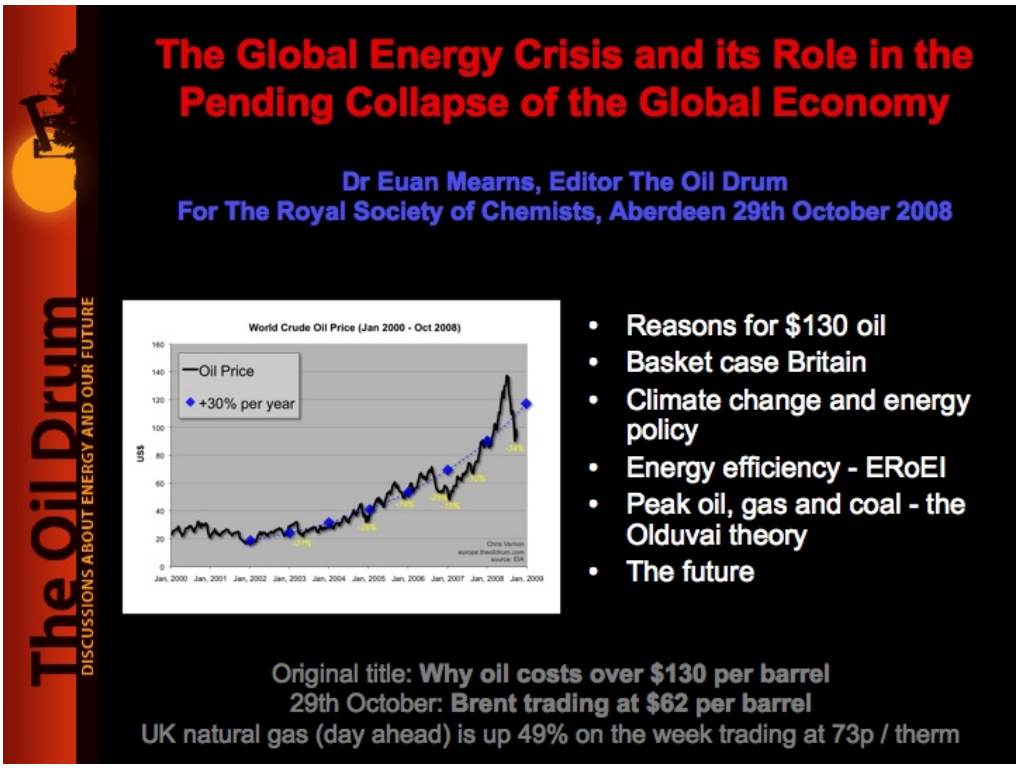
The Oil Drum: Europe
DISCUSSIONS ABOUT ENERGY AND OUR FUTURE

The Global Energy Crisis and its Role in the Pending Collapse of the Global Economy

Posted by Euan Mearns on November 3, 2008 - 10:25am in The Oil Drum: Europe
Topic: Policy/Politics
Tags: bio fuel, ccs, climate change, credit, deflation, einstein, energy efficiency, energy poverty, eroei, gdp, hydrogen, inflation, ipcc, lia, olduvai, opec, original, production decline, united kingdom [list all tags]



When my talk to the Royal Society of Chemists was first arranged this summer, oil cost over $130 per barrel, and we wondered where the price would be in October. Since then much has happened. The credit expansion bubble was pricked in part by inflation stemming from high energy prices, and the global banking system is teetering on the brink of collapse, reprieved only by the spread of social ownership throughout the OECD.

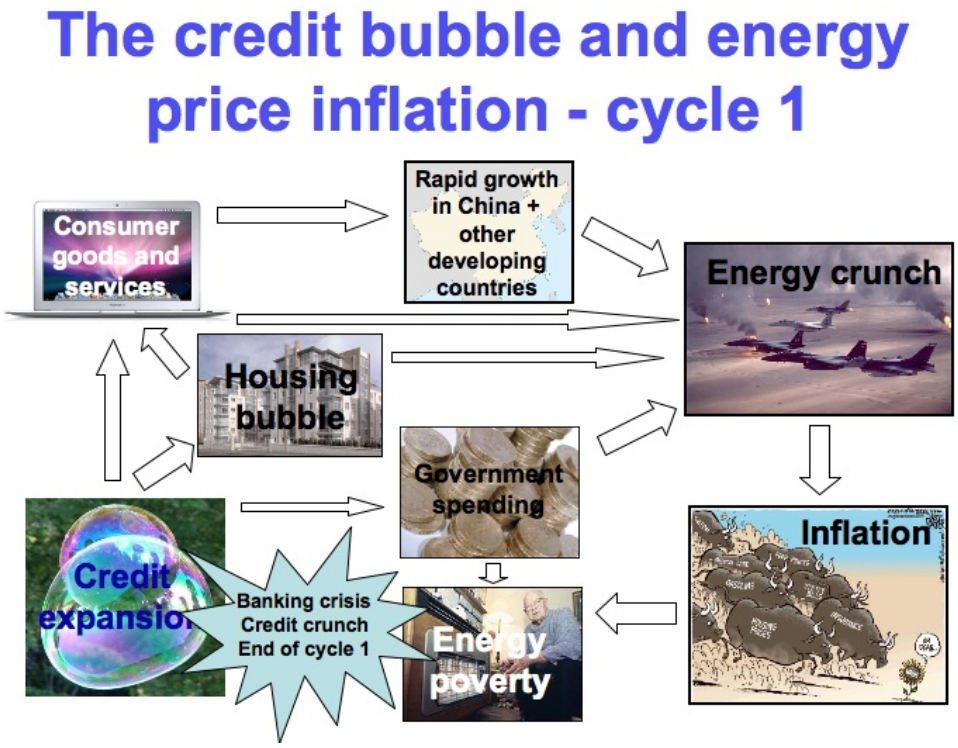
National governments and their agencies still seem to be sublimely ignorant of the causes of this year's energy crisis, and there is little sign of action being taken to mitigate the problems that underlay it. Unless these issues are addressed, the energy crisis will shortly re-emerge to dominate events. In fact, this past week, a cold snap in the UK and Europe sent day ahead natural gas prices up by 50% in a day, and these are still up 65% compared with a year ago.

I have been deliberately controversial in the subjects covered in this post because I believe it is high time we had a decent debate about certain aspects of energy policy that we have tended to

skirt around for too long. In particular, it is my opinion that UK and EU energy policies that are focussed upon CO_2 emissions instead of energy efficiency are dragging us along the path towards Olduvai at an unnecessarily alarming rate.

This is a post in pictures. Each slide is numbered below left. If you wish to leave a comment then please refer to the slide numbers. Click on slides for a larger image. I have added notes to clarify certain points.

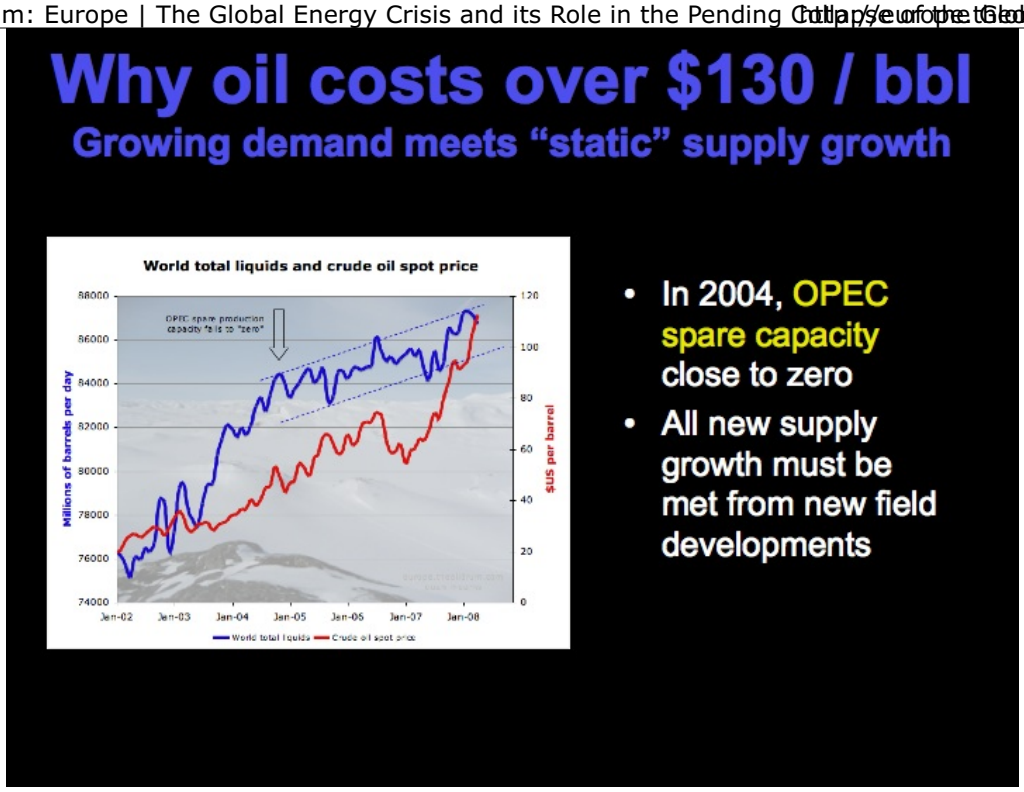
Should your organisation wish to have this presentation made in-house, then please get in touch using the information at this link. In my not so humble opinion, all UK government organisations, politicians, civil servants, large corporations and any finance companies and banks that survive the rout should be made aware of the issues presented here.



