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Better Understanding of Global Oil & Gas Peaks: The Role of Government

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Outline of Talk

- The University of Reading ‘Oil group’
- Oil supply: Viewpoints in collision
- UKERC *Global Oil Depletion Report*, 2009:
 - wide divergence in forecasts of global oil production to 2030
- The role of government
 - better data
 - better models
- Conclusions

The University of Reading, UK

‘Oil Resources Group’: Past & Present

Postgraduate Research Institute for Sedimentology

Prof. M.L. Coleman (ex-BP), Prof. B.W. Sellwood.

Department of Engineering

Dr. J.D. Burton, Mr. R.H. Booth (ex-Shell),

Dr. R.M. Mayer (ex-BP), Prof. P.D. Dunn,

MSc. students (also City & Beijing Universities).

Department of Cybernetics

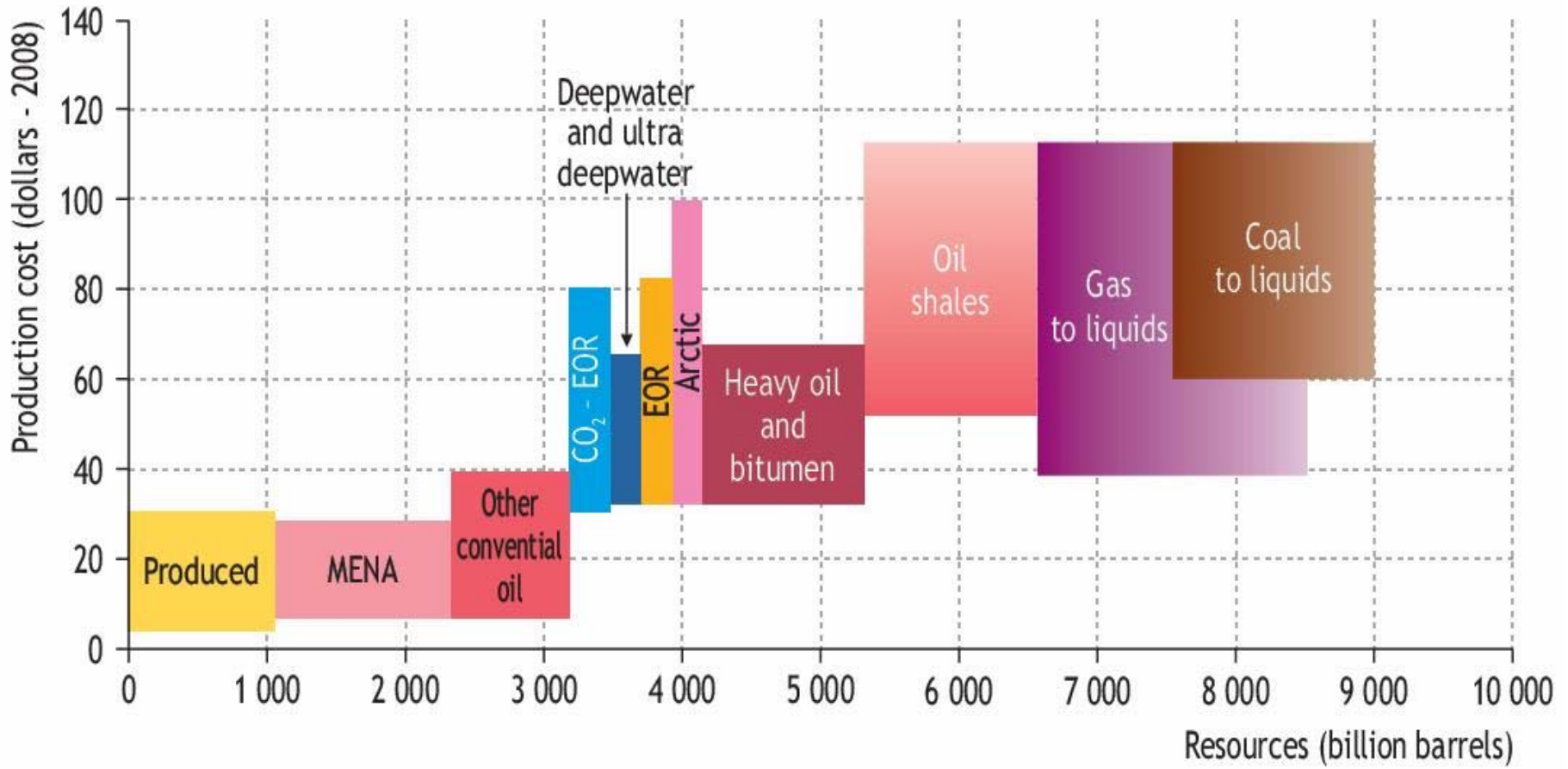
Dr. G.R. Whitfield, Dr. R.W. Bentley (ex-Exxon).

