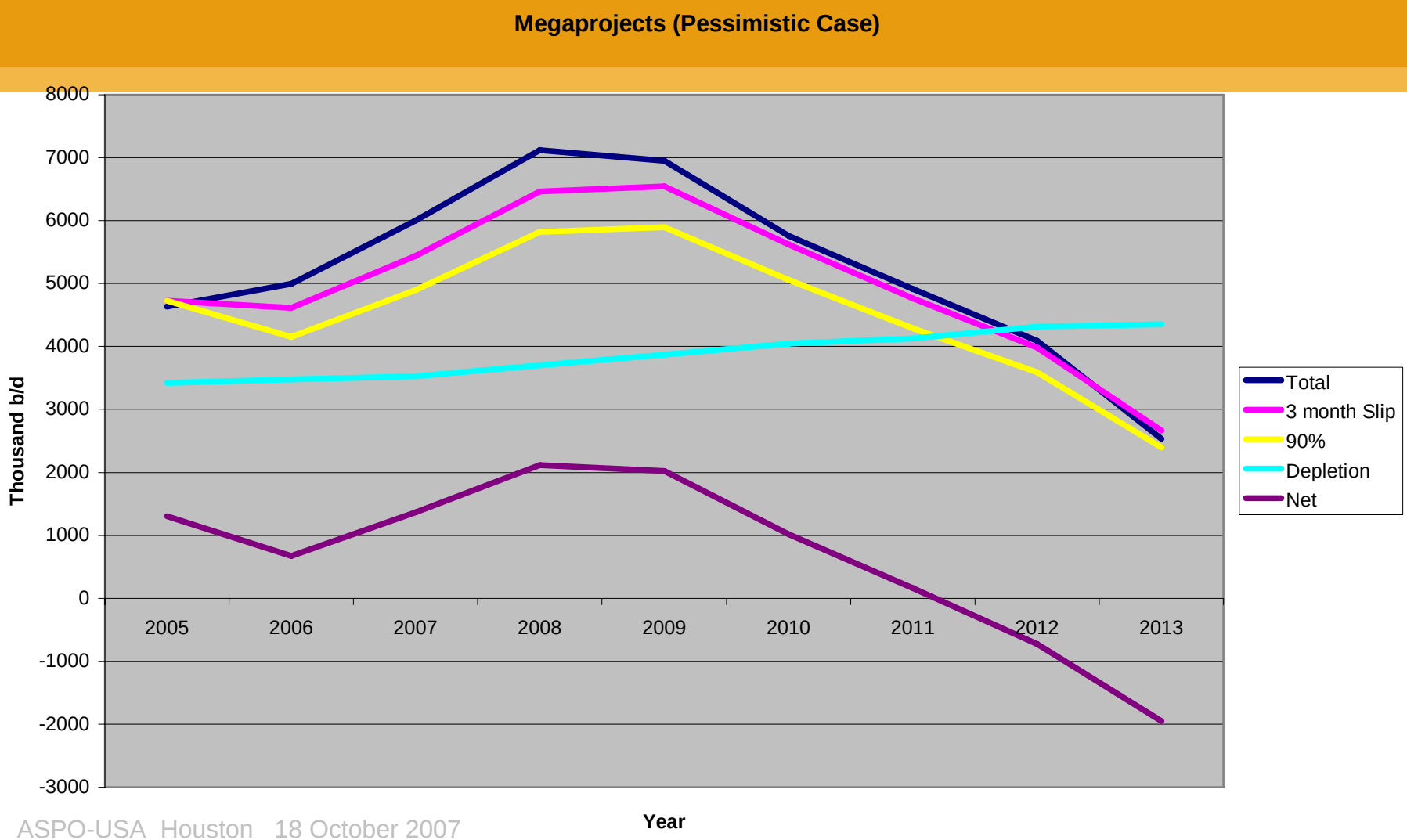
This is my best estimate



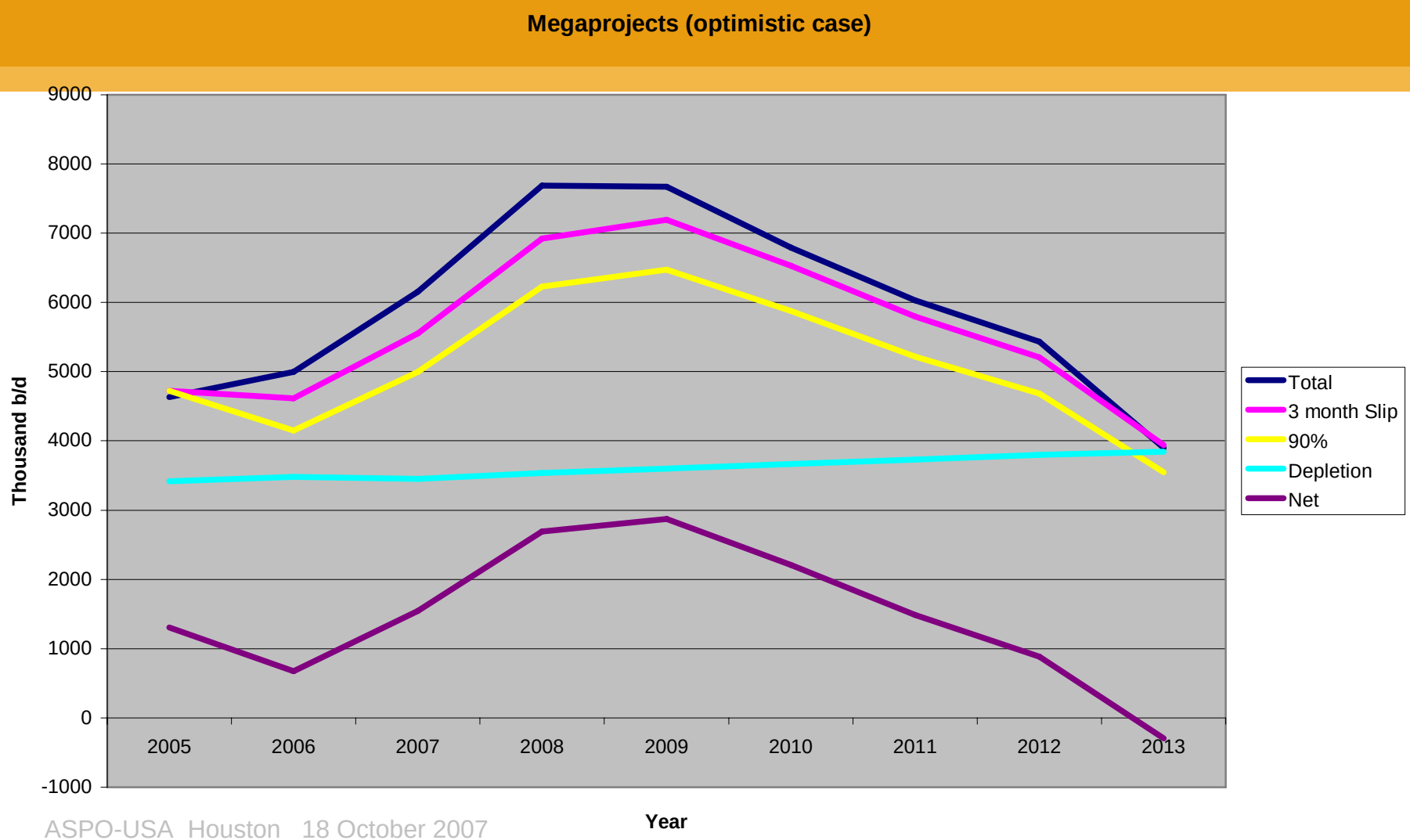
Sensitivity analysis for Peak flows

- Best estimate -- 93mn b/d in 2011/12
- Constant infill/small gives -- 95.8mn in 2012
- +5% 2008/09, +10% 2010/2011 and +15% 2011 and +20% 2012 -- 2012 at 96.8mn
- Infill/small decline at 150kb/d (100kb/d) gives peak in 2011 at 93mn b/d
- If depletion at +0.1% yr -- 2011 at 91.8mn