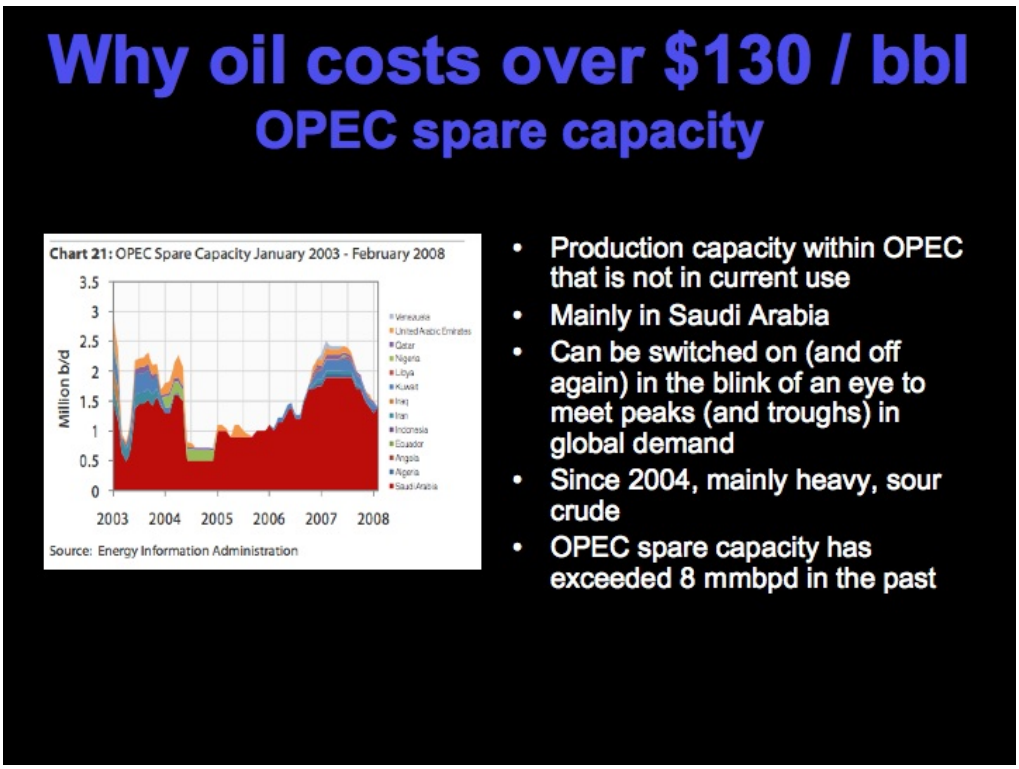
Slide 2
Rising fuel, energy and food bills have eroded the spending power of lower income groups causing difficulties in servicing debt and reducing discretionary spending. This is the needle that has pricked the credit expansion and housing bubble. These bubbles would no doubt have burst in any case, but at some later date. Borrowing even more is no longer an option to sustain this group. The reduction in discretionary spending power will hit the consume more economies of the OECD.

Slide 3
Whist the pressure on oil supplies has been alleviated for the time being, the underlying causes remain, and high oil prices will return should the world economy survive the current turmoil and begin to grow again. It is therefore worthwhile reminding ourselves what the underlying causes of the recent oil price were.

High energy prices will be an essential part of building a bridge to a sustainable future, needed to provide investment in new fossil fuel resources and alternative energy. National governments need to accept that the prosperity brought by free flowing energy from the heritage supergiant oil and gas assets is now gone, and we face a future where a greater proportion of incomes will be used on energy for survival purposes.

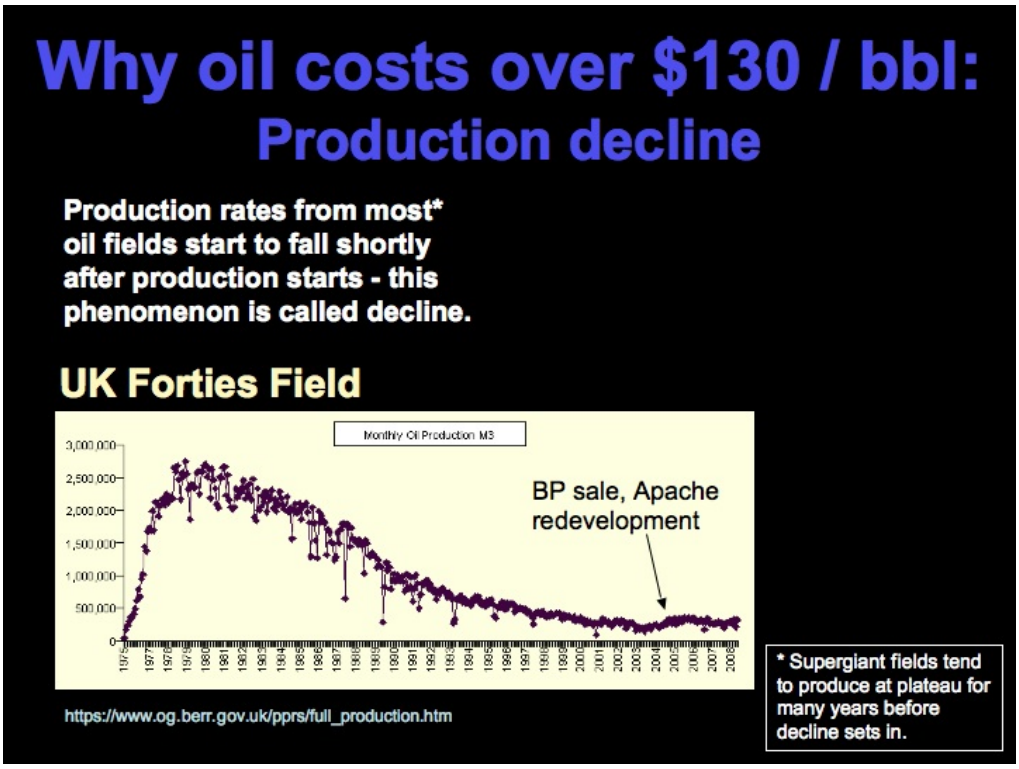


Slide 4
One of the most significant events leading to the rise in oil price was global oil production spare capacity falling to near zero in 2004.



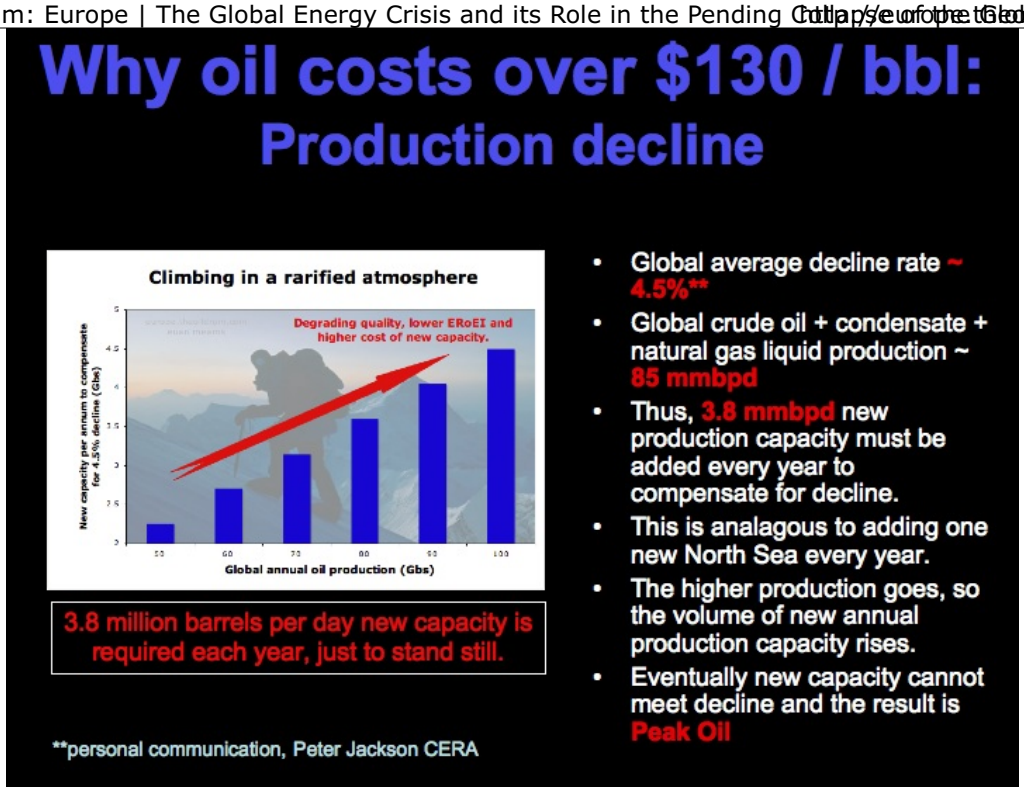
Slide 5
Prior to 2004, a rise in demand could be met by OPEC bringing on spare capacity (opening the taps), but since then demand growth could only be met by bringing on line new capacity--that means discovering and building out new fields--that involves drilling wells, building oil processing plants and pipelines. This is time consuming and expensive in terms of capital and energy used.

This is also dependent upon oil companies discovering new oil fields to develop, which they have not been very good at for decades.



