

Submission Fuel Inquiry
Peak oil (2005 – 2008) and the Financial Crisis



1970s oil crises



10 July 2009

Professor Laurie Sparke, a leading Australian automotive engineering expert, has warned of an energy crunch that could make the 1970s oil crises seem small-time. He says that in coming years Australia may not be able to buy oil, at any price.

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Fast Action at a glance – Stop the debate - Start tomorrow



Car pooling – Education of motorists



Strategic Oil Reserve



Conversion of locomotives to Natural Gas



Rehabilitation rural rail lines



Sleeper cars in night trains

Links used:

<http://www.kernfragen.de/kernfragen/gesellschaft/09-Chronologie-der-friedlichen-Nutzung/9-4-Konsolidierung-der-Kerntechnik.php#id2362978>

<http://www.abc.net.au/rn/breakfast/stories/2009/2622047.htm>

http://www.energyportal.eu/component/tag/strategic_petroleum_reserves.html

Executive Summary

The case is made that the global peaking of crude oil production has happened 2005-2008. This triggered the financial crisis in a banking sector which had a pre-condition of accumulated debt. The recession which was to be expected after peak oil has now damaged our economy, making it harder to respond to the evolving oil & energy crisis.

The root cause for the global financial crisis was and still is the untested assumption of perpetual economic growth, an almost religious belief that fuelled investments to underpin such growth, the use of accumulating debt to finance it, and the slowly dawning realization that such growth could not and cannot happen due to high oil prices and limited oil production.

Australia's energy supply stands on 3 legs: coal, oil and natural gas.

Local Australian oil production is in decline and requires increasing imports at a time when global crude oil production has peaked. These imports come mainly from South East Asia, from countries which have also peaked.. Imports of petrol and diesel are from Singapore which is highly dependent on supplies from the Middle East, where the geo-political situation is unpredictable. This will be aggravated by the problem with OPEC's overstated oil reserves, a issue which will come to light in the next years, by 2015 at the latest, when one of the main oil suppliers in the Middle East, Iran, may no longer export oil.

Coal production is pro-actively expanded (new coal terminals, coal trains) by both State and Federal governments despite a lot of rhetoric about the need to reduce CO2 emissions. Unfortunately, this will have legal and compensation claim consequences for Australia, in particular obligations to accept climate change refugees.

Natural gas is exported in long term LNG contracts. They will not reduce green house gas emissions because they do not replace coal in the destination countries. Instead, they induce further growth in what are still coal based economies, thereby creating secondary demand increase effects for even more coal. This will have a negative impact on our agriculture and thus the potential for bio fuels which have their own problems anyway.

The strategy seems to be to finance oil imports from more coal and gas exports without recognising that both peak oil and global warming (with climate change events beyond our experience) are physical processes which will make this strategy unsuccessful.

We actually see that our debt driven, oil dependent and carbon based consumer society cannot continue, let alone grow. Yet, desperate attempts are being made to do just that, business as usual, attempts which will fail because we have hit the limits to growth in all important areas: finance (debt), oil and CO2 emissions. Current policies are not only unsustainable but even dangerous as there is a risk that events will push us down the fossil fuel energy ladder without having an alternative energy supply system in place.

Priority #1 is a complete mind set change in all political parties and all government departments (in particular ABARE and BITRE) including their consultants. Due to the time limit of 5-10 years given by declining oil production and worsening climate change, an emergency program needs to be worked out. The time for endless Parliamentary debates is over.

Response to terms of reference In the context of looming physical fuel shortages

a. The impact of higher fuel and energy prices on:

Comment: The evolving oil crisis - the first phase of which triggered the financial crisis (see page 24) - will be more about physical shortages than prices. The government will be forced by circumstances to introduce fuel rationing and fuel price control

Recommendation: The government should design a fuel rationing plan which is equitable and minimizes the damage to the economy

i. Families

Comment: Motorists will have to learn to live with less fuels and energy in general and change their lifestyles accordingly

Recommendation: The government is to launch an education campaign about peak oil. If this is not done, panic will reign in the streets because the public will confuse declining oil production after peak oil with “running out of oil”. Car pooling is one of the first easy measures which can be taken, but this must also be prepared. It can’t be done overnight when the physical shortages are suddenly there.

ii. Small business

Comment: Small business will be hard hit because they do not have the lobbying power of the corporate sector when it comes to national fuel allocations

Recommendation: Special protection is needed for small business dependent on road transport, e.g. all trades people doing jobs in various locations, needing to take with them their tools, materials etc

iii. Rural and regional Australia

Comment: Rural Australia will be disadvantaged most as there is no alternative, e.g. rail transport like in urban areas

Recommendation: Bio fuels should be used in the agricultural sector itself to make it less dependent on oil, not to be wasted on the urban motorist, who can manage with car-pooling, public transport etc. If ethanol can be produced with a high enough energy profit ratio, farmers should convert their pick up trucks to E85 and special bowsers should be made available at rural filling stations. The same applies to bio diesel. Rural rail lines need to be rehabilitated and the first thing to be done is financial assistance to many volunteer groups keeping this vital rail infrastructure alive.

iv. Grocery prices

Comment: They will become more expensive with rising oil prices. But, again, physical shortages will be the main problem. Diesel shortages mean food shortages and empty shelves in shops.

Recommendation: The government must prepare a plan how to supply food to the cities. This will include fast rail transport as this is inherently more energy efficient than road transport. A prioritisation needs to be introduced e.g. transport of food is more important than transport of discretionary consumer products like plasma TVs and even export coal.

v. Key industries, including but not limited to tourism and transport

Comment: The most important “industry” is agriculture. Global tourism will go backwards and local tourism must be promoted by rail travel, e.g. along the East Coast. However, there will be a conflict with business travel by rail which will be the only alternative when airlines go into receivership in the next oil price shock

Recommendation: Agriculture must be made oil independent as much as possible. All freeway and highway upgrade projects, both urban and interstate, should be stopped immediately and replaced by rail improvement projects. I refer to my submission “Electric Rail Crash Program, jobs for public transport” to the “Inquiry into the investment of Commonwealth and State funds in public passenger transport infrastructure and services”

http://www.aph.gov.au/SENATE/committee/rrat_ctte/public_transport/submissions/sub48_amalg.pdf

b. The role of the Petrol Commissioner, including whether the Petrol Commissioner reduces the price of petroleum

Comment: There is nothing the Petrol Commissioner can do about declining oil production

Recommendation: The Petrol Commissioner should work out how tradable fuel quotas can be introduced along with rationing. Residents who do not use up their quota should be allowed to trade their remaining allocation in an orderly and legal fashion. If this is not done fuels will be stored and handled in a hazardous way.

c. the operation of the domestic energy markets, and petroleum, diesel and gas markets, including the fostering of maximum competition and provision of consumer information

Comment: According to the Hirsch report 10-20 years are needed to prepare for peak oil. We can no longer prepare for something which is in the past. We are in an emergency.

Recommendation: We can now only prepare for declining oil production and since there is a huge inertia in the current system fuel rationing is unavoidable. With current business-as-usual policies on both State and Federal levels, fuel shortages will come as a big surprise and shock.

d. the impact of an emissions trading scheme on the fuel industry

Comment: Emissions from burning oil will decrease along with declining oil production. It is very likely that both higher oil prices and physical shortages will reduce demand for oil much more than any carbon trading or carbon taxes on fuels

Recommendation: Legislation needs to be introduced in Parliament ASAP to set aside Australian oil and gas fields for the sole purpose of serving as an energy input into all projects which make us independent from oil and which reduce CO₂ emissions. If this is not done these projects may all get stuck in diesel shortages. In the worst case scenario we may experience a simultaneous occurrence of 2 looming events: (1) an explosion in the Middle East either because of an oil war or social unrest when OPEC’s paper barrels vaporize, (2) the passing of a climate tipping point e.g. the disappearance of the Arctic summer sea ice which will make it obvious that society’s job will be to extract CO₂ from the atmosphere. At present the last easy oil is literally guzzled away for convenience purposes.

e. the existing set of federal and state government regulatory powers as they relate to fuel and energy products

Comment: They are completely inadequate to deal with declining oil production

Recommendation: A strategy must be worked out – including bar charting and critical path analysis - to avoid that we'll fall down the energy ladder when nature forces us – with nasty climate change events - to abandon coal much earlier than is naively assumed. No energy hungry structures like skyscrapers, large shopping centres etc. should be added to the current portfolio of energy guzzlers

f. taxation arrangements on fuel and energy products

Recommendation: All tax concessions which promote the use of cars should be removed

g. the role of alternative sources of energy to coal and alternative fuels to petroleum and diesel

Comment: Due to peak oil ignorance in all governments it is thought that Australia can endlessly export coal and gas in order to finance the import of oil. This policy will terribly fail because global oil markets will freeze (like credit markets) when the first global shortages start. Oil will be hoarded and then no longer be fungible. Special deals between refineries and crude suppliers for dwindling feedstock of different type and quality will need to be made, under a lot of government control. Whether Australia at the end of the world and with declining crude production - despite exported condensate and LPG - will be a winner in this situation is a very big question.

All Australian sugarcane distilled into ethanol will yield around 5 litres per week per car.

Recommendation: The best alternative fuel in Australia is compressed natural gas (CNG). Priority should not be on converting cars but buses, locomotives, trucks, agricultural and construction machinery as much as is technically feasible. LNG exports should be curbed. Development of coal seam gas should be done for domestic supplies in the transport sector.

Under no circumstances should it be attempted to introduce electric cars.

One KWh is needed for 6 kms. An average car does 40 km per day so we need about 7 KWh per day. Let us assume we re-charge at night over 10 hrs so per car 0.7 KW capacity is needed. Assume 10 million cars that's $0.7 \text{ KW} \times 10,000,000 = 7 \text{ GW}$. That would be 7 new power plants @ 1 GW each plus upgrading all grid infrastructure. Coal will kill our climate and no-one wants nuclear power. Before we even start with this infrastructure the oil crisis will have killed our car culture (see page 28). It is also a bad idea to recharge EVs at night from existing coal fired power plants. First, who will control any re-charging during the day, secondly it is not good to swap oil dependency with coal dependency. Nature will force us to abandon coal.

h. domestic energy supply and the domestic oil/gas exploration and refinement industry

Comment: Australia is now exporting its last easy oil into the bottomless pit of global oil markets

Recommendation: The Australian government should employ oil exploration and service companies as subcontractors to search for oil and then keep the oil found in Government ownership and in the ground so that it is available in future when its true value is appreciated and when it is needed for absolutely vital services in the economy. It is very urgent to build up a Strategic oil reserve so that the 1st period of intermittent oil shortages can be mastered.

i. the impact of higher petroleum, diesel and gas prices on public transport systems, including the adequacy of public transport infrastructure and record of public transport investment by state governments

Comment: In all capital cities the implementation window for rail (metro) tunnels has closed

Recommendation: Follow the advice given in this document (urban rail on freeways and arterial roads): http://sydneypeakoil.com/matt/SurfaceMetro_Not_TunnelMetro.pdf
It could even be we have only time for electric trolley buses when the crunch time is suddenly there.

j. any related matters

Strategic oil reserves

As member of the International Energy Agency (IEA) Australia is in violation of its obligations to hold a strategic oil reserve of 90 days of imports.