Affiliated: Dr. D. Fleming, independent economist.

Until recently, the only UK academic group doing quantitative research on future global hydrocarbon supply.

There is a lot of oil and 'nearly-oil' - IEA data

Long-term oil-supply cost curve



Oil supply: Viewpoints in Collision

The global *resource-limited* oil production peak is:

- **Near:** Some oil geologists: -5 to +10 years away.
- **Far away:** e.g., Prof. P. Odell: “not until 2060”.
- **Not in sight:**
 - IEA - For conventional oil: all *WEOs*, except 1998 & 2008+;
 - For 'all liquids': all *WEOs*.
- Also: OPEC; US EIA; Exxon; EU WETO studies;
UK DTI / BERR. [- but DECC?]
- **Not important:** e.g., Dr. D. Helm: “energy is fungible”.
- **‘Never’:** Economists: Adelman, Davies, Stevens, Maugeri ...
 - 'it's just lack of investment needed to turn resources into reserves'.

A resource-limited peak in global oil production is likely to be serious for the world in economic terms, and have complex impacts on the drivers for climate change. - **It needs to be understood.**

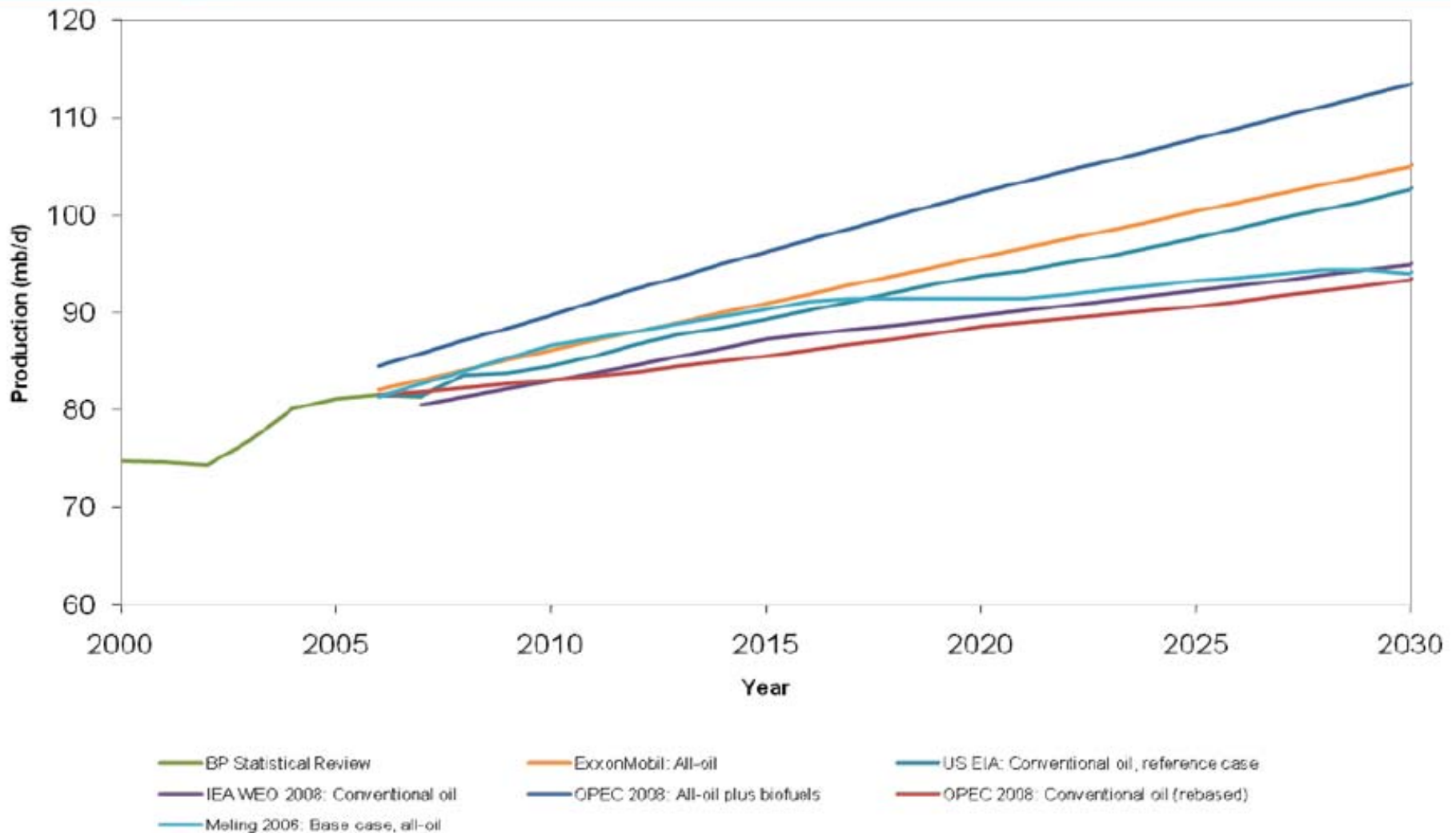
UKERC *Global Oil Depletion Report, 2009*