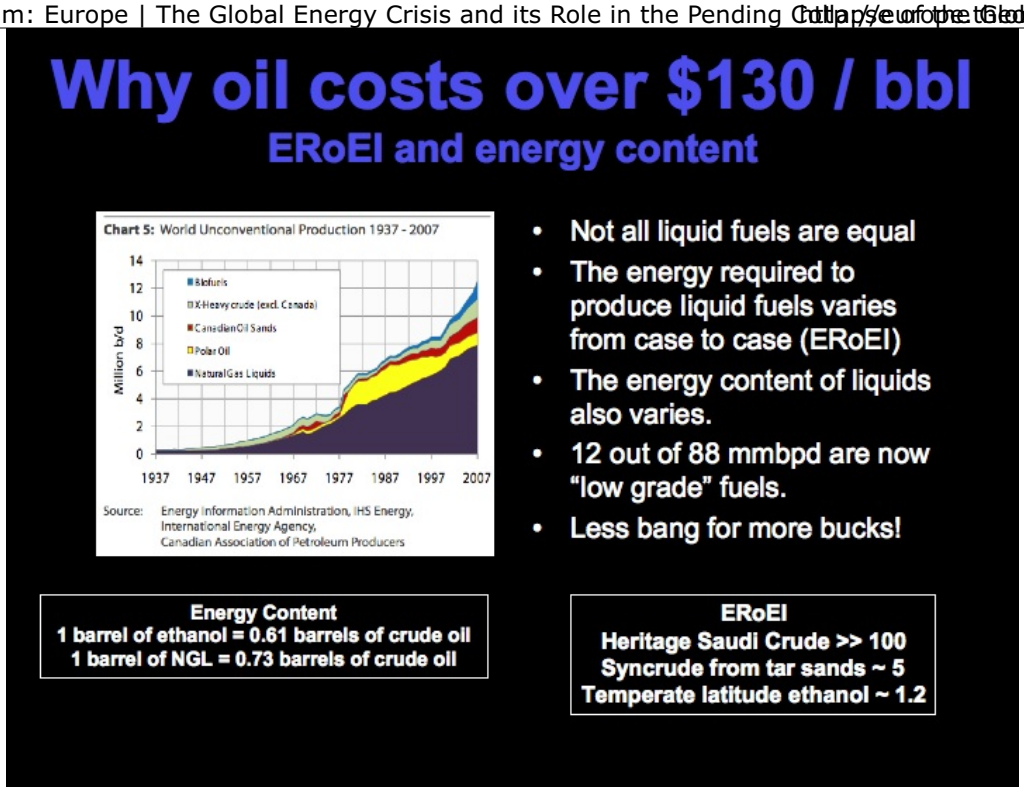
Slide 6
Production decline is a natural phenomenon whereby once a peak in oil production is achieved, it declines relentlessly as the result of the expenditure of natural reservoir energy, the proportion of water to oil being produced increasing with time, and the oil reserves being used up.

Decline is very difficult to reverse once it sets in. In the UK Forties Field, Apache Corporation managed to arrest decline late in field life through a massive investment in drilling new wells. The tail on Forties production may be extended for many years, but production will never rise to the heights achieved during the early years when the field was brimming with oil and charged with reservoir energy.



Slide 7
CERA conducted an important study attempting to estimate the global average decline rate in 2007 and proposed a number of 4.5%. This is a composite figure based on decline in individual fields much higher than this combined with the figure for new fields that are undergoing production build up where production is still rising and not falling (Dr Peter Jackson personal communication).

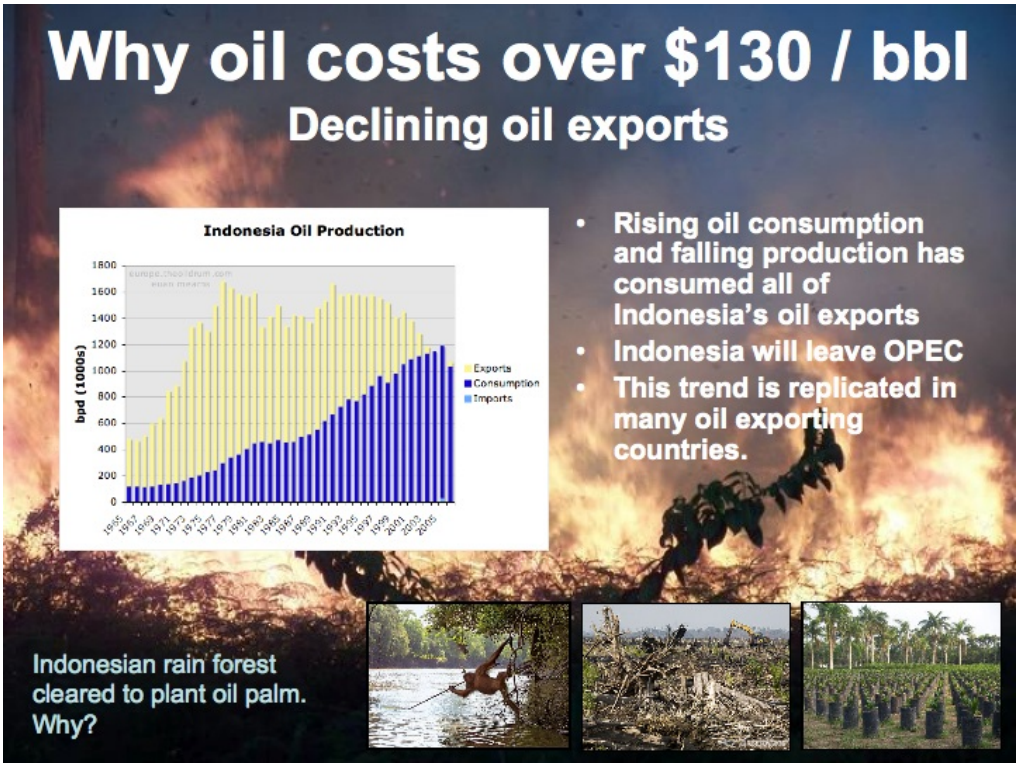
The world currently produces around 85 million barrels of oi per day (mmbpd). Applying the 4.5% decline rate to this figure shows that 3.8 mmbpd new oil production capacity needs to be added every year just to compensate for decline and maintain current production levels. Should production ever rise to 100 mmbpd then 4.5 mmbpd new capacity would be required every year, and this needs to be built out of ever degrading quality of oil field reservoirs.



Slide 8

The energy cost of producing energy is rising all the time. This will be discussed at length later on. What this means is that a growing slice of Global oil production is simply being used to produce more oil.

A growing percentage of liquids produced are poor cousins to crude oil, such as natural gas liquids and ethanol, whose energy content per barrel is much lower.



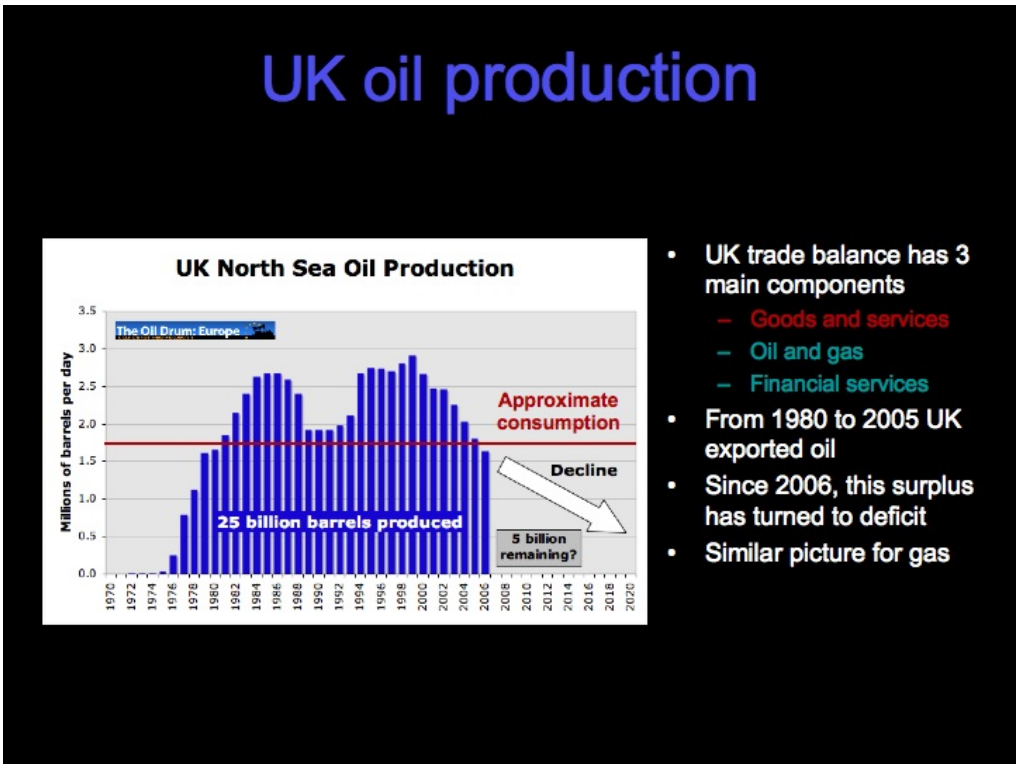
Slide 9

Many oil exporting countries are experiencing rapid economic growth, resulting in their internal energy consumption growing and consuming an ever larger percentage of oil exports upon which the OECD depends. Some exporting countries may also be experiencing production decline, such as Indonesia, Norway and Mexico. In Indonesia's case, these processes combined have consumed all oil exports. Indonesia represents the typical export land model (ELM) much promoted by Jeffrey Brown.

Indonesia has turned to oil palm to bolster dwindling supplies of crude oil resulting in massive devastation of rain forest. Obsession with global warming and CO_2 emissions, which are discussed below, enables Indoensia to present this environmental genocide in the rose tinted light of global environmental protection. This lie may be repeated by corporations wishing to project green credentials. Sadly, gullible and ignorant politicians and media have bought into this bio-fuels fantasy.