Recommendation: The Federal Government should establish – as a matter of urgency - a Strategic Oil Reserve with the objective for the economy to survive the first phase of the oil decline which will start with intermittent oil shortages

Immigration

Recommendation: Immigration has to be immediately reduced to a minimum (nurses, doctors, engineers in the energy industry etc.). The more additional immigrants, the longer the petrol lines and/or the smaller the fuel quota per motorist.

Metropolitan Growth Strategies

All Australian Capitals plan to grow their cities. Such plans are unsustainable.

Recommendations: These plans should be reviewed immediately.

Oil vulnerability assessments

An oil vulnerability taskforce by the Queensland Government was ineffective in that it could not stop new road tunnel projects in Brisbane. As a result, hundreds of millions of dollars in Brisbane investments were lost. In NSW, a Peak Oil Response Plan Bill was narrowly defeated in the Upper House.

The Energy white paper team is currently conducting a public consultation. An oil vulnerability assessment was prepared by ACIL Tasman but this is totally flawed. My critique is here: http://sydneypeakoil.com/matt/Comments_EWP_April_2009.pdf

Recommendation: ACIL Tasman's oil vulnerability assessment should to be re-written from scratch

Stimulus package

It is a fatal error to stimulate an oil dependent, carbon based consumer economy by aimlessly throwing money to consumers. The result of this desperate attempt can only be that oil demand rises again, causing another oil price shock which will kill the economy for good.. Moreover, we'll come closer to climate tipping points. Current policy settings will lead to a multiple system failure. The 1st signs are already there.

We may never see an end to the GFC because an oil dependent economy will not grow if oil production cannot grow and therefore it will become increasingly difficult to roll over debt, let alone to pay back any debt, whether new or old. The current money printing strategy of many countries (“bad banks”, “re-capitalisation”, “stimulus packages” etc.) will not work for very long.

Recommendations Funds from the stimulus packages must be entirely used to get the economy away from oil and to reduce CO2 emissions, not to maintain current consumerism.

Australian Oil Reserves

The BP Statistical Review reports 4.2 Gb for several years now. Note the definition of proved reserves and the source of data.

Microsoft Excel - statistical_review_of_world_energy_full_report_2009											
	A	W	X	Y	Z	AA	AB	AC	AD	AE	AF
1	Oil: Proved reserves									Change	2008
2										2008 over	share
3	Thousand million barrels	2001	2002	2003	2004	2005	2006	2007	2008	2007	of total
59	Australia	5.0	4.6	4.4	4.1	4.2	4.2	4.2	4.2	+	0.3%
60	Brunei	1.2	1.1	1.1	1.1	1.1	1.2	1.1	1.1	-	0.1%
61	China	18.3	15.5	15.5	15.5	15.6	16.3	16.1	15.5	-4.2%	1.2%
62	India	5.5	5.6	5.7	5.6	5.9	5.7	5.5	5.8	6.2%	0.5%
63	Indonesia	5.1	4.7	4.7	4.3	4.2	4.4	4.0	3.7	-6.0%	0.3%
64	Malaysia	4.5	4.5	4.8	5.2	5.3	5.4	5.5	5.5	-	0.4%
65	Thailand	0.6	0.7	0.5	0.5	0.5	0.5	0.5	0.5	-	+
66	Vietnam	2.2	2.8	3.0	3.1	3.1	3.3	3.4	4.7	38.7%	0.4%
67	Other Asia Pacific	1.1	1.1	1.1	1.0	1.0	1.0	1.1	1.1	+	0.1%
68	Total Asia Pacific	43.4	40.6	40.8	40.3	40.8	41.8	41.3	42.0	1.8%	3.3%
69											
70	Total World	1133.0	1180.0	1206.3	1211.3	1220.3	1240.6	1261.0	1258.0	-0.2%	100.0%

85 **Notes:** Proved reserves of oil - Generally taken to be those quantities that geological and engineering information
 86 indicates with reasonable certainty can be recovered in the future from known reservoirs under existing
 87 economic and operating conditions.

Source of data – The estimates in this table have been compiled using a combination of primary official sources, third-party data from the OPEC Secretariat, World Oil, Oil & Gas Journal.....

<http://www.bp.com/productlanding.do?categoryId=6929&contentId=7044622>

In 2006, in its submission to the Senate Inquiry on oil supplies, Geoscience Australia wrote on page 5:

“Identified resources of crude oil plus condensate have been maintained at approximately two billion barrels since 1967, due to a combination of reserves upgrades in discovered fields, and new discoveries of oil fields and condensate in gas fields. **Crude oil resources are 1.496 billion barrels [714.37 mb Cat1 and 781.25 mb Cat2 – table 6 page 28], the lowest level since 1967. Remaining commercial crude oil reserves (the part of resources which is currently producing or for which there are firm development commitments) are 0.714 billion barrels.**”

With following definition:

“Identified resources are the total amount of petroleum that can be recovered from specific accumulations that have been identified by drilling. Undiscovered resources are the amount of conventional petroleum that can be recovered from unspecified accumulations that have not been identified by drilling, but may exist within a specific reservoir sequence wherever it lies within a structural or stratigraphic trap.”

http://www.aph.gov.au/senate/committee/rrat_ctte/completed_inquiries/2004-07/oil_supply/submissions/sub127.pdf

So the question was and still is: who reported 4,200 million barrels to the BP Statistical Review? The US also has a definition similar to commercial reserves mentioned above and these are reported in the BP Statistical Review. See this web link of the US Security and Exchange Commission about the definition of reserves

http://www.sec.gov/divisions/corpfin/guidance/cfactfaq.htm#P279_57537

In July 2009, Geoscience Australia published its OGRA 2008 report.

<http://www.bp.com/productlanding.do?categoryId=6929&contentId=7044622>

The reserves are on this web page:

Reservers table 3: Australia's economic demonstrated resources and production of crude oil, condensate, naturally-occurring LPG and natural gas 1982 to 2008 (gigalitres and billions of cubic metres)

End of year	Crude Oil			Condensation			LPG			Gas		
	EDR	Annual Production	R/P	EDR	Annual Production	R/P	EDR	Annual Production	R/P	EDR	Annual Production	R/P
2004	157	23.8	7	301	7.8	39	214	5.9	36	2587	39.6	65
2005	169	18.9	9	257	11.2	23	214	8.7	25	2428	42.1	58
2006	160	19.4	8	236	10.9	22	203	8.8	23	2421	49.5	49
2007	162	19.5	8	228	10.2	22	191	7.9	24	2362	49.2	48
2008	188	18.6	10	340	10.8	31	174	8.7	20	3145	49.7	63

<http://www.ga.gov.au/resources/publications/oil-gas-resources-australia-2008/reserves/reserves-table-3.jsp>

Economic demonstrated resources (EDR) of crude for 2008 is 188 GL or 1.2 Gb and 340 GL or 2.1 Gb of condensate

In table 1 <http://www.ga.gov.au/resources/publications/oil-gas-resources-australia-2008/reserves/reserves-table-1.jsp> which is also available as spreadsheet:

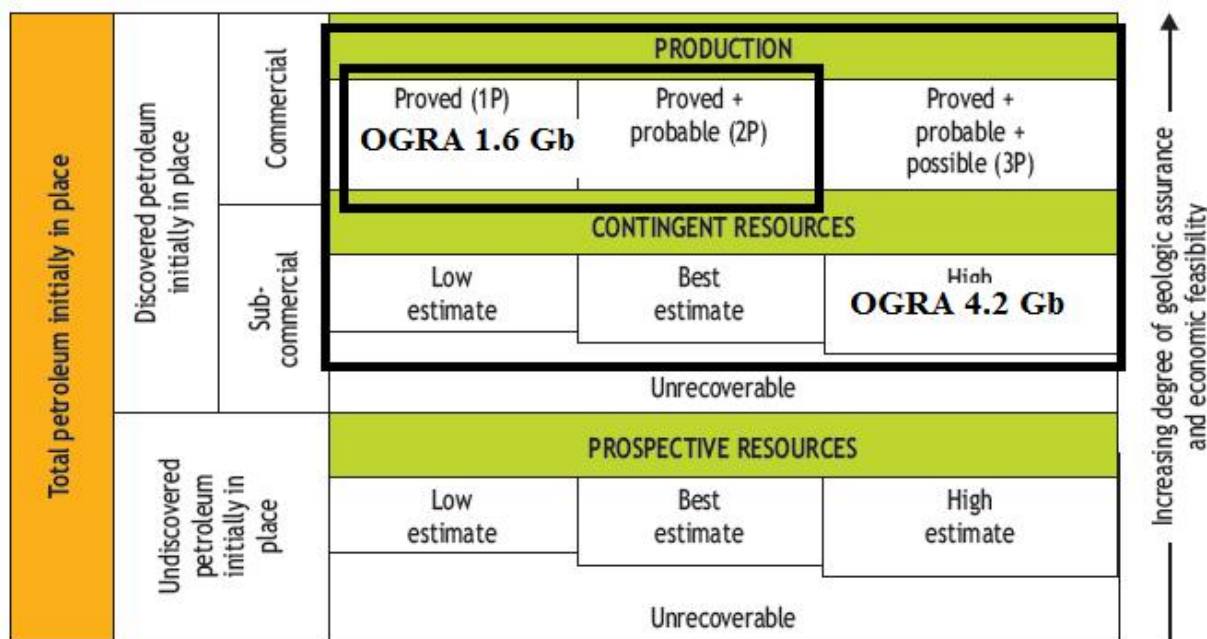
Microsoft Excel - ogra-2008-all									
Reserves Table 1: Petroleum reserves estimates by basin as at 1 January 2009									
Category	Basin	Crude Oil		Condensate		LPG		Sales gas	
		GL	million barrels	GL	million barrels	GL	million barrels	Bcm	Tcf
Category 1	Adavale	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Amadeus	0.62	3.89	0.30	1.91	0.03	0.20	8.37	0.30
	Bass	0.00	0.00	1.88	11.81	1.71	10.74	6.16	0.22
	Bonaparte	11.58	72.85	19.14	120.41	15.74	99.00	75.55	2.67
	Bowen	1.03	6.47	0.30	1.89	0.34	2.14	10.91	0.39
	Canning	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Carnarvon	82.86	521.18	72.06	453.21	72.94	458.78	524.30	18.52
	Cooper	2.49	15.64	2.39	15.00	4.37	27.48	19.63	0.69
	Eromanga	6.30	39.59	0.06	0.40	0.03	0.20	0.25	0.01
	Gippsland	33.24	209.09	14.64	92.09	23.91	150.38	145.57	5.14
	Gunnedah	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.01
Otway	0.00	0.00	1.22	7.65	0.00	0.00	26.29	0.93	
Perth	1.95	12.29	0.00	0.03	0.00	0.00	0.39	0.01	
Surat	0.09	0.55	0.02	0.13	0.01	0.09	0.92	0.03	
Total		140.16	881.55	112.01	704.53	119.08	749.01	818.64	28.92
Previous		139.12	875.04	115.96	729.39	122.46	770.22	821.35	29.01
Category 2	Amadeus	0.00	0.00	0.00	0.00	0.00	0.37	0.01	
	Bass	2.11	13.28	4.70	29.56	7.40	46.54	7.42	0.26
	Bonaparte	21.08	132.58	56.50	355.36	29.30	184.30	596.81	21.08
	Bowen	0.00	0.00	0.01	0.04	0.01	0.04	0.44	0.02
	Browse	2.16	13.59	169.97	1069.05	52.52	330.33	951.04	33.59
	Canning	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.01
	Carnarvon	48.00	301.90	87.29	549.01	25.36	159.52	2148.94	75.89
	Cooper	0.45	2.81	0.12	0.75	0.33	2.04	3.58	0.13
	Eromanga	0.82	5.13	0.00	0.00	0.00	0.00	0.00	0.00
	Gippsland	12.73	80.09	5.63	35.39	0.48	3.00	76.87	2.71
	Otway	0.00	0.00	0.98	6.17	0.00	0.00	13.07	0.46
Perth	0.05	0.30	0.00	0.00	0.00	0.00	22.50	0.79	
Surat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Total		87.40	549.68	325.20	2045.33	115.40	725.77	3821.22	134.95
Previous		103.66	651.99	321.60	2022.77	146.53	921.66	3856.94	136.21
Category 1+2	Grand Total	227.55	1431.23	437.23	2750.06	234.47	1474.80	4649.10	164.18
	Previous Total	242.78	1527.04	437.56	2752.16	268.99	1691.89	4678.29	165.21
Notes									
Category 1 comprises current reserves of those fields which have been declared commercial. It includes both proved and probable reserves.									
Category 2 comprises estimates of recoverable reserves which have not yet been declared commercially viable; they may be geologically proved or are awaiting further appraisal.									
Cat1 (Proved and probable crude and condensate) 881.55+704.53 = 1,586.08									
Cat2 (Reserves not commercially viable yet) 549.68+2045.33 = 2,595.01									
Cat 1+2 4,181.09									