- Probably the best current report on the oil peak
- *Technical Report 7: Comparison of global oil forecasts to 2030*
- 14 forecasts:
 - *International*: IEA, OPEC
 - *National*: EIA (US), BGR (Germany)
 - *Oil Cos.*: Shell, Meling (StatoilHydro), Total, Exxon Mobil
 - *Consultancies*: Energy Files, LBST, Peak Oil Consulting.
 - *Universities*: Uppsala
 - *Individuals*: Colin Campbell, Richard Miller (ex-BP)
- 2 ‘views’: BP, ENI

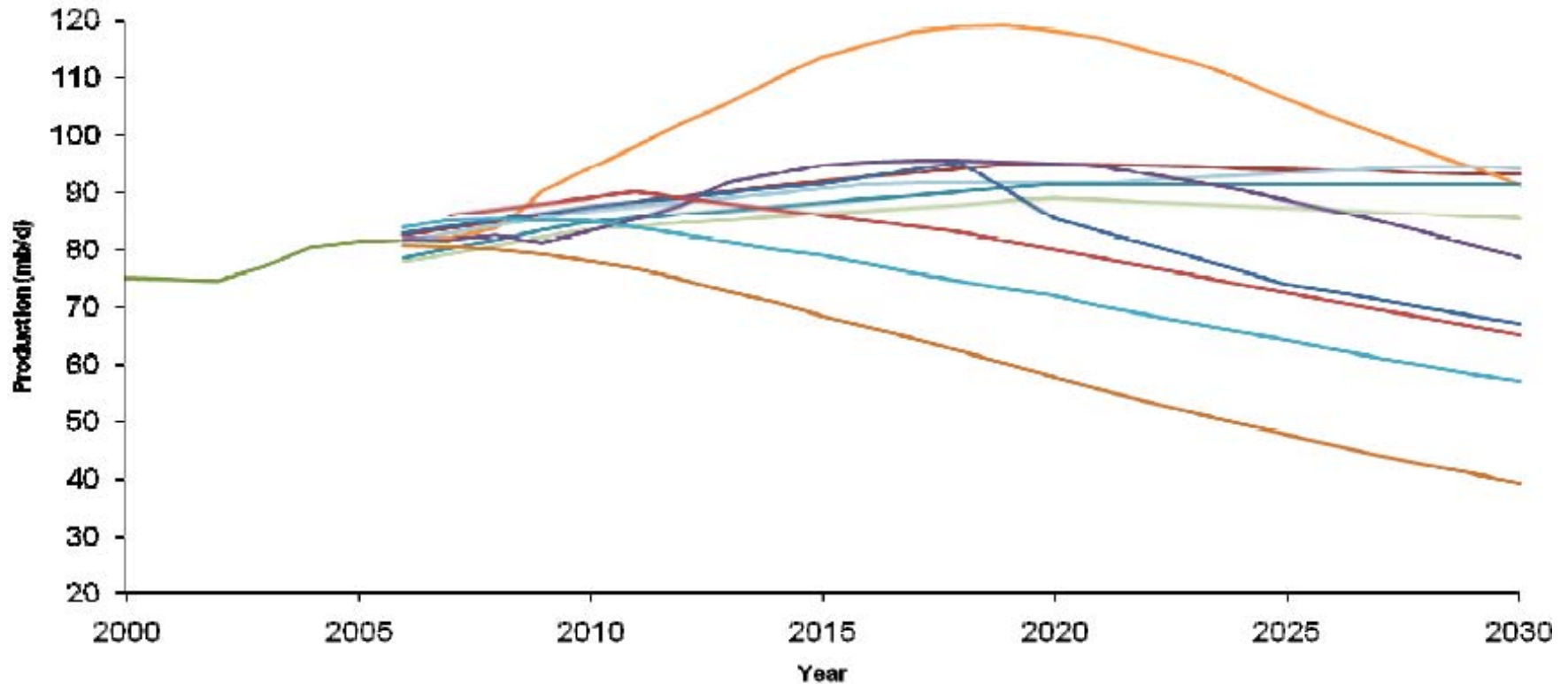
Forecasts for global ‘all-oil’:

- Quasi-linear to 2030: IEA, EIA, OPEC, Exxon (& BP, ENI)
- Resource-limited peak: BGR, Meling, Total, Energy Files, LBST, Peak Oil Consulting, Uppsala, Campbell, Miller
- Demand-limited peak: Shell

Quasi-linear forecasts



Peaking forecasts



- BP Statistical Review
- Total 2008: All-oil
- Miller 2000: All-oil (rebased)
- Melling 2008: Base case, all-oil
- Shell: All-oil (Blueprint scenario)
- Shell: All-oil (Scramble scenario)
- Energyfiles 2009: All-oil
- Uppsala: All-oil excluding YTF
- Peak Oil Consulting 2008: All-oil
- Campbell 2008: All-oil
- LBST: All-oil

So what to do about these very different views?

- Oil Forecasters' Workshops
 - E.g., Energy Inst. London, Nov. 2010: IEA, BGR, CERA, 'WETO', Shell, Total, Peak Oil Consulting, Uppsala, Miller.
- Update UKERC *Tech. Report 7*: On-going (McGlade)
- Bring in other models:
 - E.g., PFC Energy, Douglas-Westwood, Wood Mackenzie, P. Wells
- The Role of Government:
 - Better data
 - Better models

The Role of Government: Better Data

Data for conventional oil (light, medium, heavy, EOR, NGLs)

- based on advice from Richard Miller.

1. Production by field

- In both public & commercial data, fields are increasingly aggregated.
- Field data are needed for good bottom-up modelling.
- Data are held by companies, & in most cases by governments; just not released.