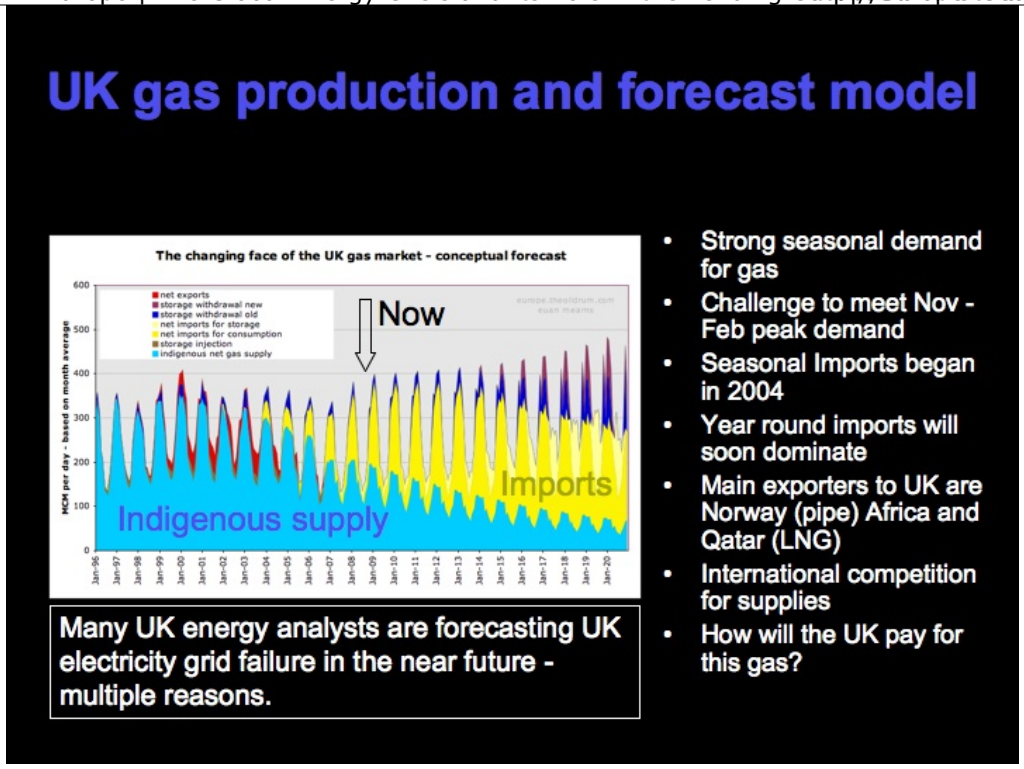
Basket Case UK

British Prime Minister Gordon Brown may be trying to lead the Global economy away from collapse whilst at the same time leading the UK economy off the edge of an energy cliff.



Slide 10

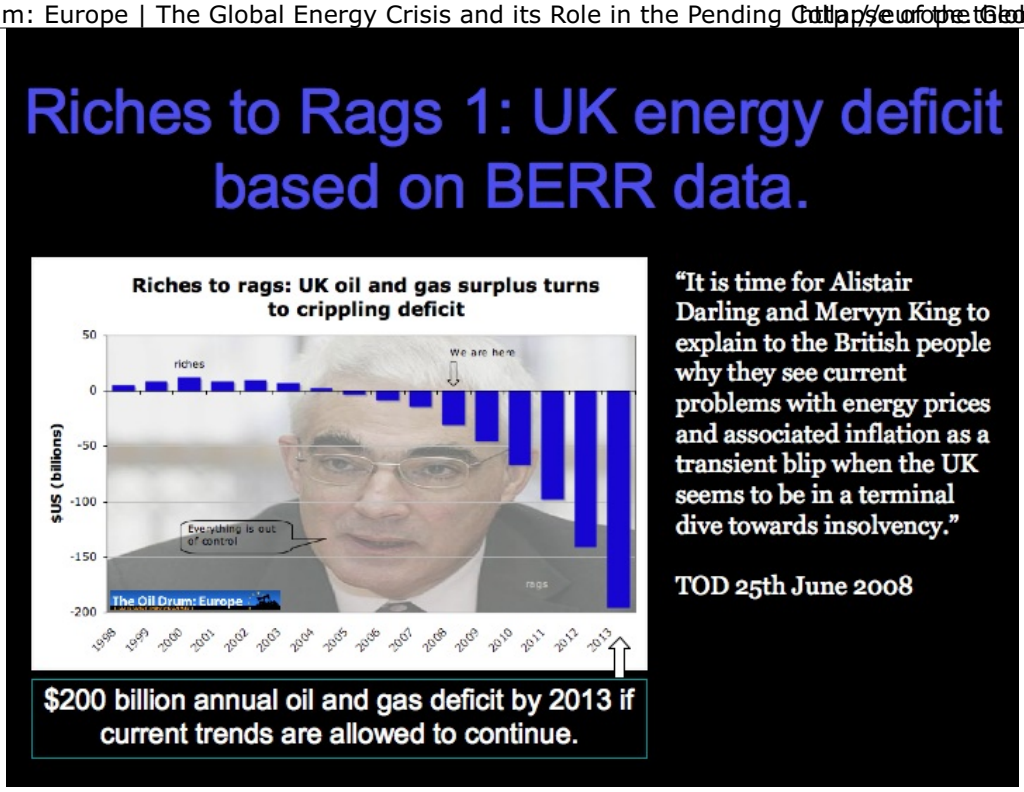
UK oil production peaked in 1999 and since then it has been declining at a rate of approximately 9% per annum and will continue to do so. Prior to 2006, the UK had an oil surplus that was exported, but since then the UK has been importing oil with devastating effect upon the trade balance (see below).



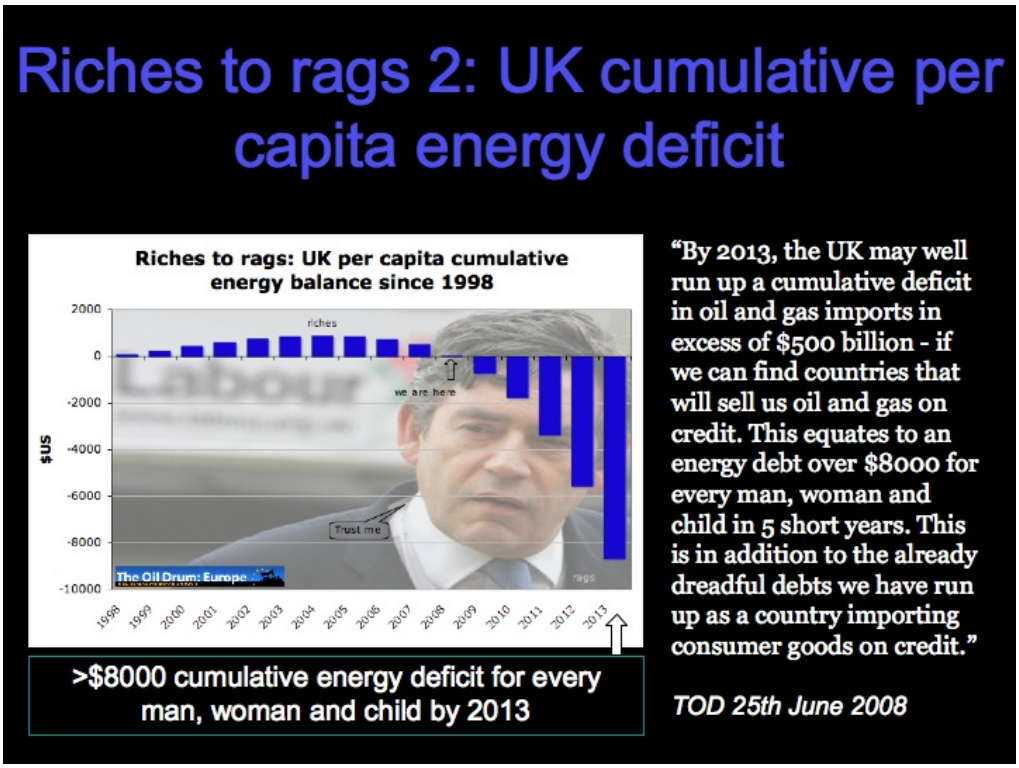
Slide 11
The situation with natural gas is equally grim. We will soon be importing gas the year round. The model forecast is flawed since it seems increasingly unlikely that demand will grow in the face of high natural gas prices.

The UK has invested heavily in gas import infrastructure - pipelines and liquefied natural gas terminals, but has failed to secure supply contracts to fill this capacity. It seems quite likely that the gas imports shown will never materialise owing to a shortage of gas. As a result, UK gas and electricity supplies might fail.

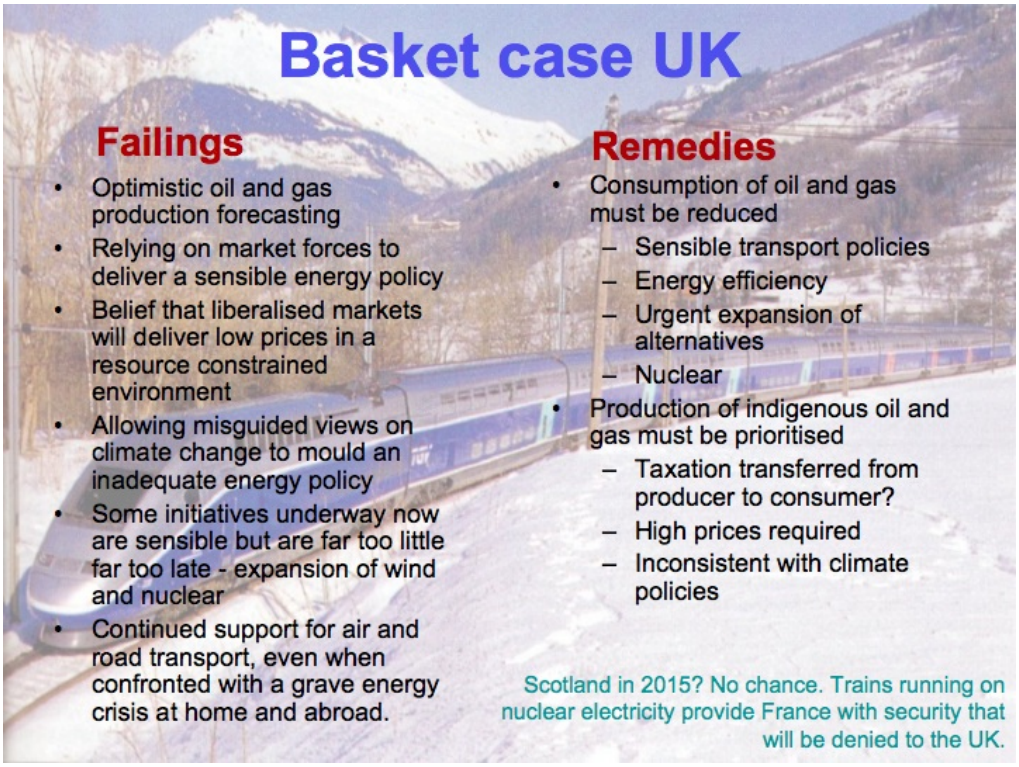
One aspect of this forecast model is that it shows gas imports rising during the summer months to fill storage for use in winter time. It seems likely that summer - winter price differentials will be eroded as a result of this.