<http://www.ga.gov.au/resources/spreadsheet/ogra-2008-all.xls>

Cat1 (proved and probable) crude reserves are 881 million barrels crude oil and 704 million barrels condensate. Far from 4.2 Gb in the BP Review which should actually report only proved reserves. One arrives at 4.2 Gb only by adding Cat 1 and Cat 2 crude and condensate which is not commercially viable yet.

Using the hydrocarbon resource classification in the IEA WEO 2008, page 199, and entering the OGRA figures. 1.6 Gb are proved and probable (Cat 1), the 4.2 Gb include possible and sub-commercial categories.

Figure 9.1 • Hydrocarbon resource classification



Source: SPE/WPC/AAPG (2007).

<http://www.iea.org/weo/2008.asp>

Reserves booked in the BP Statistical Review should actually be only proved reserves 1P, so less than 1.6 Gb (which is 2P).

This means that Australian proved reserves as claimed in the BP Statistical Review are too high by a factor of at least 262% (4.2/1.6). That is a scandal of the 1st order.

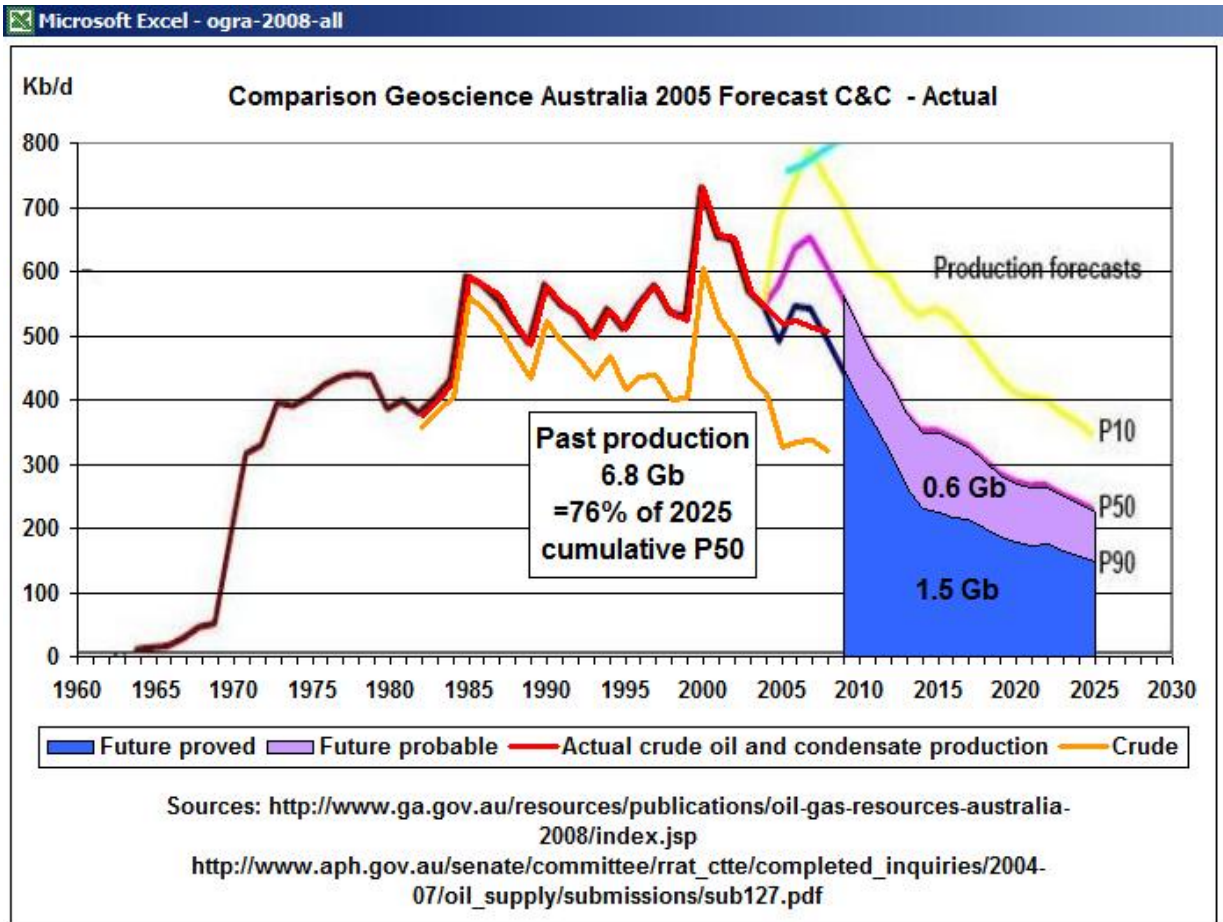
Why is this so important?

In a recent seminar on energy at Engineers Australia, participants quoted BP data, using them for their planning, but not knowing that these data are misleading by including sub-commercial resources.

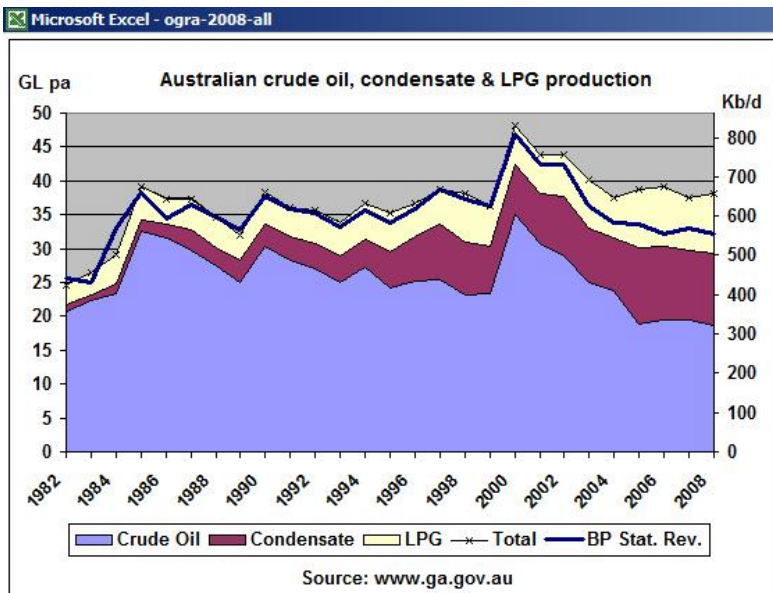
This issue has also become very relevant as the financial crisis is shifting the boundary between commercial and sub-commercial towards the lower, not the higher side of reserves. It was previously assumed that higher oil prices mean that resources can be proved up but there are really limits to this as the high oil prices in 2008 have shown that the economy gets to its knees BEFORE resources can become commercially viable at those prices..

Australian oil production

The OGRA 2008 report also contains production data for the last 3 years which can be compared with the GA forecast in 2006. In the following graph the red curve is this actual production superimposed on Figure 6 from the above mentioned submission 127:



- (1) Actual production seems to follow the P90 curve (90% probability).
- (2) A 2nd peak from a P10 scenario did not materialize and it is clear that therefore Australian oil production peaked in the year 2000 at 732 Kb/d
- (3) The volume of producible P90 crude and condensate until 2025 is around 1.5 Gb, followed by a tail end production. A P50 production would yield 0.6 Gb more.
- (4) Past production is 76% (82%) of cumulative P50 (P90) production until 2025
- (5) The crude oil share is declining. In 2008 it was just 63% (320 Kb/d of 507 Kb/d)



<< crude, condensate and LPG production. The condensate is increasing.

The blue curve is the oil production as reported in the BP Statistical Review. It is also inconsistent with OGRA data by including LPG (natural gas liquids)

Australian Oil Production ctd.

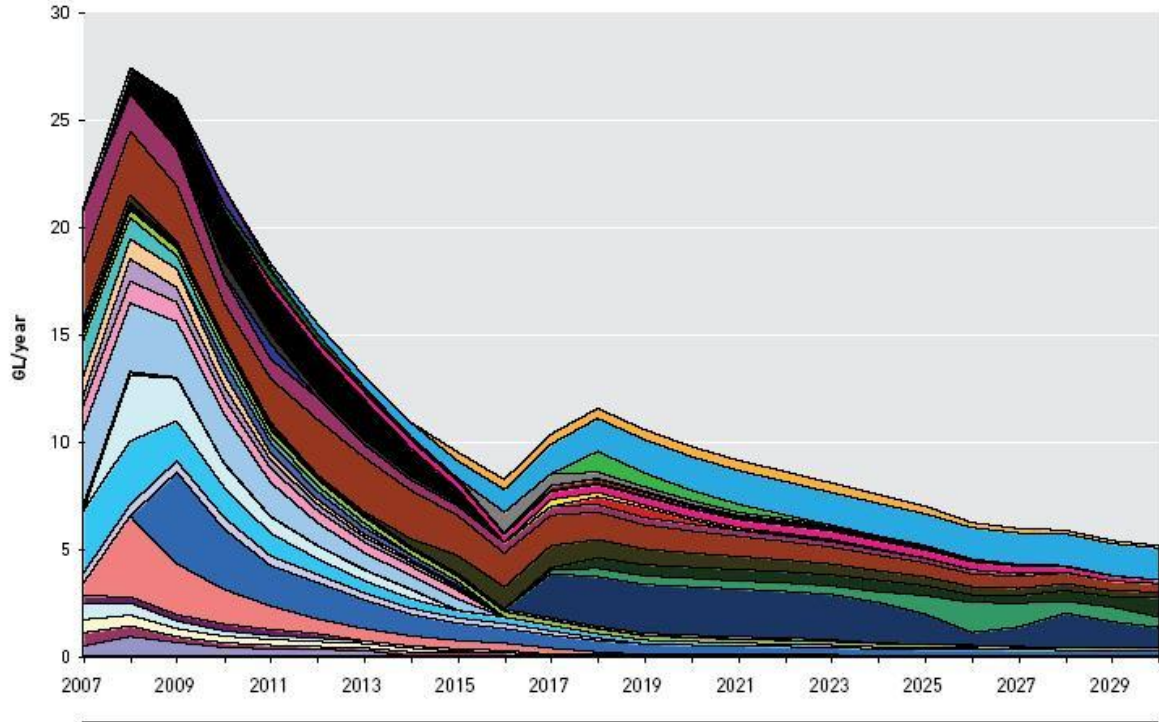
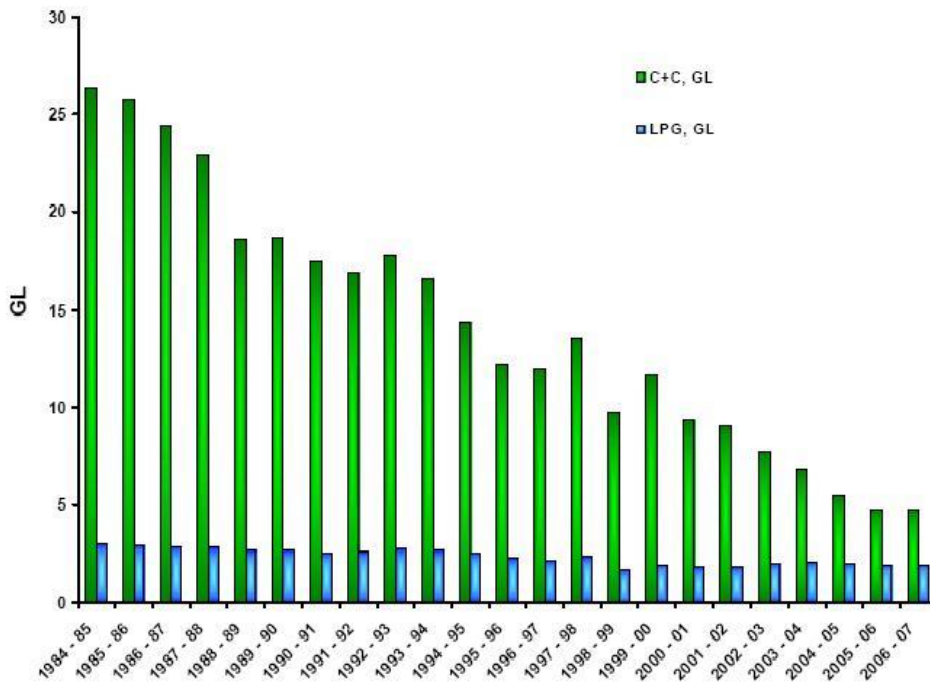