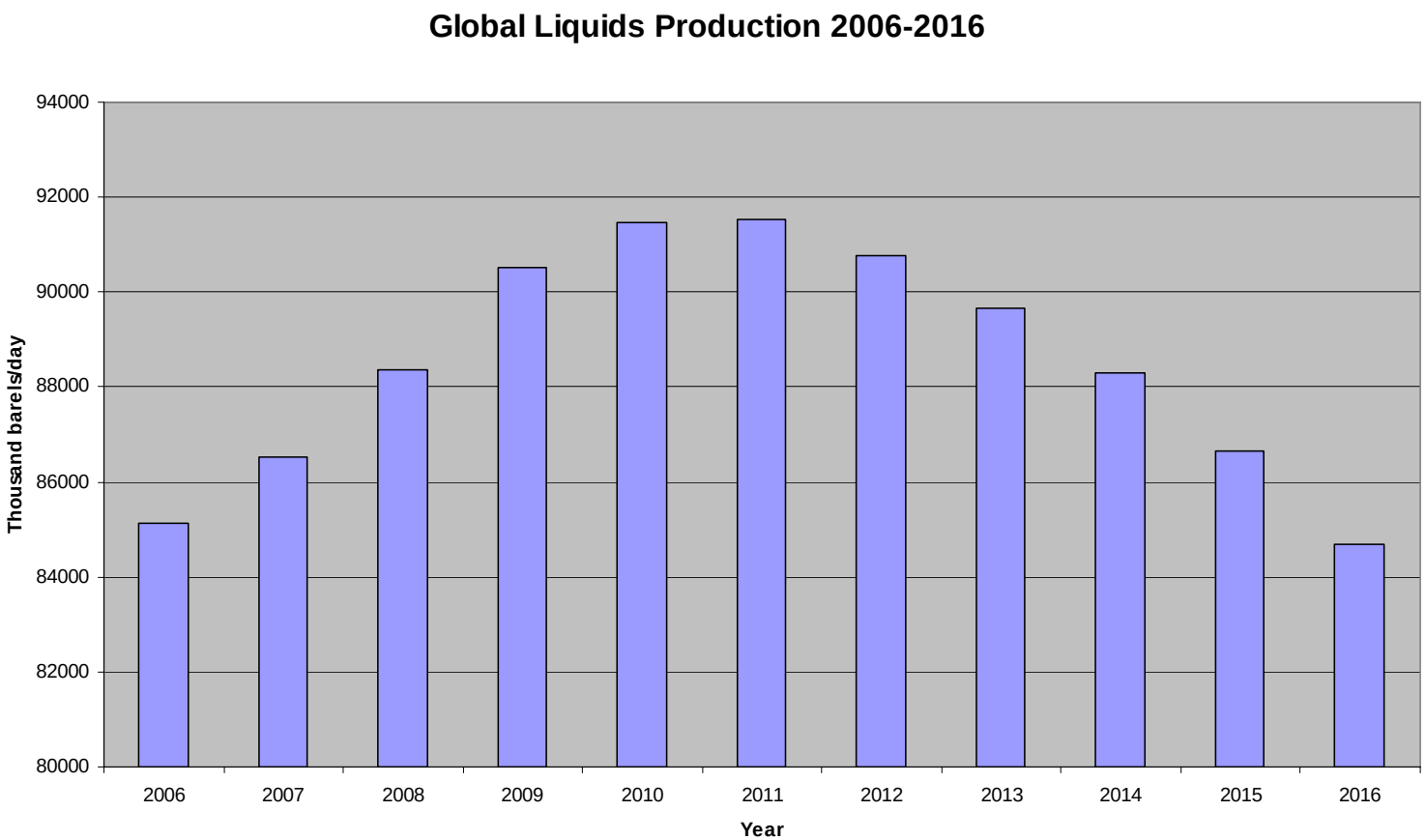
How wrong can you be -- low side



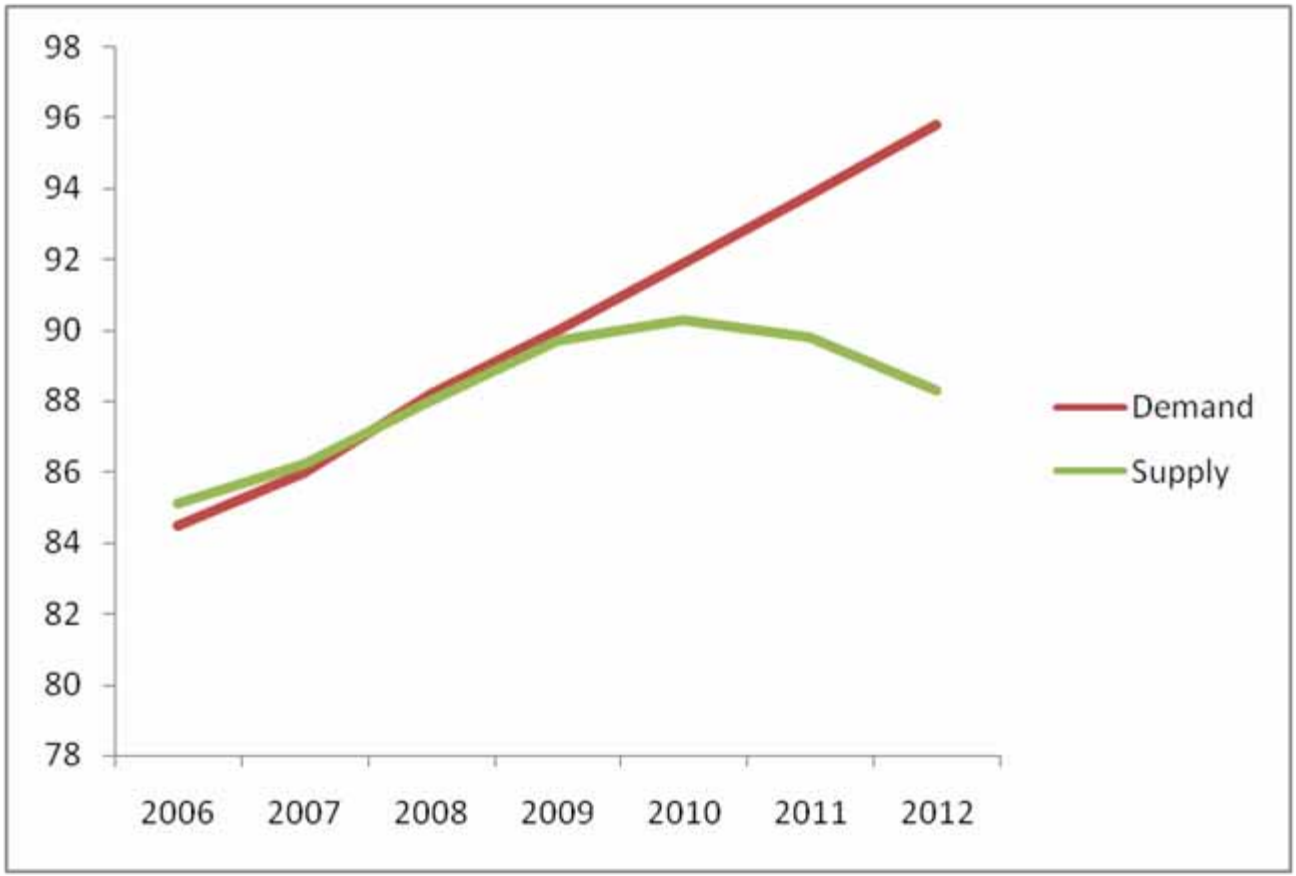
How wrong can you be -- high side



What will happen to production?