Slide 12
In recent years the UK has run a trade surplus in oil & gas and financial services and a deficit in manufactured goods and services. The oil & gas surplus has now turned to deficit and will drag the trade balance deeper into the red at an alarming rate. The chart is based on government figures.



Slide 13
By 2013, the cumulative trade deficit for oil and gas alone may amount to $8000 for every man, woman and child in the UK. It seems inconceivable that this may be allowed to happen, and measures must be taken to reduce our consumption of oil and gas. See next slide.

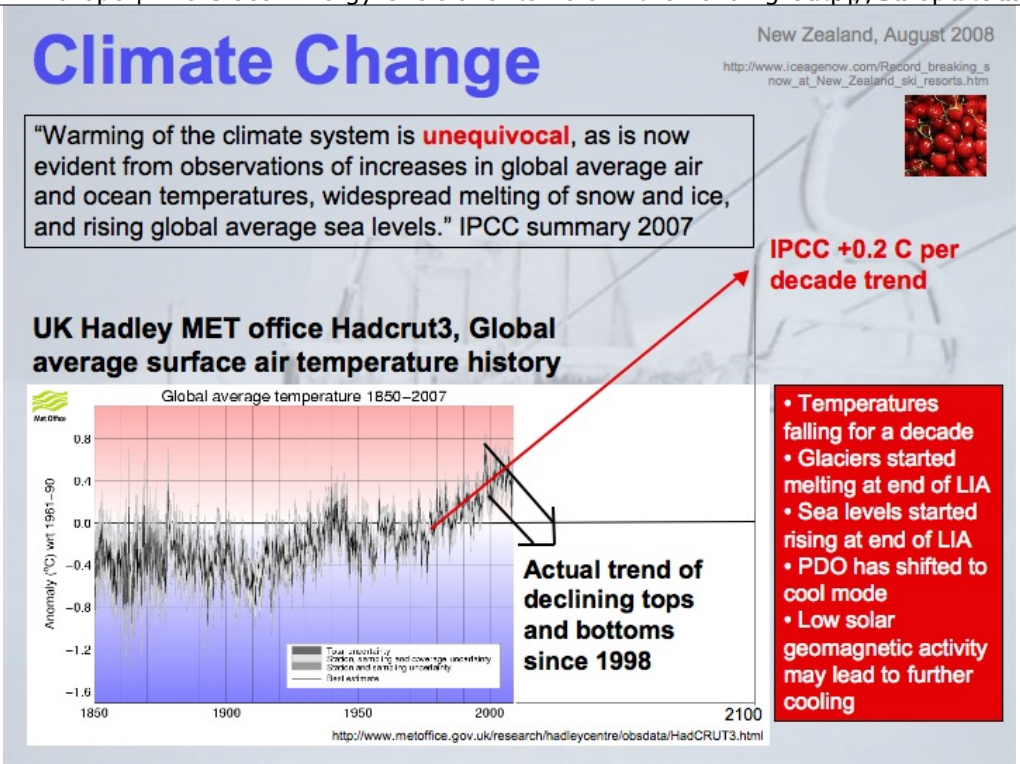


Slide 14
The degree of failure in UK energy policy is extraordinary. It is misguided to believe that the market alone will deliver a sensible and secure mix of energy supplies and transportation. This requires a strategic framework within which the market may operate. It is also extraordinarily naive to believe that market forces will deliver low prices in a resource constrained environment, and this is one reason why the UK will pay very high spot prices for gas whilst the rest of Europe will pay lower contract rates negotiated many years ago.

The UK has just created a ministerial position for Energy and Climate Change when they should have created a position for energy and transport. And despite the slump in car sales and increase in airline bankruptcies, the government continues to support road and air transport ahead of collective electrified rail and light rail.

There is much rhetoric about energy efficiency whilst the government puts money into energy wasting schemes such as bio-fuels, CCS and hydrogen (see below).

Climate Change and Energy Policy

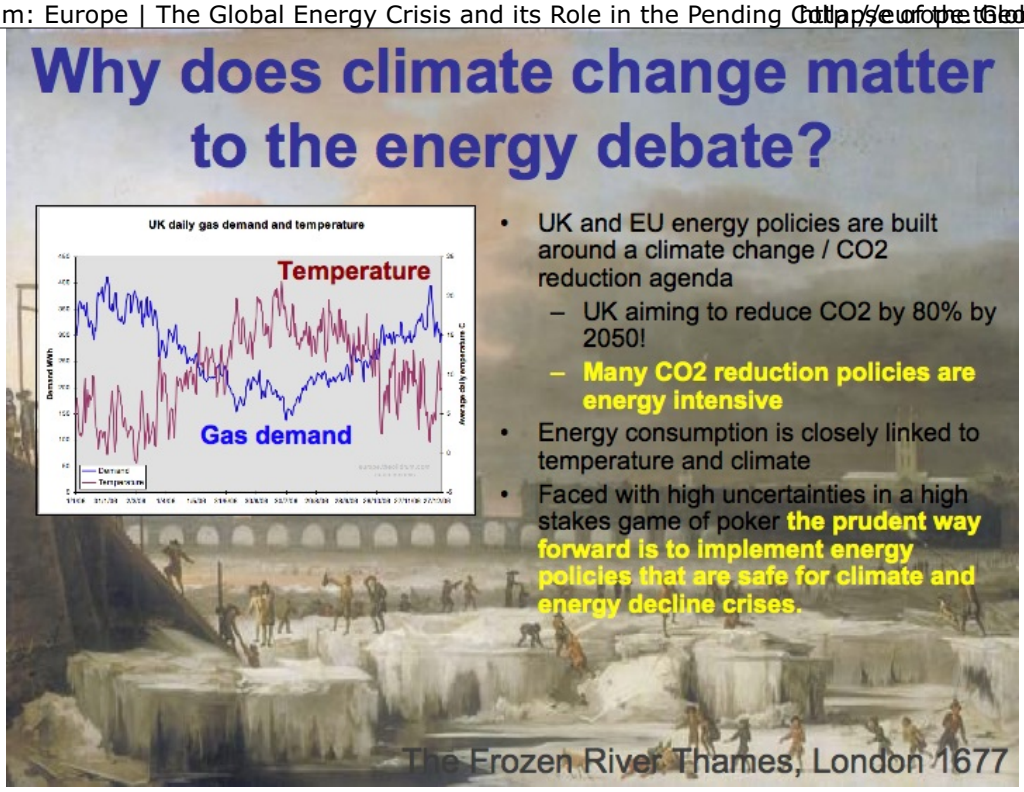


Slide 15

The view presented by the IPCC and other organisations is that the rise in global average temperatures observed from 1980 to 1998 is largely caused by anthropogenic causes of green house gas (GHG) emissions and surface albedo changes caused by changing land use and loss of surface ice. I do not agree with this position. I do believe that accumulation of GHGs has contributed to the observed rise in temperatures, but also believe that natural processes have made a very significant contribution. In particular, the Sun was hyper active in the latter decades of the 20th Century and this has likely contributed to the observed warming. Furthermore, the Pacific Decadal Oscillation (PDO) that moderates the ENSO cycle was set in warm mode. The geomagnetic activity of the Sun has since become much less active and the PDO has likely switched to the cool position. I suspect that these events plus others are responsible for the cooling trend observed since 1998 that is showing signs of intensifying.

I hasten to add that I share concern about the alarming loss of Arctic Sea Ice mass and area since 1998. The pattern of ice loss is consistent with anomalous warm water flowing in through the Bering straights, and it seems that the super el Nino event of 1998 was the trigger for this process. I draw considerable comfort from the fact that Arctic Sea ice area showed significant recovery this year and at time of writing the global sea ice anomaly stands at -1 million square kms - well within the range of historic values.