Figure 3 | CRUDE OIL AND CONDENSATE PRODUCTION FORECAST FOR WESTERN AUSTRALIA, SHOWING THE SLOWER DECLINE FOR CONDENSATE COMPARED TO OIL.

http://www.dmp.wa.gov.au/documents/PWA_September_2008.pdf

WA oil production profile from the WA department of mining and petroleum. A steep decline will occur in the next years.

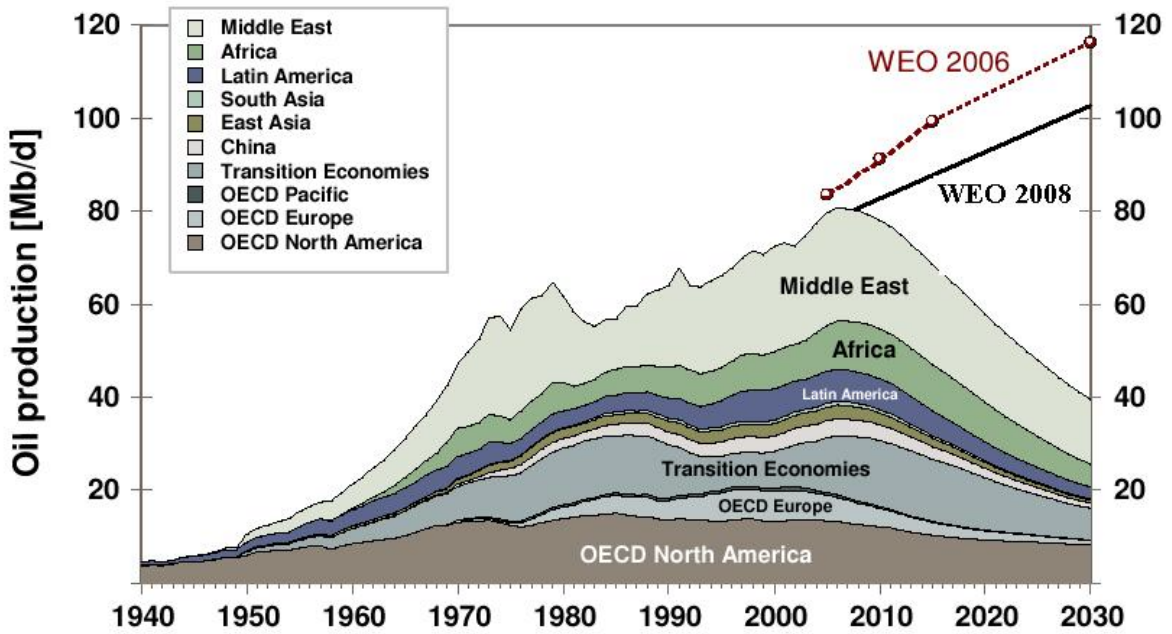
Graph 2.5 Gippsland Basin Historical Petroleum Production (excl. gas): 1984/85 – 2006/07



www.dpi.vic.gov.au

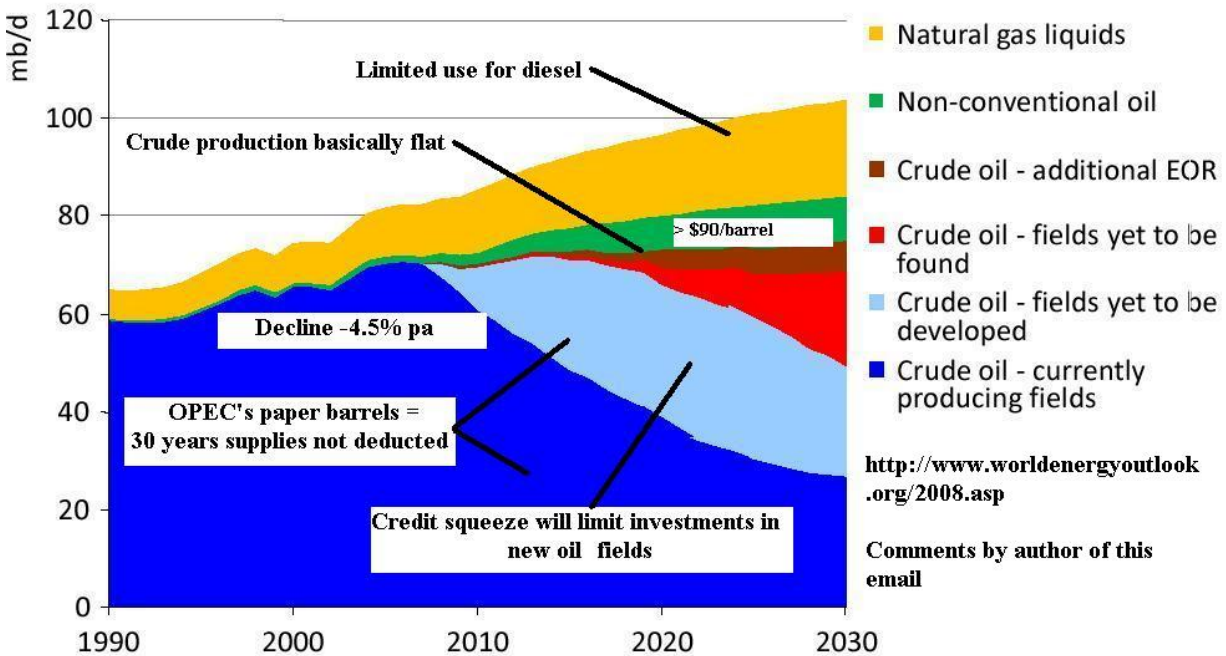
Gippsland is in long term decline. The Turrum oil field will come on-stream by 2011. But where will this oil go? Will it disappear in the bottomless pit of the global oil markets?

Figure 40: Oil production world summary



http://www.energywatchgroup.org/fileadmin/global/pdf/2008-02_EWG_Oil_Report_updated.pdf

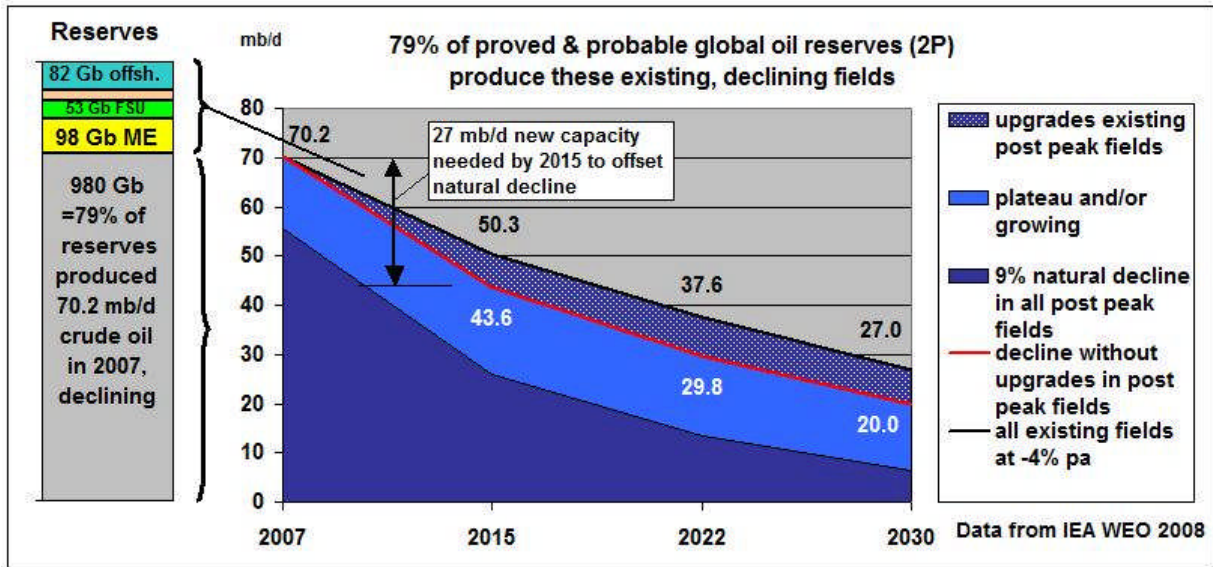
Why is there such a huge gap between the Energy Watch Group and the IEA? This is the EIA WEO 2008 in detail:



<http://www.worldenergyoutlook.org/2008.asp>

Comments by author of this email

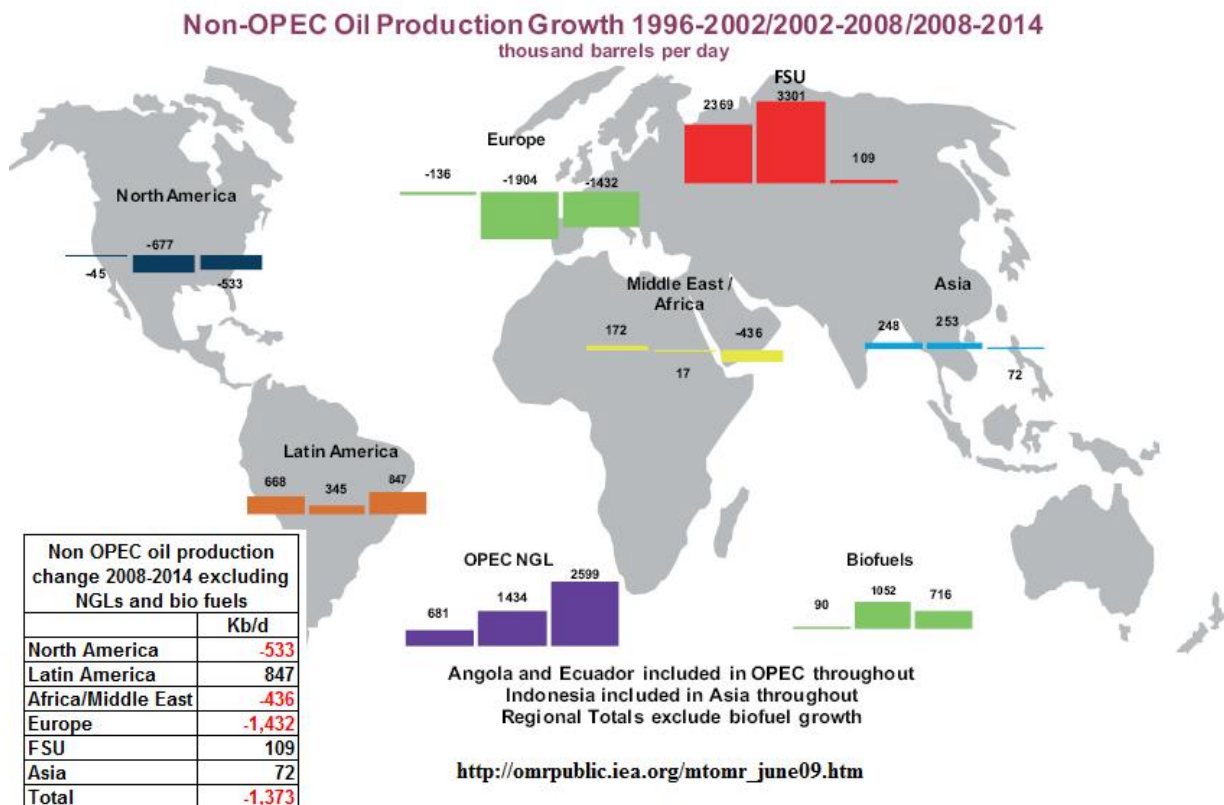
What does the above graph tell us? Crude oil production, the most important part, will stay practically flat, even under all the optimistic assumptions the IEA is usually making. Growth would only come from natural gas liquids. But these are not as versatile as crude. You can run fork lifts with Propane but you can't fly planes with these liquids.



Disassembly of the WEO 2008: the reserve debate is over. 79% of P2 reserves (whatever the true figure is) are already exploited in existing fields which are declining at the above rates. In order to offset natural decline in these fields 27 mb/d of new capacity have to come on-stream until 2015 alone. And what about the remaining reserves for those new oil fields?

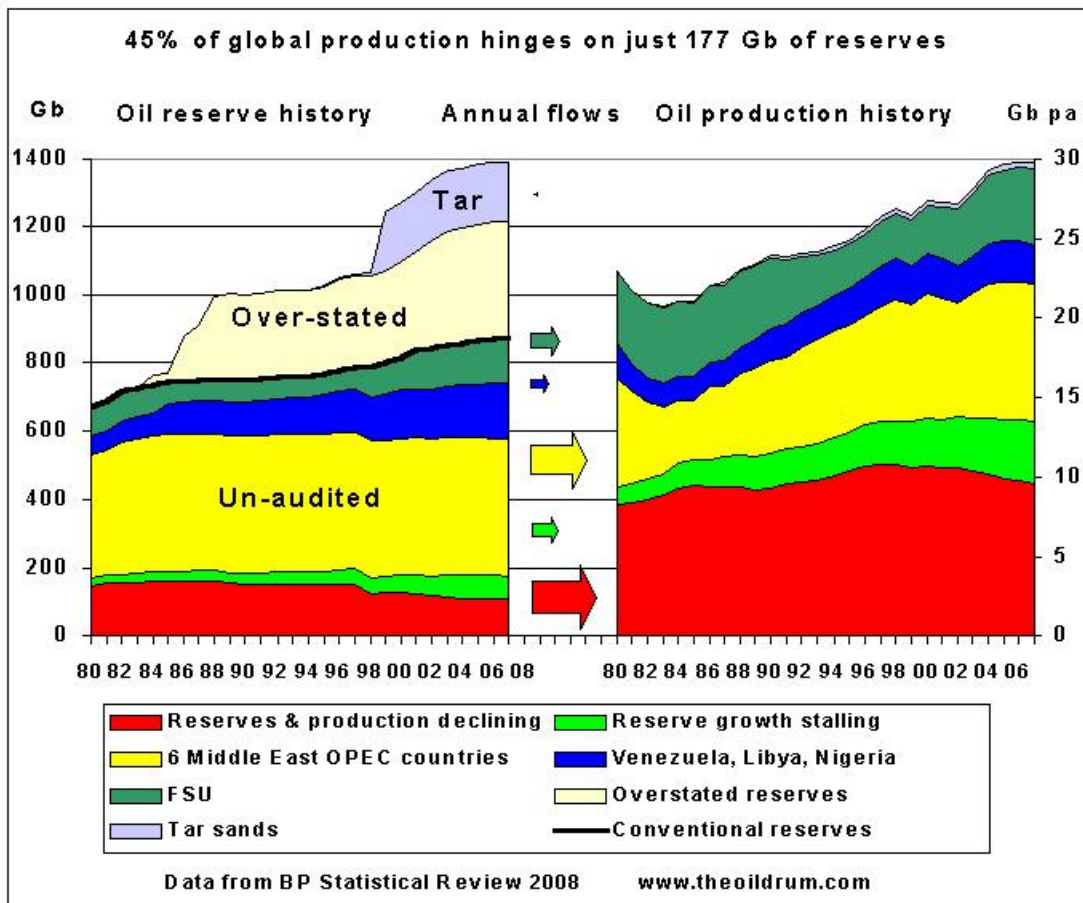
- (1) 98 Gb are in the Middle East (not audited according to SEC rules <http://www.sec.gov/interps/account/sabcodet12.htm>)
- (2) 82 Gb offshore – not easy or cheap oil,
- (3) 53 Gb from the Former Soviet Union, outside OECD control.

In the latest Medium Term Oil Market Report http://omrpublic.iea.org/mtomr_june09.htm Non-OPEC oil production will decline by 1.3 mb/d

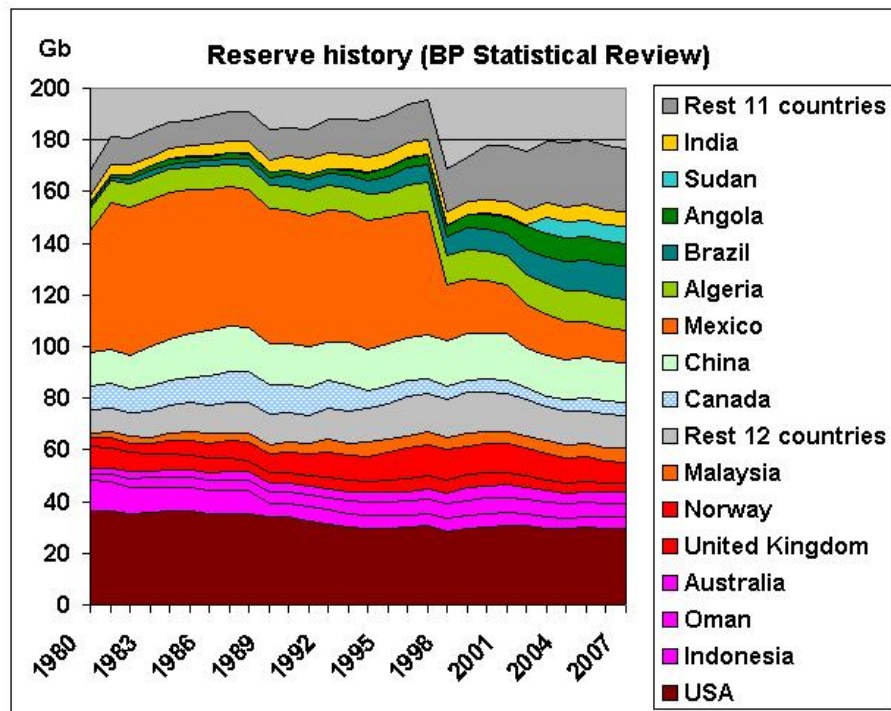


It took the sub prime mortgage crisis, the collapse of Lehman Brothers and a deep recession to save around 2 mb/d of crude oil. That tells us what the future decline means

The Disconnect Between Oil Reserves and Production



<http://www.theoil drum.com/node/3664> The original report for this article is here:
http://sydneypeakoil.com/matt/Worlds_Fragile_Oil_Flows_From_Declining_Reserve_Base.pdf



Declining reserves for 1/3 of global oil production. Note the sudden re-assessment of Mexico's reserves. We can expect similar cases of downgrading when oil shortages make it evident that reserves have been overstated.

Overstated Oil Reserves

“Reserves” are inflated with >300 B bbls of “resources”

	Depleted	Statistical reliability	Production Outlook	Technical basis
Actual Reserves : 0.9 Trillion	Proven > 90%	Proven oil In Place – high confidence Developed – clear recovery factor Undeveloped – good. recov. est.	Growth thru actual reservoir mgmt. & performance	Improved Oil recovery thru existing technology
	Probable > 50%	Probable oil in place – confident Developed - prelim. recovery factor Undeveloped – est. fair recovery	Growth thru delineation, testing & development	Clear opportunity with existing technology
Contingent Resources: 1.1 Trillion	Potential > 5%	Potential oil in place – low confiden. Drilled – v. low recovery factor Undrilled – recovery likely poor	Growth thru pricing, delineation or IOR/EOR technology	Indicative data & potential opportunity
	Resource: Uneconomic volume & commerciality	Likely presence but undelineated Oil or GIP	Profitability or Technology currently inadequate	Available access but lacks good reservoir and fluids data
Prospective & Speculative Resources: 2.0 Trillion	Oil, Gas, Shales, EHC & to be discovered resources (speculative outlook)	Technically present but physically inaccessible hydrocarbons	Future resolution thru exploration & relevant technology	General geological, seismic and/or physical indications
		Conceptually Possible Hydrocarbons, incl. EHCs		

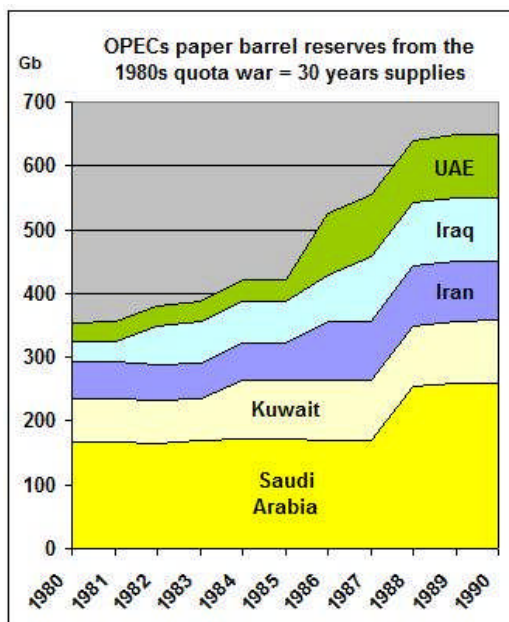
<http://www.energyintel.com/om/speakersNew.asp?Year=2007&filename=SadadIbrahimAlHusseini.pdf>