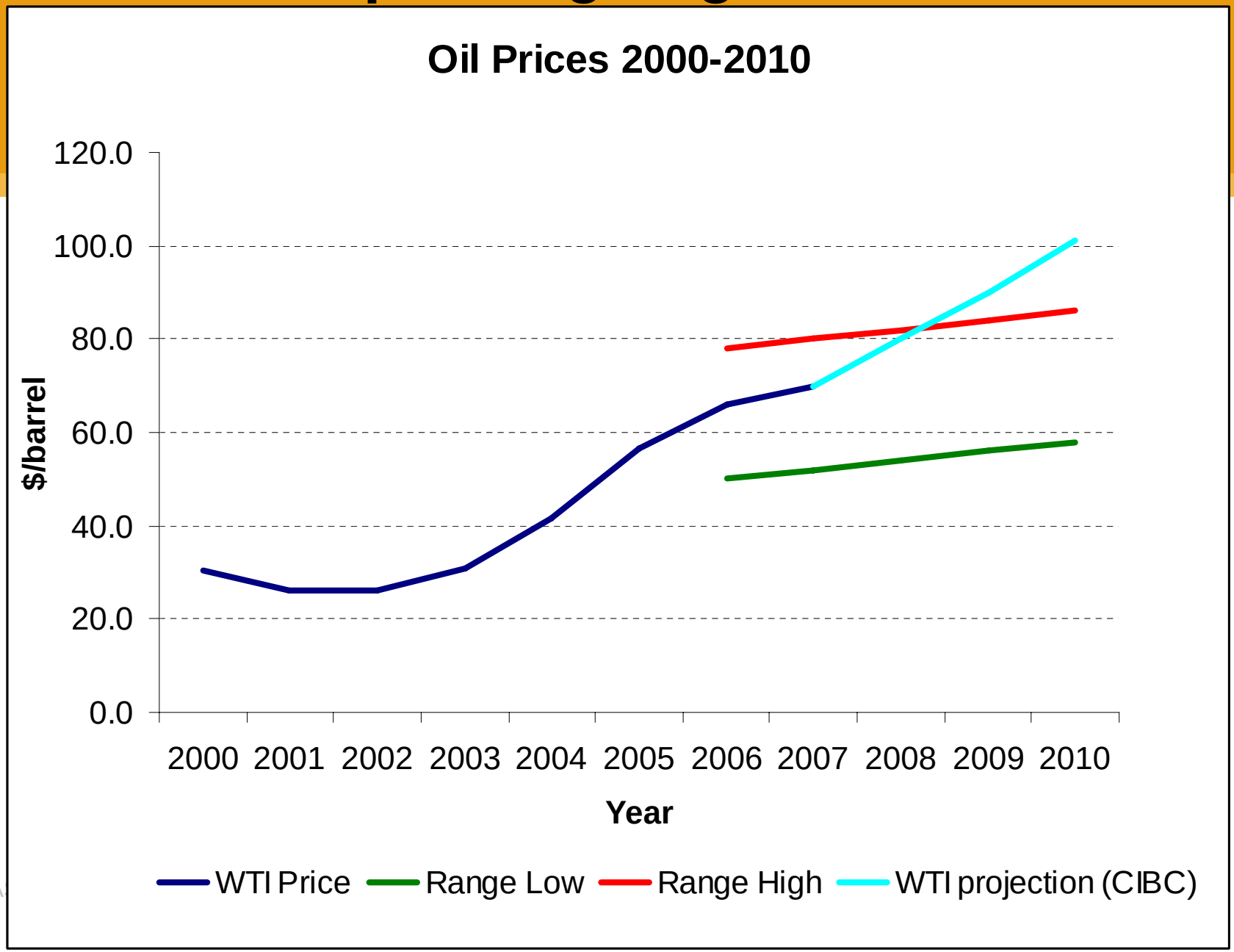
Supply and Demand to 2012



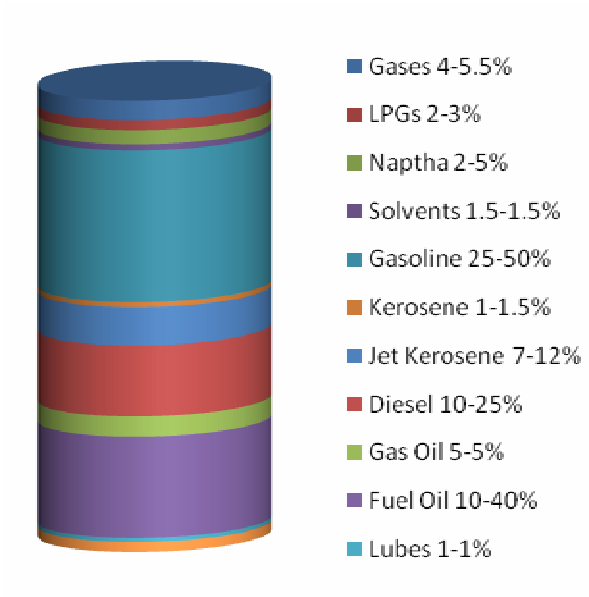
Squaring the circle or making Supply and demand equate

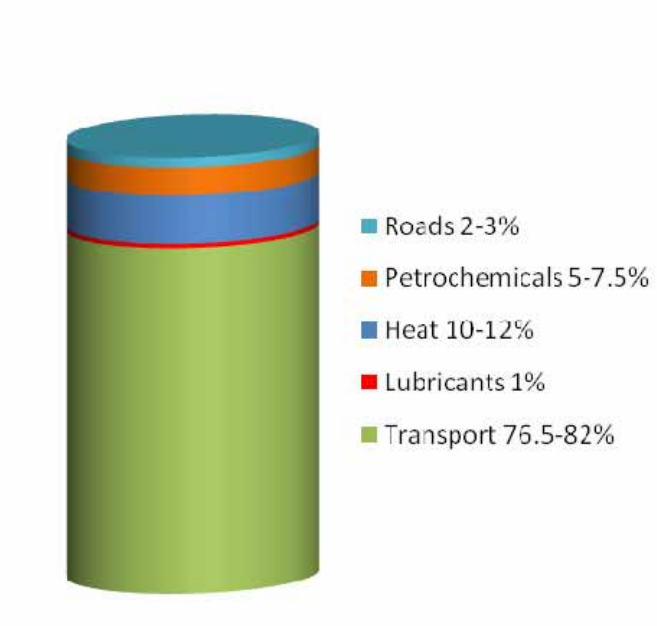
- 1 Depress demand -- slowdown, recession, depression, slump
  - To date, little demand response to high prices
- 2 Expand supply by:
- Producing more oil
- By utilising substitutes
- By efficiency in use

Where are oil prices going?



How the barrel breaks down





To avoid economic disaster we need to shed lots of oil demand

- There's still some conventional substitution to go of fuel oil of heating oil + efficiency
- The big hit is substitution of transport fuels that make up 70% of the barrel
- Jet fuel and ships bunkers are difficult
- Surface transport (50% of the barrel) can increasingly go electric-- known technology

Are there realistic substitutes for the main oil products?

- Petrochemicals – naphtha/LPGs :- coal derived chemicals, sugar derived, some gas/LPG. (Few alternatives)
- Aircraft fuel – jet kerosene/Avgas :- alcohols as extenders, jet from coal or gas -CTL or GTL (Few realistic alternatives)
- Road vehicle fuels – Gasoline and Diesel dominant :- Gas, LPG, alcohols, Electric. (Large existing Investments)
- Ships and boats – marine diesel and fuel oil:- Coal? Sails? Nuclear? (No realistic alternatives)
- Lubricants and greases – (very limited alternatives)
- Power generation – (little fuel oil now used - 9% globally)
- Heating – (increasingly substituted by gas)

My conclusions at very best

- Supply will remain tight and prices high barring a major economic setback
- Oil supply will peak in 2011/12 at around 93 million barrels/day
- There will supply shortfalls in winter before Peak
- Oil supply in international trade will peak earlier than the oil production peak
- We remain reluctant to face up to Peak Oil
- There are huge challenges and huge opportunities