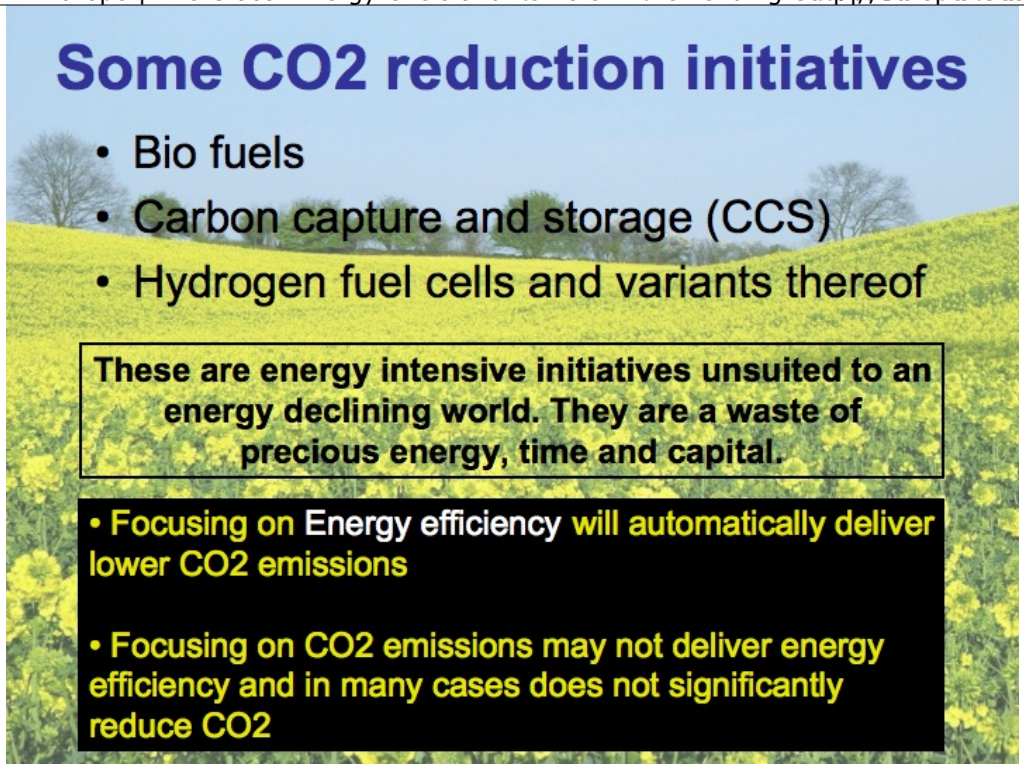
The main reason for raising the issue of climate change is my belief that the remedies for this perceived problem being pursued by UK and EU parliaments may be utterly devastating for the European population. This is especially the case if we end up in a position where the climate cools even further, and we are wasting large quantities of imported energy dealing with CO2 instead of heating and feeding the elderly and poor.



Slide 16
OECD governments have grown obsessive about climate change and have allowed CO_2 reduction polices to dominate their energy policies. The IPCC summary report presents the risks associated with climate change in black and white terms when, as indicated above, there are ample reasons to doubt the solidity of many of their findings.

In terms of risk management I will argue strongly that energy policies should take fully into account the risks associated with energy decline in addition to the perceived risks of climate change.

European governments should consider what would happen to their populations should we return to the conditions of The Little Ice Age in the decades that lie ahead. A scenario where we are wasting vast quantities of imported energy dealing with CO_2 whilst our populations starve and freeze to death is in my opinion a realistic prospect in the decades that lie ahead, if not sooner.

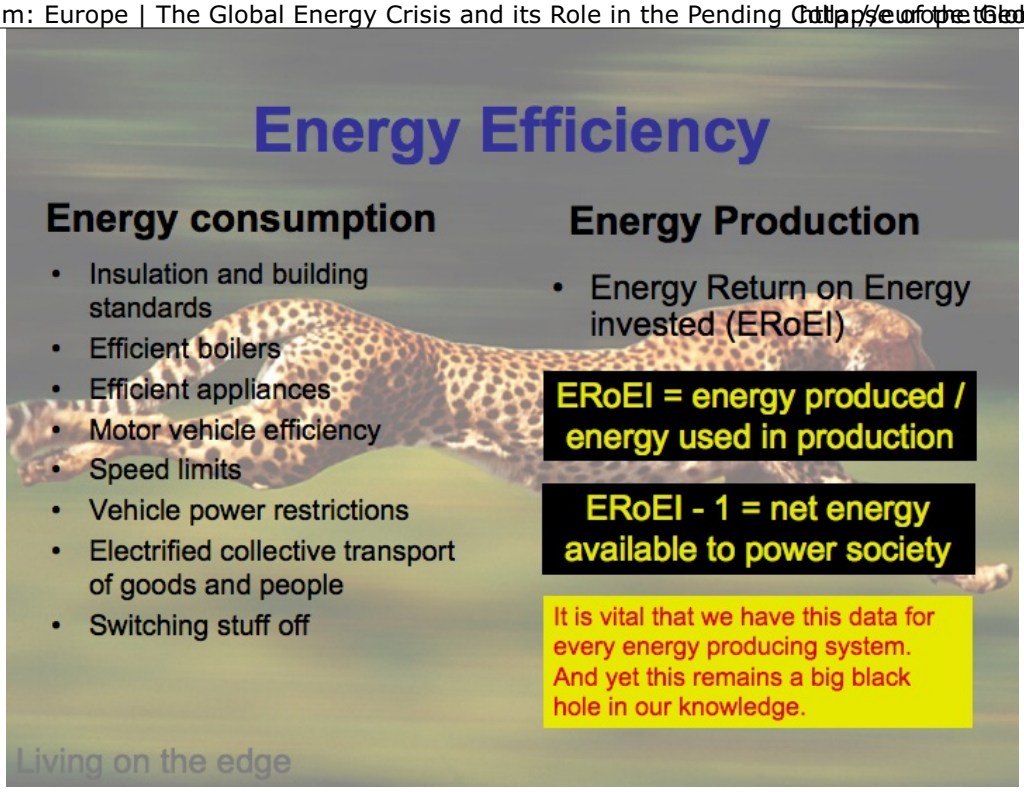


Slide 17
It is depressing for me to know that UK and EU parliaments are pouring millions into bio fuels, CCS and hydrogen technologies. It seems that governments have been persuaded by pressure groups with commercial interests that these activities will create employment and wealth. The same may be said for carbon trading schemes.

The financial, intellectual and energy capital spent on these schemes that will produce nothing worthwhile for humanity would be much better spent on viable energy production, energy efficiency and electric transportation schemes at this point in time.

Energy Efficiency

I will make a plea that energy efficiency should become the corner stone of all OECD energy policy. This must be at both energy consumption and energy production stages.



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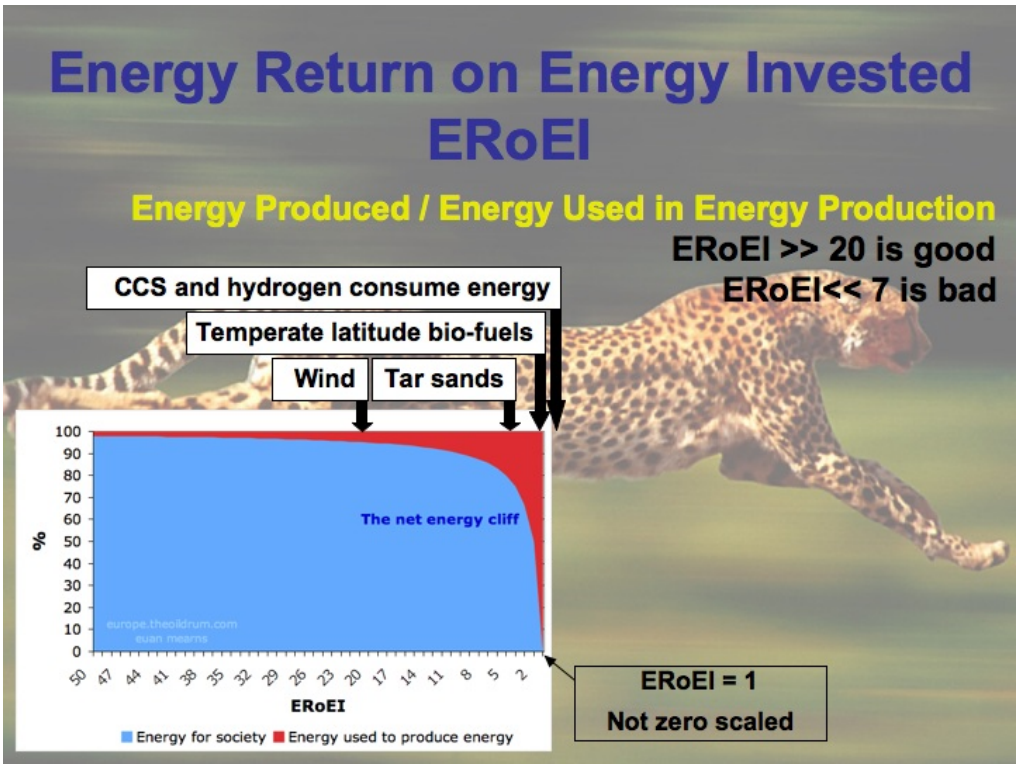
Too frequently, governments and individuals think only about energy efficiency when they are considering consumption. There is no need to go over this well trodden ground. However, the efficiency of energy production which is equally if not more important is normally ignored.