1	2	3	4	5	6	7	8	9
OPEC	Cum Prod End 2003	% Depleted	Indicated Total	Remaining Reserves Gb				BP Estimates Interpreted
				PFC	ASPO	Salameh	BP	
Iraq	28	22%	127	99	62	62	115	Total Discovered
UAE	19	31%	61	42	49	37	98	Total Discovered
Kuwait	32	35%	91	59	60	71	97	Total Discovered
Libya	23	39%	59	36	29	26	36	
Saudi	97	42%	231	134	144	182	263	Total Discovered
Algeria	13	50%	26	13	14	11	11	
Nigeria	23	50%	46	23	25	20	34	? High Estimate
Iran	56	51%	110	54	60	64	131	Total Discovered
Venezuela	47	58%	81	34	35	31	78	Total Discovered
Qatar	6.8	62%	11	4.2	4.1	4.6	15	Total Discovered
Indonesia	20	75%	27	6.7	9.4	12	4.4	
TOTAL	365		870	506	492	520	882	

Iran's reserves less than half

OPEC'S reserves overstated by 80 %

http://www.energiekrise.de/e/aspo_news/aspo/newsletter046.pdf

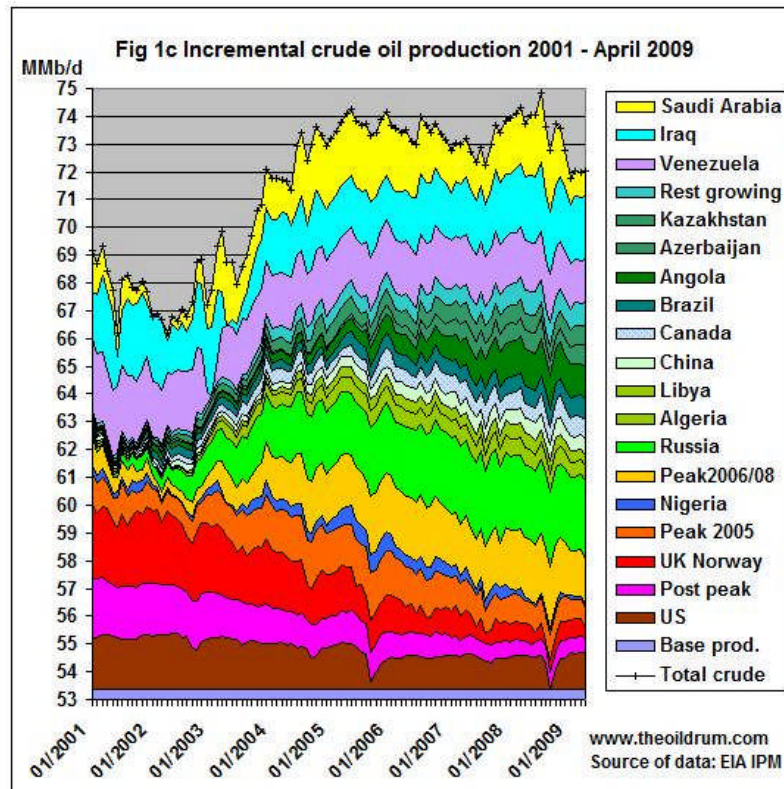


Well known, but still ignored: OPEC’s so-called paper barrels from the quota wars in the 1980s when OPEC countries artificially increased their reserves without new discoveries.

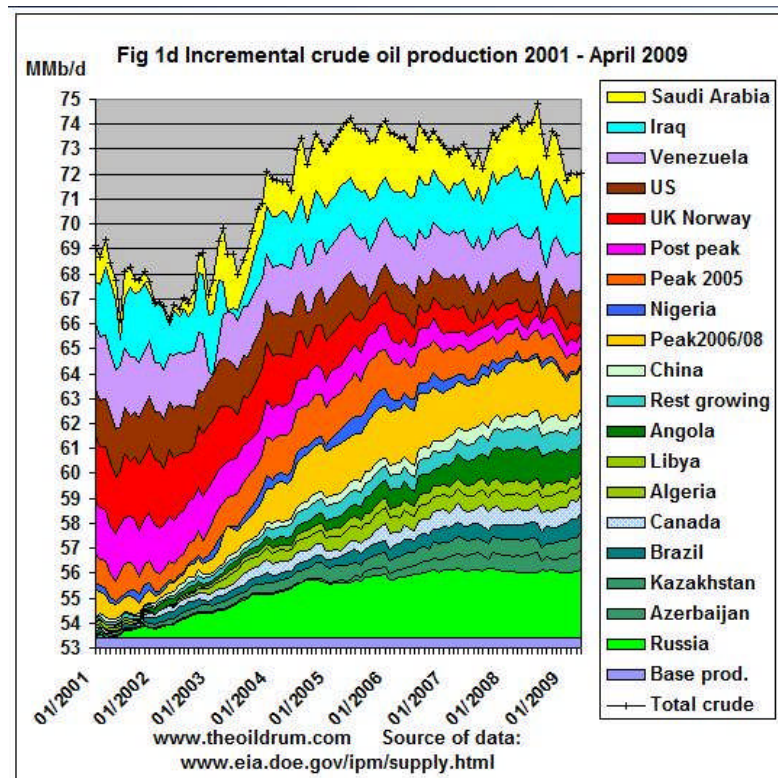
While some of these increases might be justified by arguing that they represent reserve growth from enhanced oil recovery, this problem will soon explode, when it becomes obvious that despite huge reserves, oil production declines. The social unrest which may follow such revelation is incalculable and will change the geo political situation in the Middle East dramatically.

The 1st earthquakes of this event we see now in Iran.

Monitoring the global crude oil peak (2005-2008) – EIA data from July 2009



We clearly see the declining wedge (red) compensated by growing countries.....



.....which are now also peaking (Russia is peaking for several years now). Saudi Arabia could not lift production 2006-2007 in a critical moment of the world's economy which tried to grow sky-high. Methodology of graphs explained here: <http://www.theoil drum.com/node/3793>

Matthew Simmons warned 2005: "The coming Saudi oil shock and the world economy"
<http://www.twilightinthedesert.com/> It has happened. Stubbornly ignored by governments.\

China



Fuel shortages in 2005: stuck in the 1st phase of peak oil. In order to avoid a similar situation during the Olympic games China imported an extra 800 Kb/d in June/July 2008. That caused the extra high oil price of \$147. These were the most expensive games the world ever had.

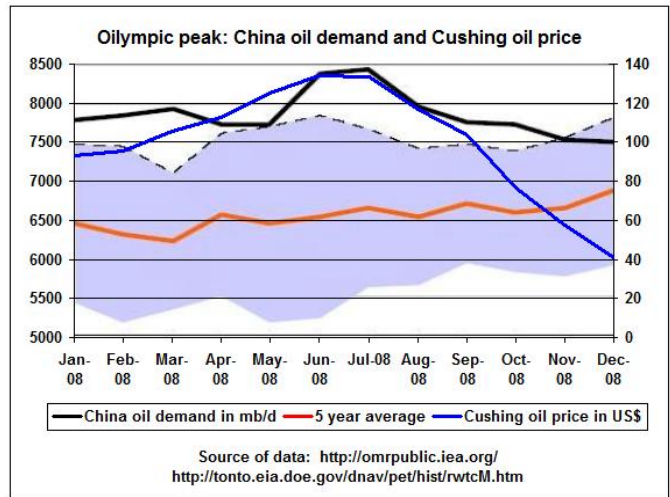
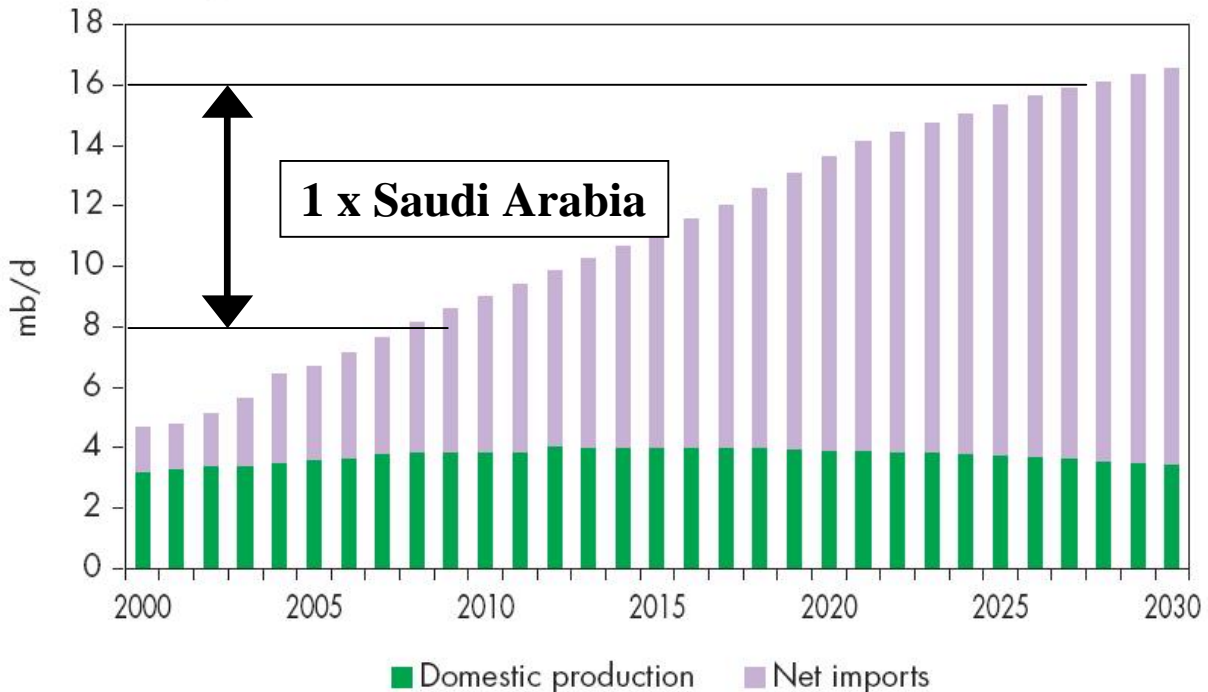