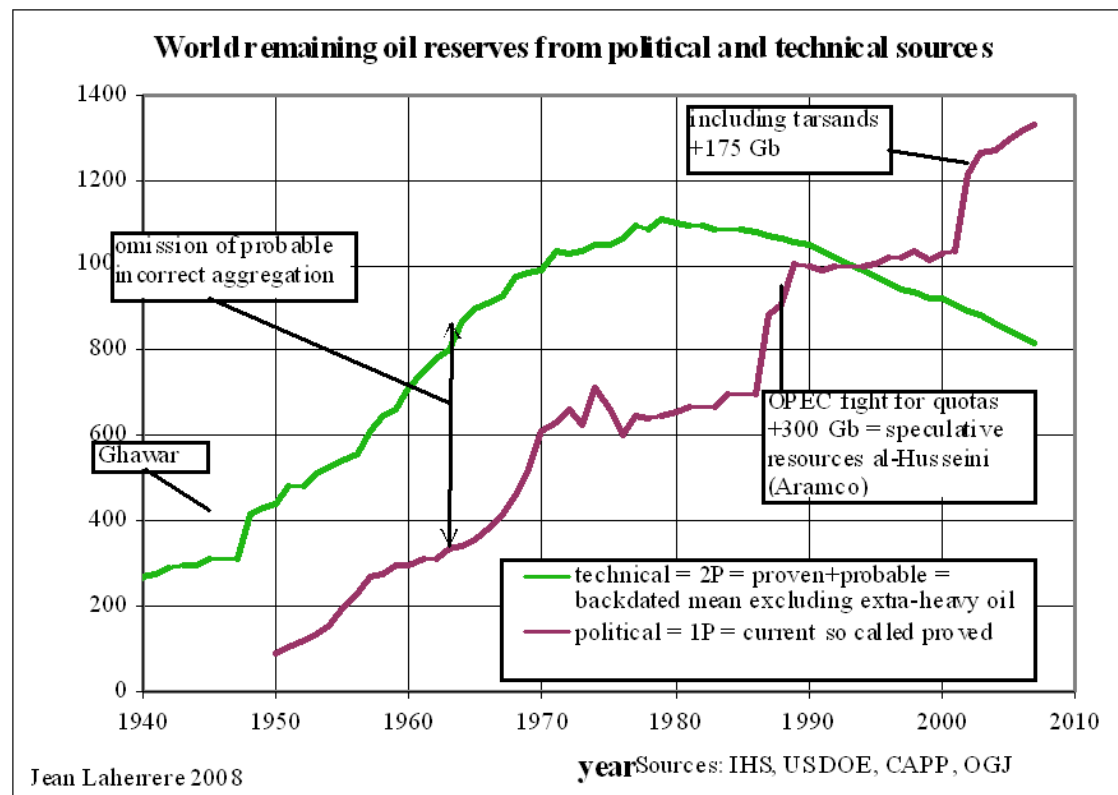
2. Fallow fields

- There is significant oil in fields that are currently fallow.
- Some of these fields will be produced late, or not at all.
- If produced 'immediately' the 'Miller bump' ensues; treatment of fallow fields explains some of the difference between models.
- Realistic rating & timing of these fields is needed.

Better Data – contd.

3. Use of ‘2P’ Reserves

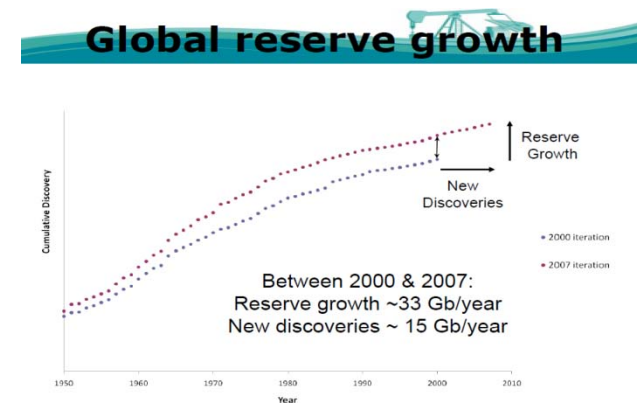
- Ignorance of oil peak largely due to confusion over reserves:
 - “30 years ago we had 30 years’ of reserves; now we have 40.”
- All good forecasts use P50 or ‘proved + probable’ (2P) reserves.
- Governments must ensure *proved* reserves are not used.



Better Data – contd.

4. Reserves Growth

- Key missing information in today's models.
- *Scope* for oil from reserves growth is theoretically large:
If global avg. recovery today is 35%, and 50% is possible by 2050; this adds ~25 Gb/yr (cf demand = 30 Gb/yr).
- So: *what* is rate; and *when* – only tail-end of field production, little effect on peak?
- **Methods:**
 - Aggregate plot of industry data (e.g. UKERC report)
 - Reservoir engineer estimates
 - Data from oil companies: change in field size vs. time. (UK used to give these data, now stopped.)



Better Data – contd.

If you need oil, you can:

- Drill ‘thousands’ of wells in every reservoir (e.g., Daqing)
- Drill in regions off-limits (e.g., in US)
- Build ‘shadow factories’ on tar sands
- Extract shale oil
- Produce CTLs etc.

5. So data are needed on Practical limits:

- Investment available, vs. price uncertainty
- CO₂ limits
- EROEI:
 - E.g.: ‘Limits to Growth’ model - increasing proportion of resources to extract resources eventually leads to collapse.
 - Today: Modelling of Hall and others.
 - Important data to assemble; may be difficult to come by.

The Role of Government: Support for Better Models

- For conventional oil, the primary requirement is on bottom-up models, using realistic data for field production timelines (including reserves growth & depletion rate), introduction and rates of fallow fields, and access and rate for fields of national oil companies. Modelling should include effect of price, and handle uncertainty.
- Such modelling should be set in the context of results from more aggregate modelling, such as ‘mid-point peaking by region’ models, and discrepancies understood.
- For both classes of model, the effect of external limits, including investment, CO₂, and EROEI, should be examined.
- For non-conventional oil more aggregate modelling is probably adequate, but investment, CO₂, and EROEI constraints (including net energy rate constraints) need greater attention.
- There is a need for government oversight of key models, requiring, e.g., the EIA & IEA, to use the best expertise available.

Conclusions

- Oil peaking was well understood in the 1970s & '80s. Many textbooks from that date expected the global oil peak around the year 2000 or soon after.
- Governments have been negligent to allow the topic to get forgotten, and allow poor understanding & modelling to flourish.
- As a result, recognised bodies today give widely divergent views on the risk of a global oil peak.
- But the solution is not hard:
 - Government can help in the assembly of better data; in particular production by field, fallow field probability, reserves growth by field, and EROEI data by field class.
 - Government can encourage better modelling, in particular by the IEA and EIA.
- For the sake of their peoples and good world order, governments need to support reliable answers in this area.

Thank you for listening