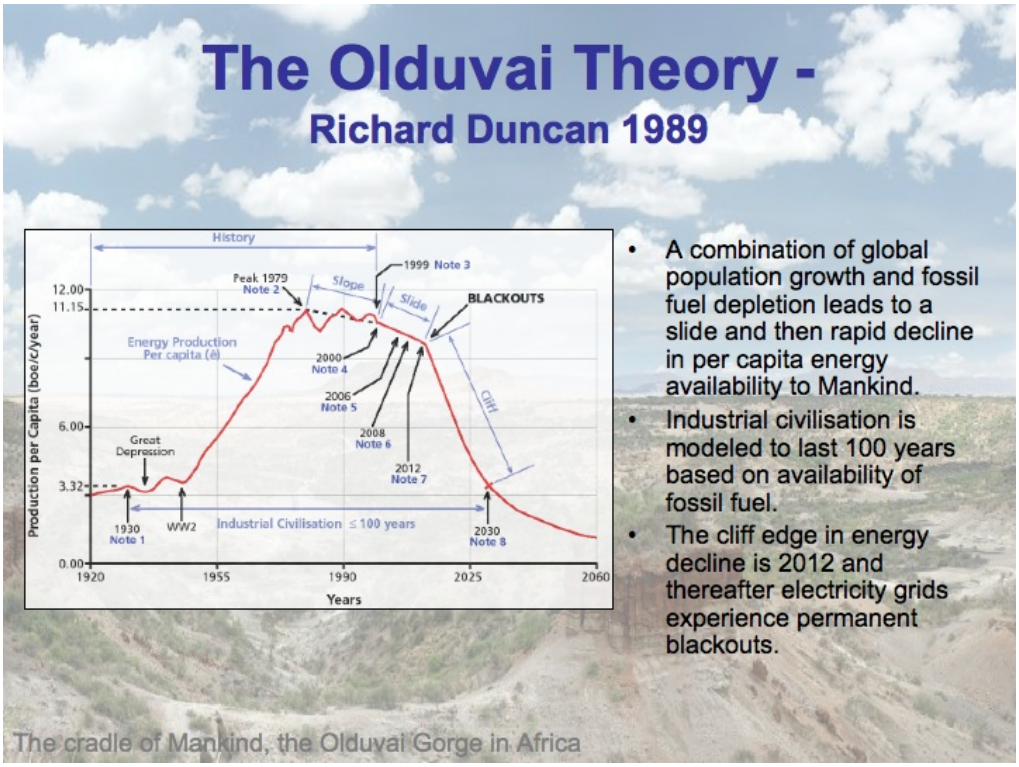
Slide 19

The efficiency of energy production is measured by Energy Return on Energy Invested (ERoEI). The chart shows the distribution of energy used to produce energy (red) and energy available for

society (blue) for different values of ERoEI. If all the energy produced is used to produce more energy then the ERoEI = 1 and there is no net energy available to power society - doctors, teachers, soldiers, children, elderly, holidays and food.

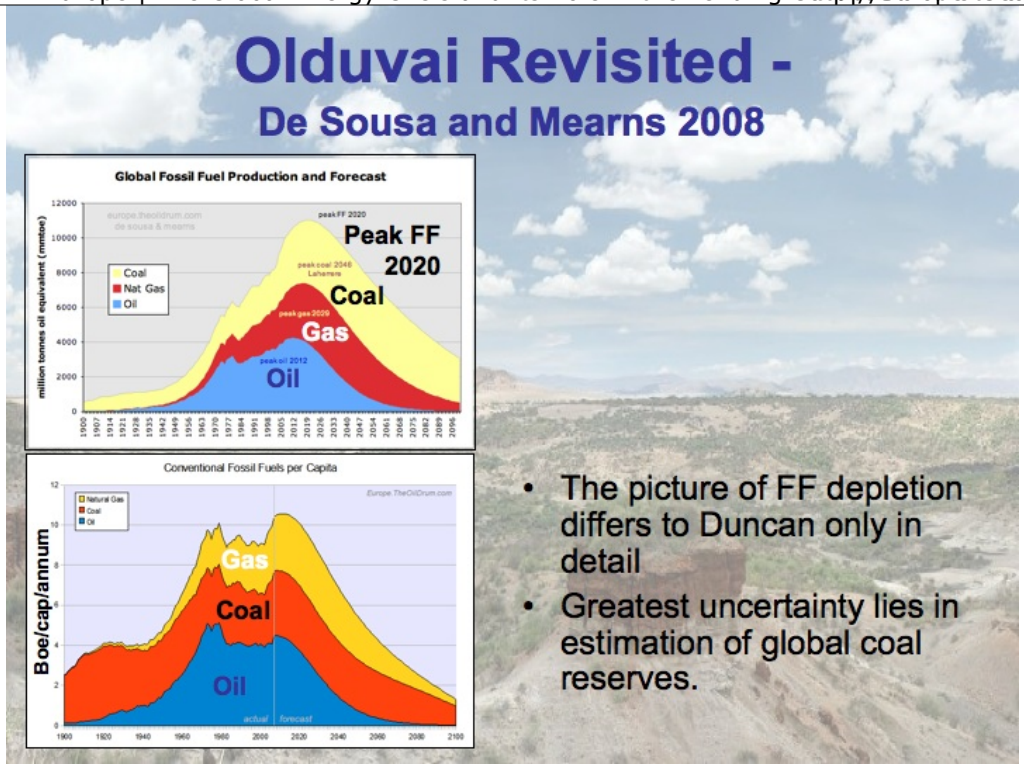
The legacy deposits of oil, gas and coal have likely had ERoEI values >100 and thus in the past we have not had to worry about ERoEI. However, now that these deposits are being depleted and must be replaced by new deposits or alternative energy sources it is essential that these new sources have ERoEI sufficiently high to power society. In terms of ERoEI, wind power is a useful energy source. Synthetic fuel from tar sands scrape by whilst temperate latitude ethanol is not a viable source of energy. CCS and Hydrogen should not really appear on this chart since neither produce any energy but actually consume large amounts of energy. It is extraordinary that when confronted with energy decline, our national governments have made so many bad choices that will lead society off the energy cliff if these misguided policies are not abandoned.

Olduvai Theory



Slide 20

The Olduvai Theory, proposed by Richard Duncan, integrates decline in oil, gas and coal production with population growth to provide a bleak picture of the per capita energy availability to Mankind. Around 2012, Duncan forecasts that per capita energy production falls off a cliff edge, and this will lead to the demise of Industrial Civilisation.



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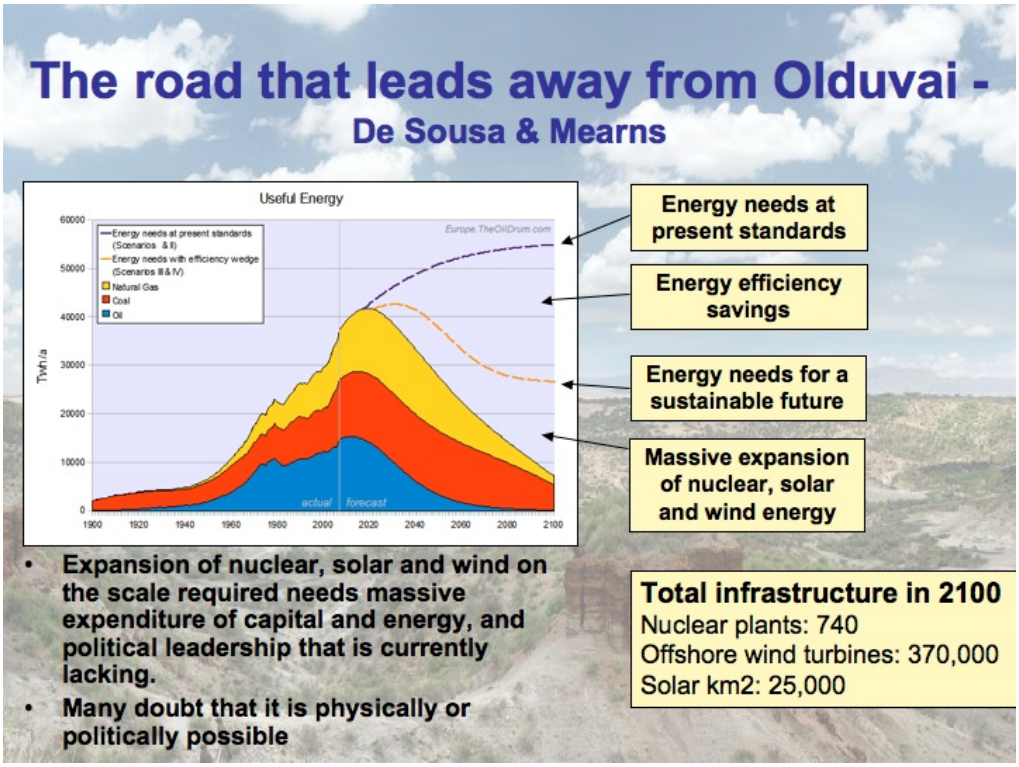
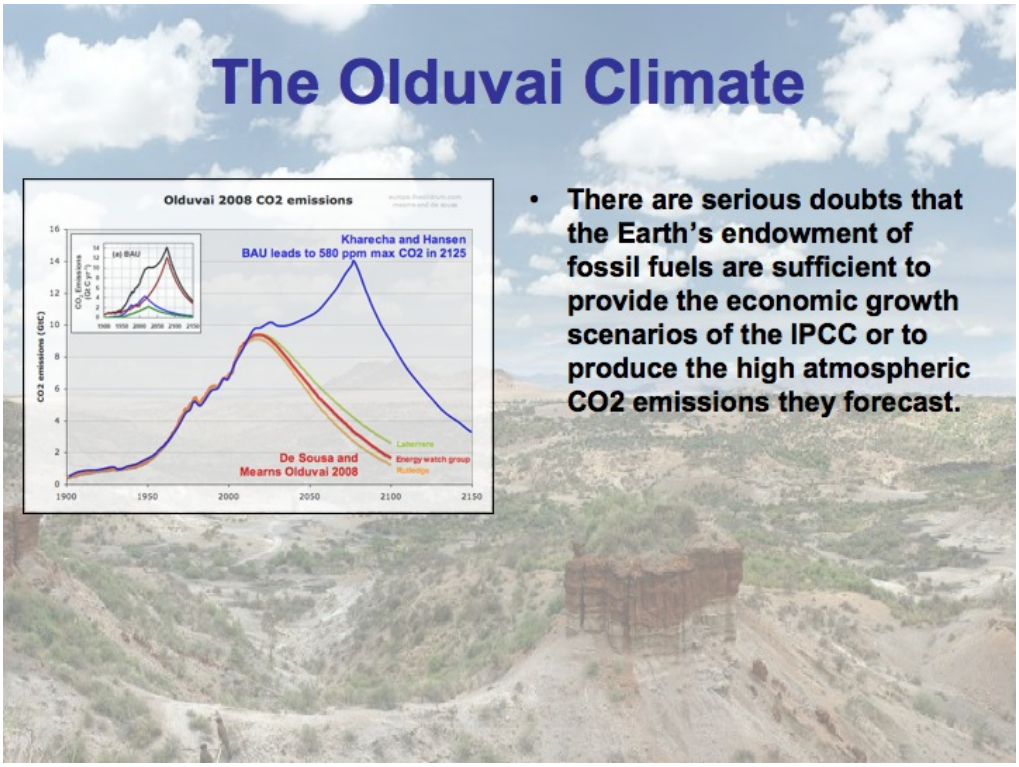
Luis de Sousa and I decided to check Duncan's theory using more up to date reports on fossil fuel reserves and production. Our findings were equally bleak as Duncan's.