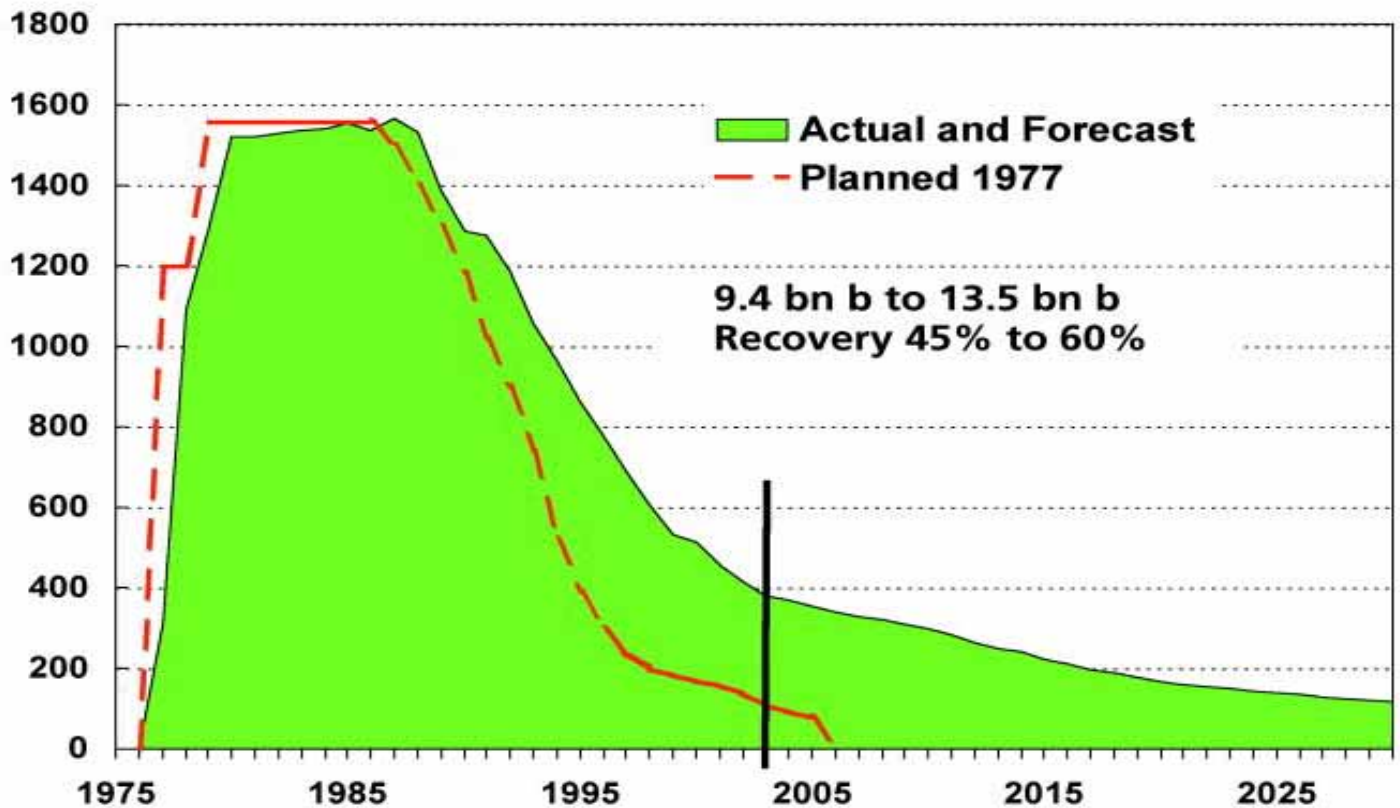
Contact:

Chris Skrebowski
Editor, Petroleum Review
cs@energyinst.org.uk
+ 44 (0)20 7467 7117

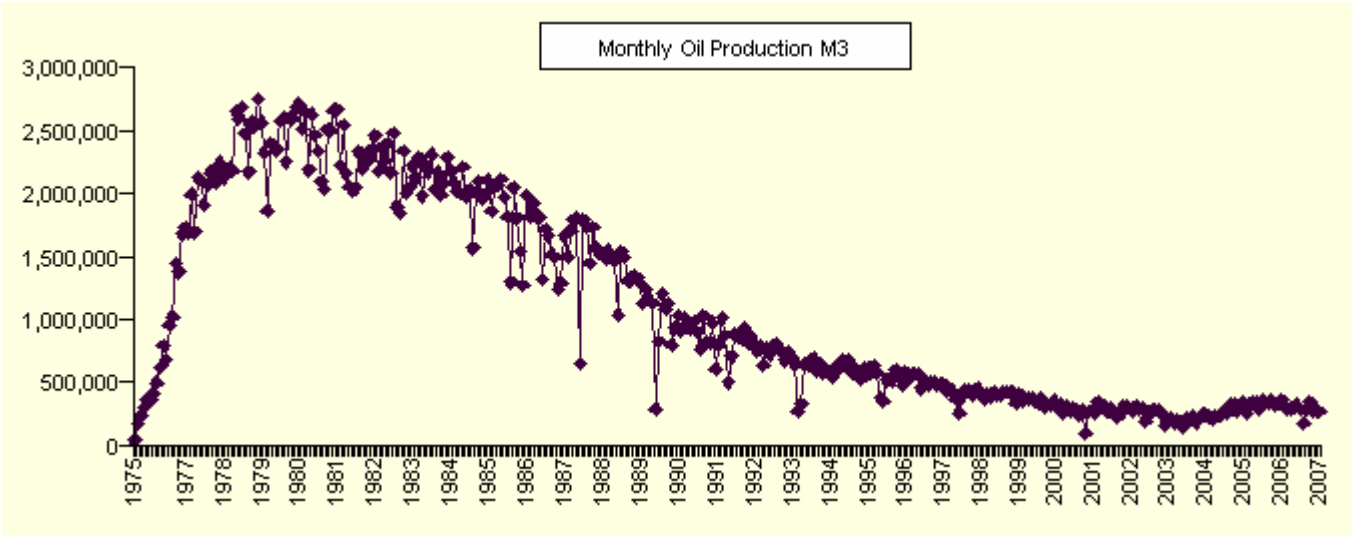
Latest BP statistics show Peaks are already happening

