



IPCC Summary and Fossil Fuel

Posted by [Chris Vernon](#) on February 12, 2007 - 11:00am in [The Oil Drum: Europe](#)

Topic: [Environment/Sustainability](#)

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2007 sees the staggered release of the Intergovernmental Panel on Climate Change's (IPCC) 4th Assessment Report. The first part of which was released on Friday 2nd February. This "Summary For Policy Makers" is available [here \(.pdf\)](#) and at just 21 pages is certainly worth reading.

Column yards have been written about it already, I'm just going to offer brief comment on a single extract spread over pages 12 and 13. (GtC = billions tonnes of carbon)

Based on current understanding of climate carbon cycle feedback, model studies suggest that to stabilise at 450 ppm carbon dioxide, could require that cumulative emissions over the 21st century be reduced from an average of approximately 670 [630 to 710] GtC to approximately 490 [375 to 600] GtC. Similarly, to stabilise at 1000 ppm this feedback could require that cumulative emissions be reduced from a model average of approximately 1415 [1340 to 1490] GtC to approximately 1100 [980 to 1250] GtC. {7.3, 10.4}

So that's ~490 GtC to 2100 keeps us below 450ppm?

How does that compare with the resource we have available to us?

Oil

This is the data form the latest ASPO newsletter available [here \(.pdf\)](#) table:

| ESTIMATED PRODUCTION TO 2100 | | | | | | | | | End 2006 | |
|---|---------|-------|---------------------------|------|------|------|------|------|----------|------|
| Amount | | | Annual Rate - Regular Oil | | | | | | Gb | Peak |
| Regular Oil | | | Mb/d | | | | | 2005 | Total | Date |
| Past | Future | Total | 2005 | 2010 | 2015 | 2020 | 2050 | | | |
| Known Fields | New | | US-48 | 3.3 | 2.6 | 2.1 | 1.7 | 0.4 | 200 | 1971 |
| 967 | 764 | 119 | Europe | 5.0 | 3.4 | 2.5 | 1.8 | 0.3 | 71 | 2000 |
| | 883 | | Russia | 9.2 | 9.5 | 7.5 | 6.0 | 1.5 | 225 | 1987 |
| All Liquids | | | ME Gulf | 20 | 20 | 21 | 23 | 11 | 634 | 2020 |
| 1102 | 1398 | 2500 | Other | 29 | 27 | 23 | 19 | 6 | 720 | 2004 |
| | | | World | 66 | 62 | 56 | 51 | 19 | 1850 | 2005 |
| 2005 Base Scenario | | | Annual Rate - Other | | | | | | | |
| M.East producing at capacity (anomalous reporting corrected) | | | Heavy etc. | 2.3 | 3 | 4 | 4 | 4 | 150 | 2021 |
| Regular Oil excludes Heavy Oils (inc. tarsands, oilshales); Polar & Deepwater Oil; & gasplant NGL | | | Deepwater | 3.6 | 12 | 11 | 6 | 1 | 69 | 2011 |
| | | | Polar | 0.9 | 1 | 1 | 2 | 4 | 52 | 2030 |
| | | | Gas Liquid | 6.9 | 12 | 13 | 14 | 14 | 355 | 2035 |
| | | | Rounding | | -1 | 0 | -2 | -3 | 25 | |
| Revised | 13.1.07 | | ALL | 80 | 90 | 85 | 75 | 40 | 2500 | 2010 |

The important number is 1398 Gb all liquids future production to 2100.

1.4 trillion barrels of oil left to burn, that's 191 Gt (7.33 barrels per tonne) or **162 GtC** (assuming an average carbon share of ~85% by mass) in the remaining oil.

Gas

Gas... is less. The 2005 BP Statistical Review lists world gas reserves at 179.83 trillion cubic meters. 1.0 cubic meter natural gas contains 0.49 kg carbon so we are left with **90 GtC** in the remaining gas.

Total so far

Total carbon in remaining oil and gas is therefore 252 GtC or barely half the IPCC's 490 GtC threshold. This supports James Hansen's point [I emphasised](#) in the past about being able to burn the remaining oil and gas reserves without causing dangerous climate change (considered here to be +2C and 450ppm CO₂).

Assuming that all the remaining oil and gas will be burnt as fast the depletion curve allows, it is strangely addictive stuff after all, what does this leave us with? A remaining "allowance" of $490 - 252 = 238$ GtC, a whole lot of coal and the significantly smaller anthropogenic CO₂ emissions from land use change.

Coal

The [World Coal Institute](#) lists 2005 world coal production as 4973 Mt hard coal and 905 Mt brown coal/lignite. Hard coal is approximately 95% carbon and lignite is around 35% so that totals to approximately **5.0 GtC** in 2005 from coal. Not all the hard coal will be the "good stuff" though so this will be a slight overestimation. Coal burn has increased rapidly in recent years - I wouldn't be surprised if 2007 doesn't come in close to 5.5 GtC.

Taking our remaining budget of 200 GtC (leaving the other 38 GtC for land use change and other minor sources) would allow $200 / 5.5 = 36$ years of 2007 coal burn. It is this statistic that shows us where to focus our attention. It appears the climate change problem is all about coal. One approach would be to stop coal expansion and new build within a decade (at least without proven carbon sequestration technology) and be off coal by the 2nd half of the century. If we do stop new build within a decade the old plant will gradually retire producing the desired result.

Is this even remotely feasible? I can't help thinking that it is easier to move away from coal than it is oil and gas leaving it unburnt in the ground and surely that is what is important, *the easiest* of a bunch of hard choices? I say easiest as we have many alternative (wind, wave, nuclear, tidal, solar, geothermal, biomass etc) ways of generating electricity and from where we stand today electricity consumption could be reduced significantly with minimal pain.

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[Greenland, or why you might care about ice physics](#)

[More Coal Equals More CO₂](#)

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