Slide 22
Luis and I looked at what needed to be done to mitigate for the effects of fossil fuel decline. The largest mitigating factor is energy efficiency, but this alone is unlikely to solve the problem. Expansion of alternative energy sources on a truly massive scale will also be required. It is possible to use a combination of new energy sources, some not shown here, but they must have

high ERoEI.

It is easy to underestimate the amount of energy contained in crude oil; the scale of new infrastructure required to replace it is truly massive. There are serious doubts that Mankind can rise this challenge since energy decline is likely to bring more economic chaos and social disintegration. New infrastructure will require large amounts of dwindling energy to construct.



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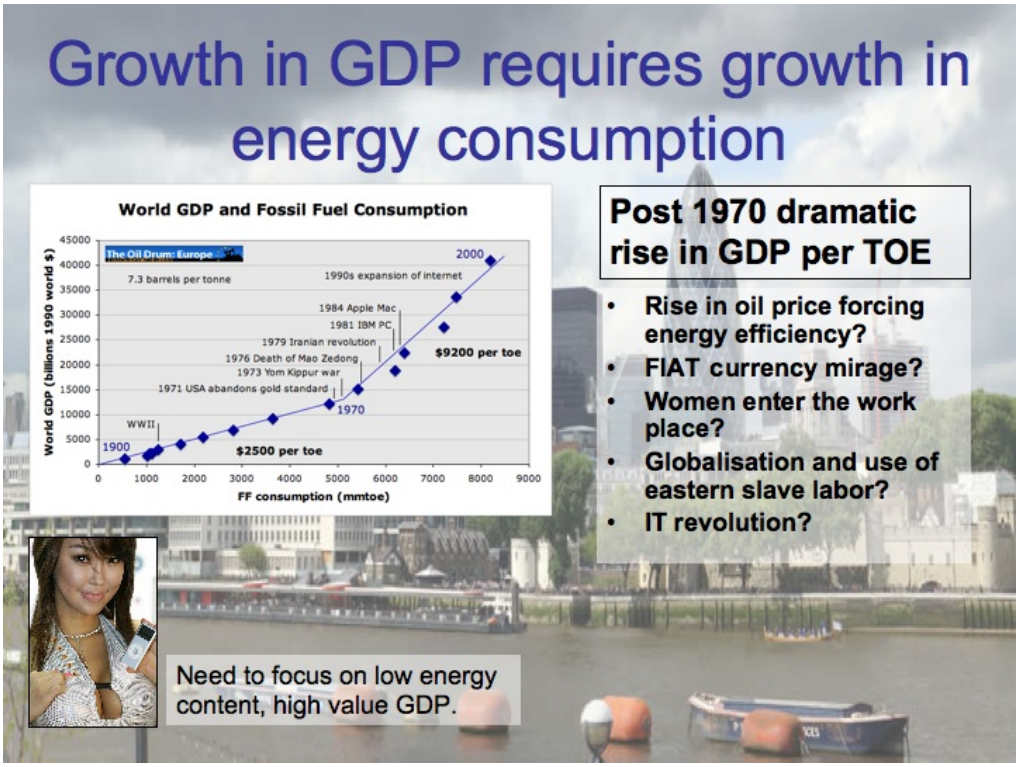

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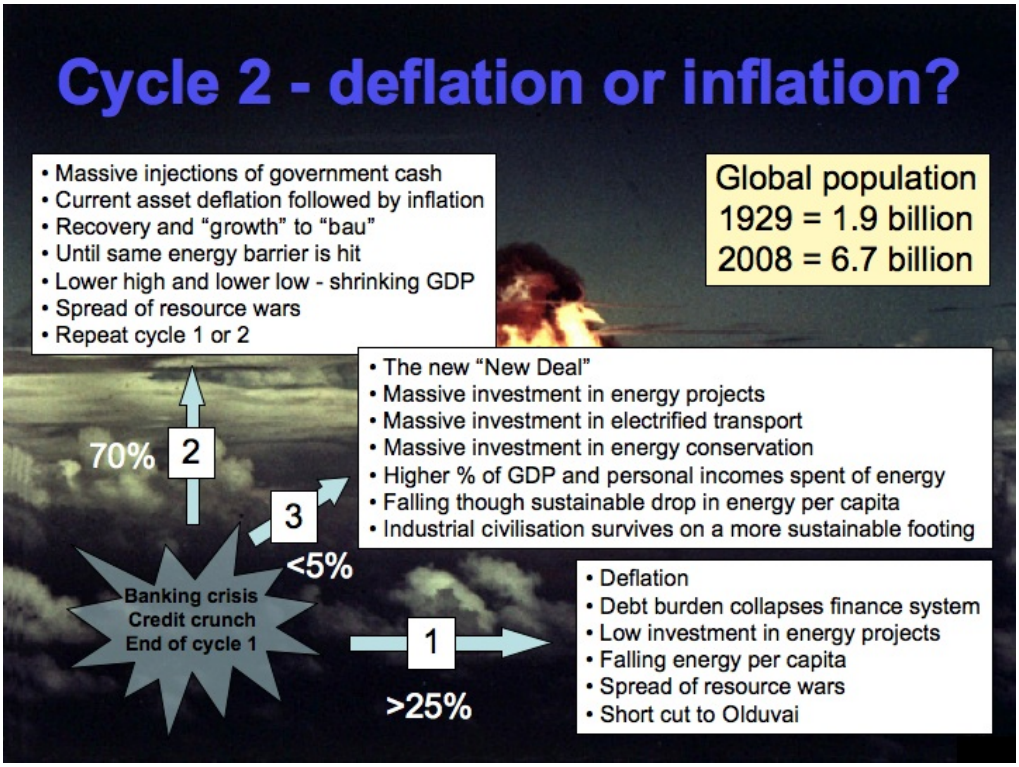
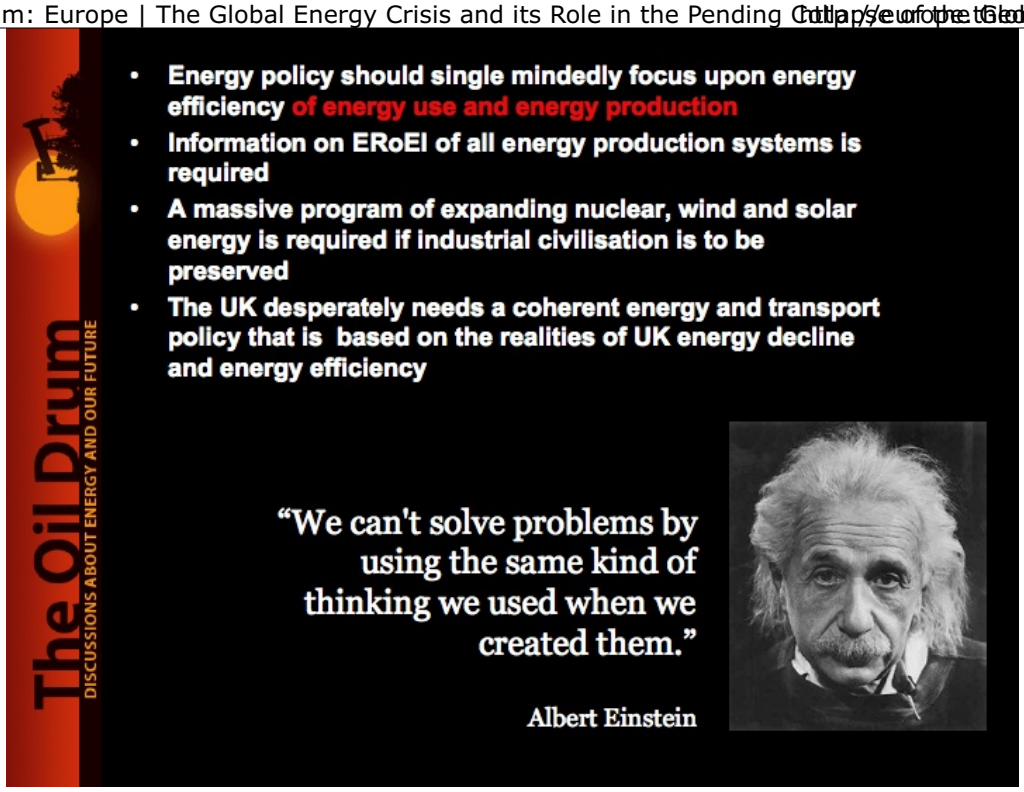
Historically there has been a clear correlation between GDP and fossil fuel consumption. When fossil fuels start to decline, it is likely so will GDP and this will likely collapse the global economy. We are in the early stages of this process.



Slide 25

There are three possible outcomes for the world from this point. The percentages give my subjective view of the likelihood of these outcomes. National governments are fully aware of the threat posed by deflation and will continue to do everything within their power to avert such a catastrophe for global capitalism. The most likely scenario seems to be a forlorn hope to return to the fiesta of the last 20 years. I therefore expect to see current asset deflation replaced by rampant inflation, stoked by runaway energy prices until the system collapses once again - and that will be that.



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