- OECD production **peaked in 1997** and has now declined by 2.2 million b/d (10.4%)
- Non-Opec, non-FSU production **peaked in 2002**
- North America/Mexico **peaked in 1997**
- North Sea - UK/Norway/Denmark **peaked in 2000** now declined by 1.6 million b/d (25.4%)
- Around 28 significant producers in decline
- About 35% of global production from decliners
- But if Saudi in decline then 49.9% in decline

Alaskan North Slope Production
Reserves grow -- Production falls



North Sea production by field

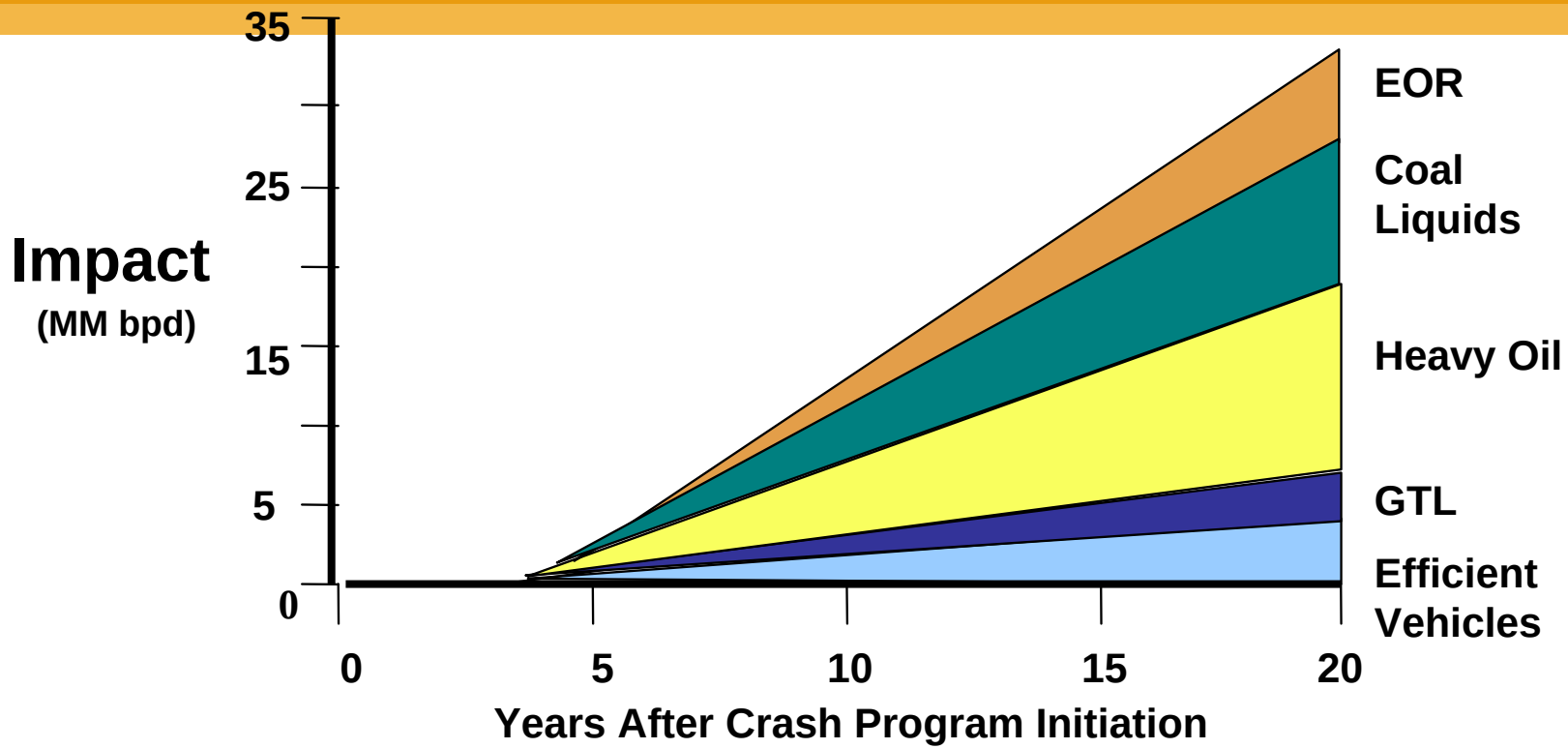


Forties monthly production to date

2005 Study

Worldwide Crash Program Mitigation of Conventional Oil Production Peaking

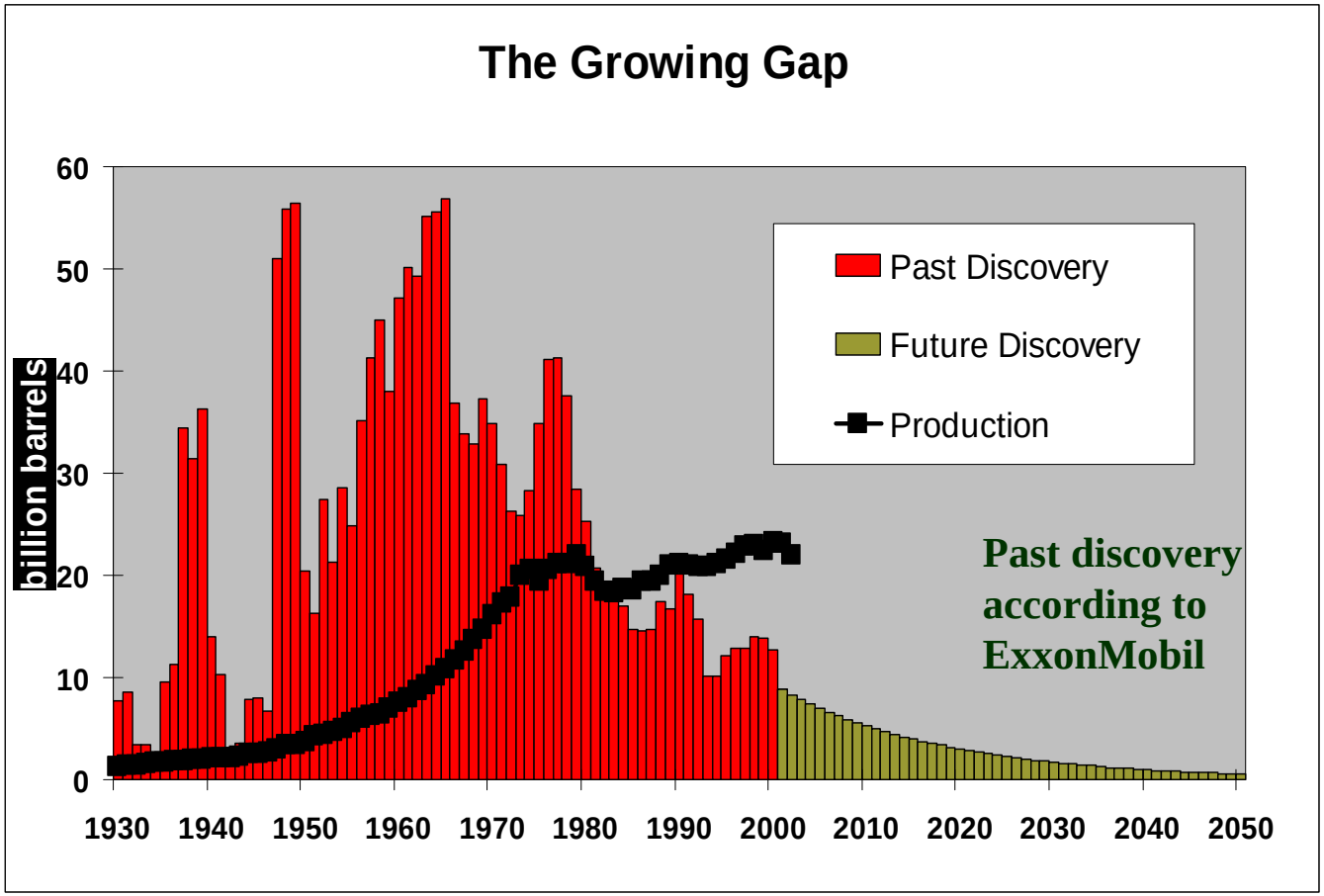
A Study for DOE NETL



Delay / Rapid growth.

Roughly 35 MM bpd at year 20.

The real discovery trend



More countries going into decline

- 25 major and 40 minor producers already in decline
- Mexico producing 3.8mn b/d went in 2005
- India producing 0.8mn b/d goes in 2007/08
- China producing 3.6mn b/d goes in 2007/08
- Collectively 9.9mn b/d or 12.3% of production
- Iran is struggling -- next to go?
- When does Saudi go? As Matt Simmons says
- ‘When Saudi goes so does the world’

The world's biggest oilfields are old, tired and fading

- Of the 120 largest fields, 50 are in decline, 44 not in decline, 12 unclear and 7 are undeveloped
- Average age of the giants is 42 years
- But, the 120 largest fields give 50% of total production and contain two-thirds of reserves
- 70% of production from fields 30+ years old
- Few large recent discoveries
- We're dependent on the oil equivalent of 'Old men and young boys'

Post-peak we are going to need other energy sources – Opportunity

- How fast will supply decline post-peak?
- Possibly around 2-3%/year like the US onshore but initially at just 1-2%
- But,it could be much faster
- Suppliers could anticipate, ration out supplies, delay peak and force adaptation
- Some might use military strength to commandeer supplies

2007 Houston World Oil Conference

Proceedings

- Conference Program
- Conference DVD
- Video Highlights
- Peak Oil Review
- ASPO-USA