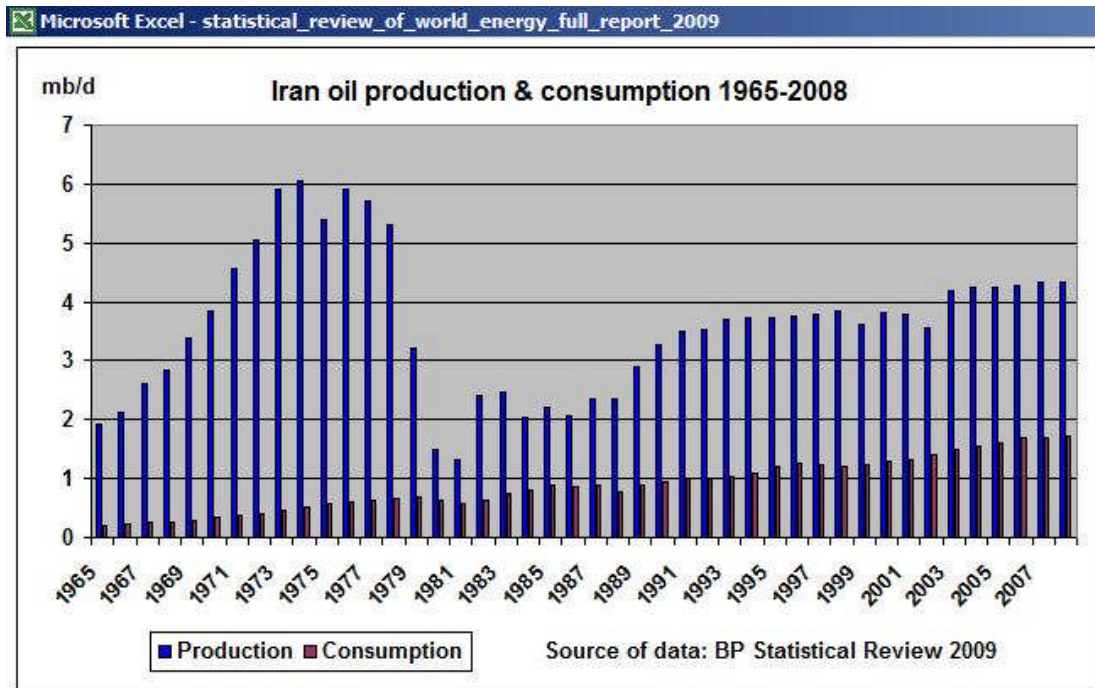
Figure 10.6: China's Oil Balance in the Reference Scenario



http://www.iea.org/textbase/nppdf/free/2007/weo_2007.pdf

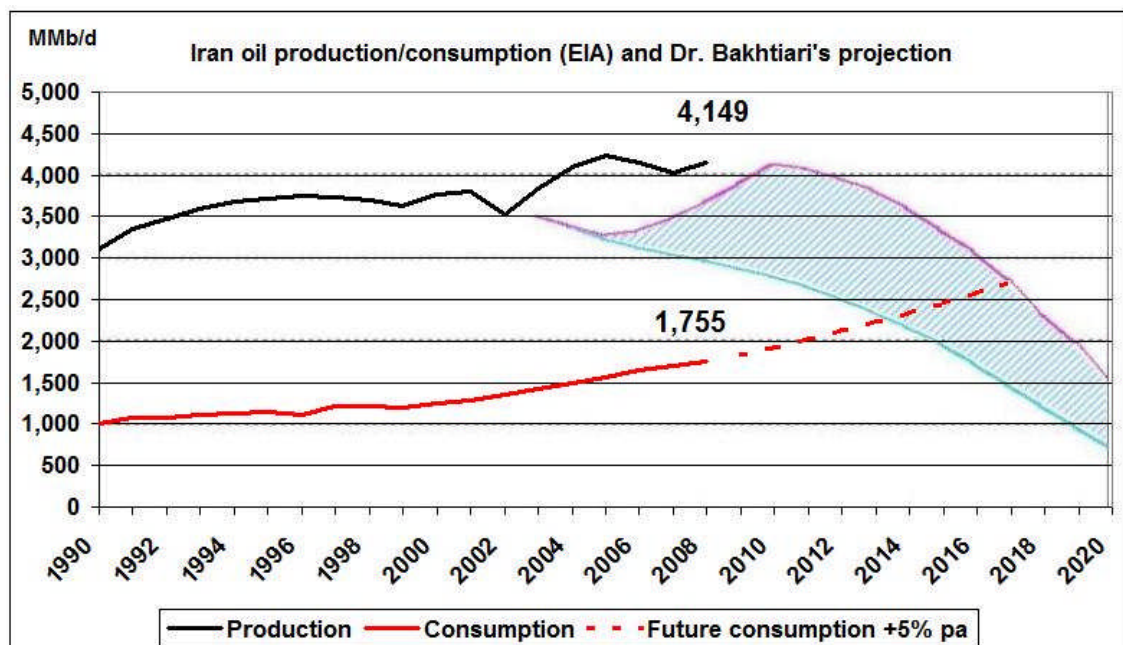
This graph speaks for itself. If the government thinks there will be perpetual growth as a result of an unending mining boom, it should look at oil statistics first.

Iran a key country in the Middle East



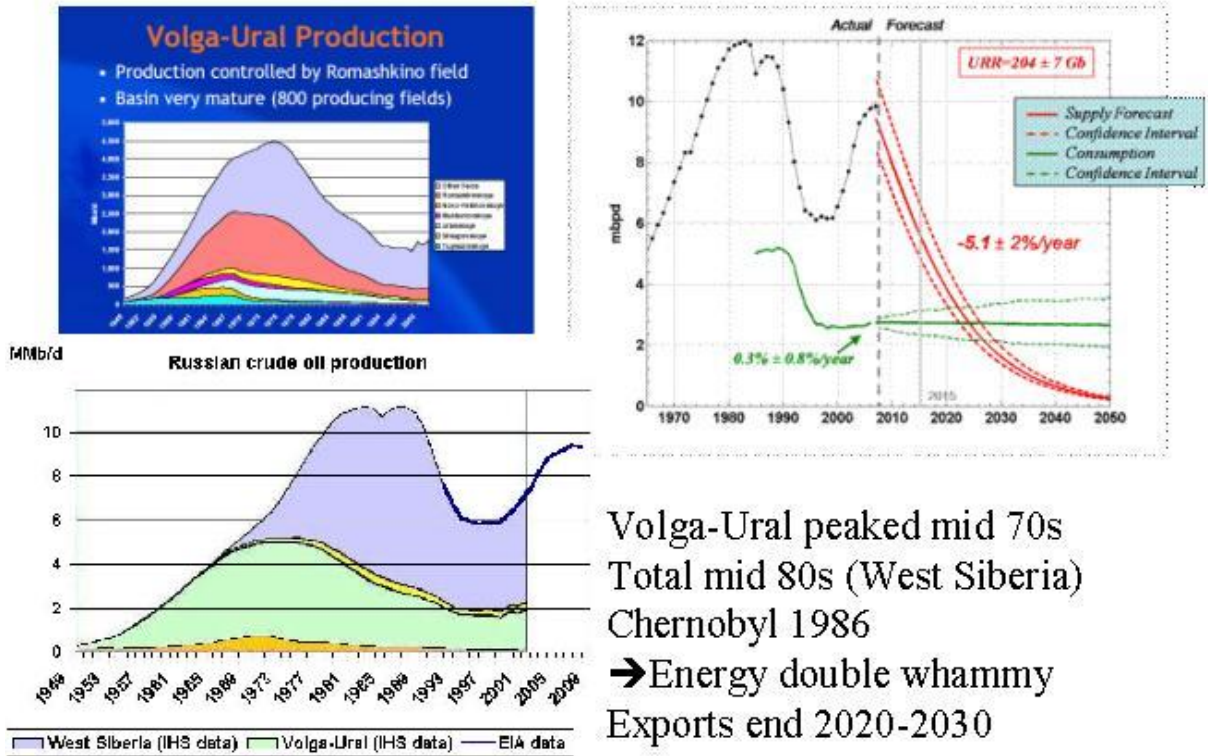
Iranian oil production dropped steeply during the revolution in the late 70s. This can happen again. Petrol rationing was introduced in 2007. IMF report: inflation 24%, unemployment 10%, stagnating oil production: <http://www.imf.org/external/pubs/ft/scr/2008/cr08284.pdf>

Dr. Bakhtiari, who worked in the National Iranian Oil Company, gave a 3 hr long testimony to the Senate Inquiry on oil supplies in July 2006. He spoke prophetically about “new economic rules” which we are now slowly learning as the global financial crisis after peak oil is evolving. <http://www.aph.gov.au/hansard/senate/commtee/S9515.pdf>



".....export extinction in 2014–2015 is preceded by a decline to 33–46% of 2006 exports by 2011. Notice, however, that export declines are substantial, even in the least likely, most optimistic scenario. Because government revenue could be sustained only by rising price in all scenarios, absent such a price rise **political challenges might overwhelm the regime long before exports go to zero.**" <http://www.pnas.org/content/104/1/377.full>

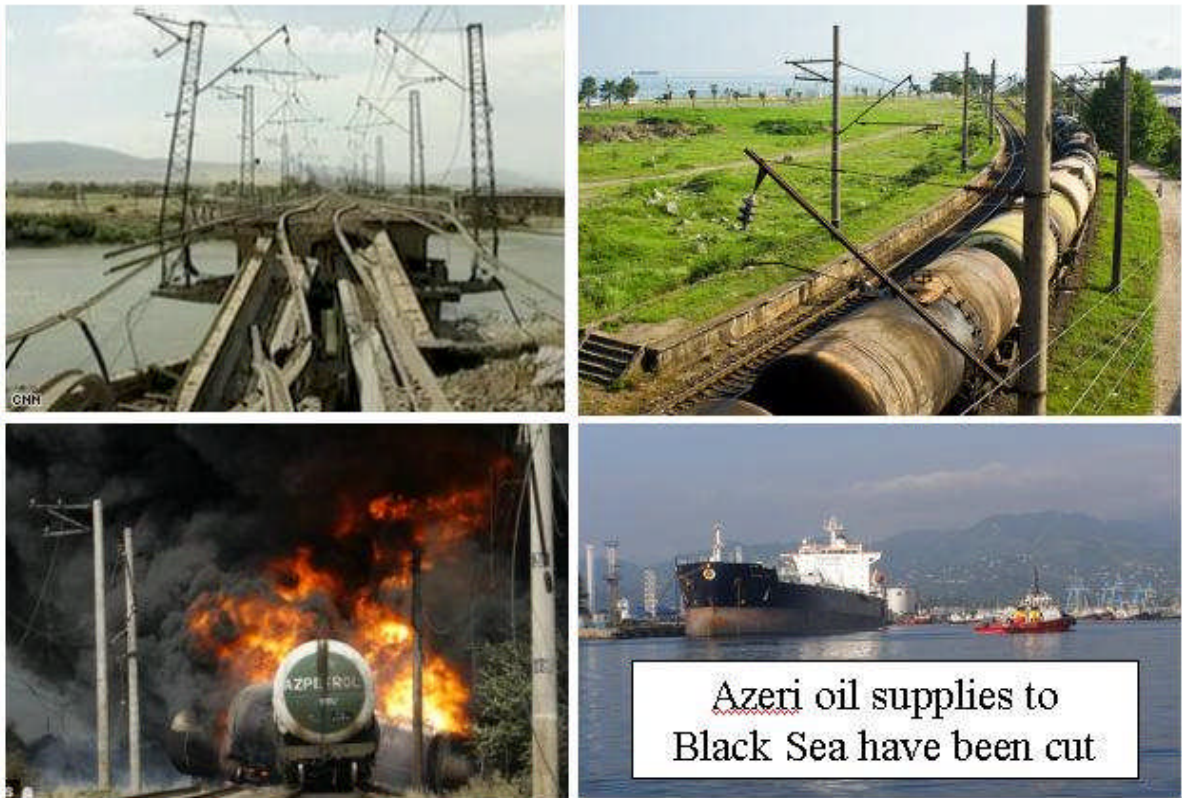
Russian Oil Peak



Russian net export graph from:

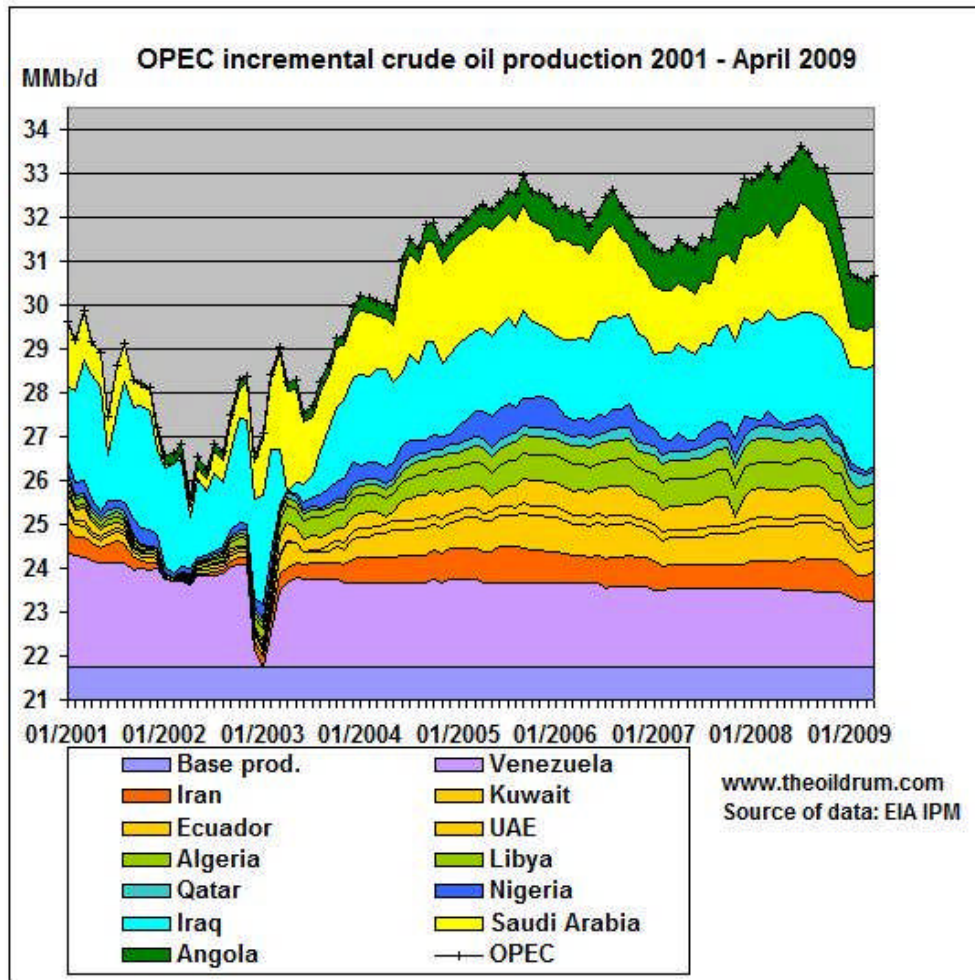
<http://graphoilogy.blogspot.com/2008/01/quantitative-assessment-of-future-net.html>

Oil end game



Events in August 2008. How many warning signs are ignored?

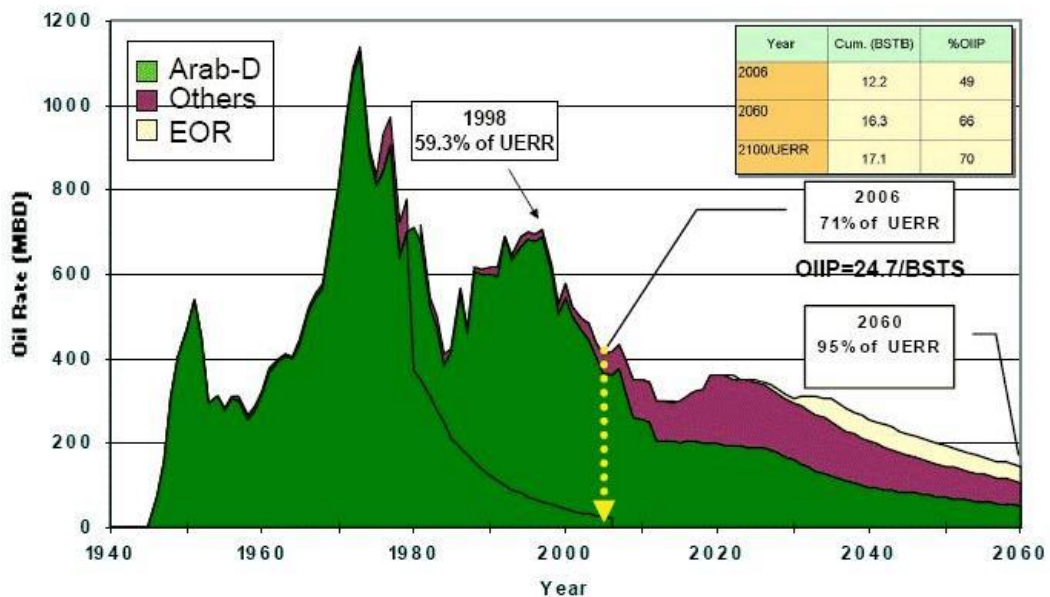
Saudi Arabia



It can be clearly seen that Saudi Arabia could not produce more oil – despite highest oil prices - in 2008 than in 2005. The annual decline in Saudi oil fields is around 8% pa

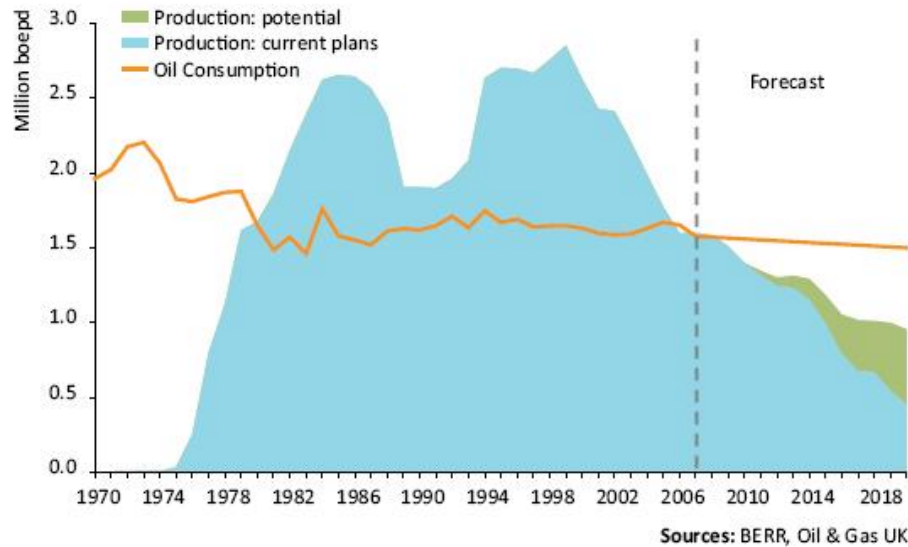
<http://lists.ibiblio.org/pipermail/tcrp-news/2006-April/000019.html>

The workover in Khurais with an alleged new capacity of 1.2 mb/d requires 4.5 mb/d of sea water to flush out the rock and to maintain reservoir pressure. This project may offset natural decline elsewhere by no more than 2 years. A typical example of what happens in Saudi oil fields is Abqaiq:



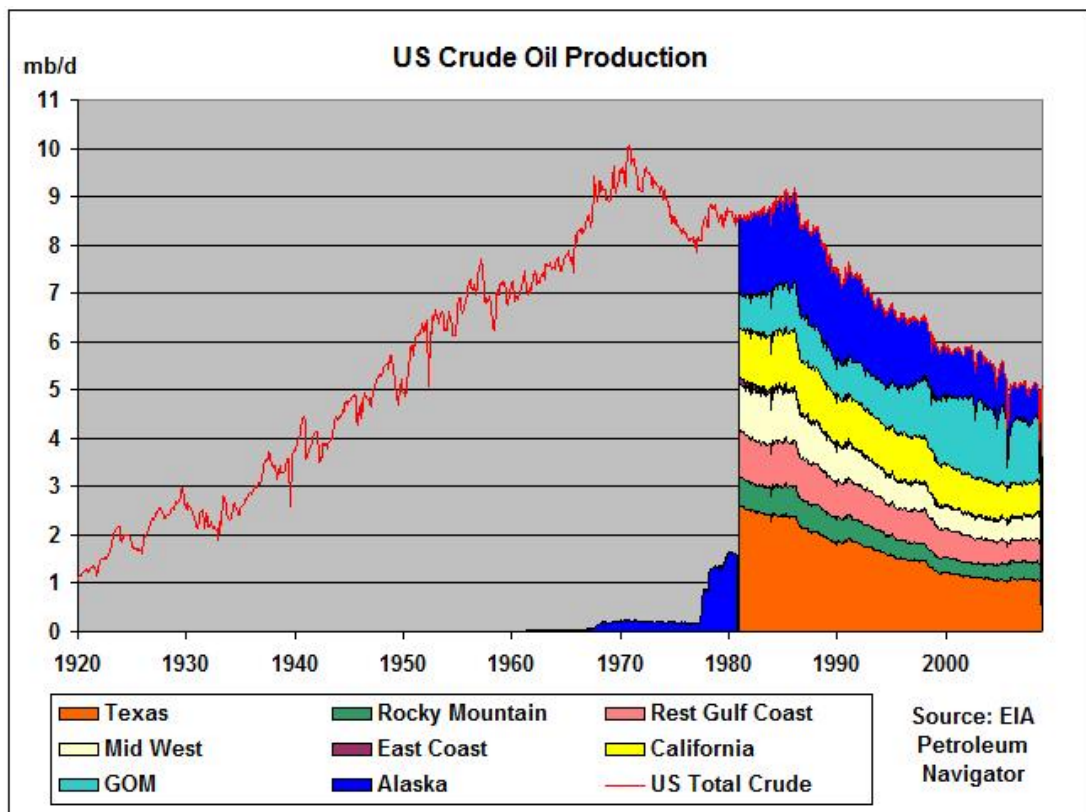
<http://www.cera.com/asp/cda/filedisplay/filedisplay.aspx?PK=29004>

Figure 20: UK Oil Production vs Consumption, 1970-2020



<http://www.oilandgasuk.co.uk/issues/economic/econ08/pdf/report-2008.pdf>

UK is now a net oil importer. The double peak is a result of the Alpha piper platform accident.



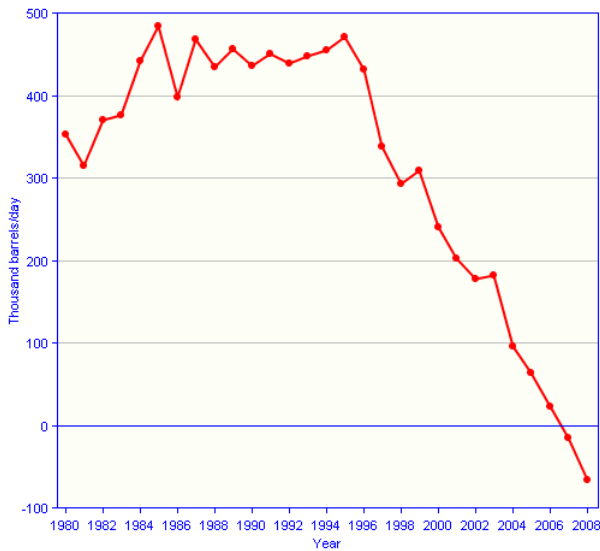
US oil production peaked in 1970, requiring increasing oil imports. One year later, President Nixon had to terminate the convertibility of the US dollar to gold.

http://en.wikipedia.org/wiki/Bretton_Woods_system

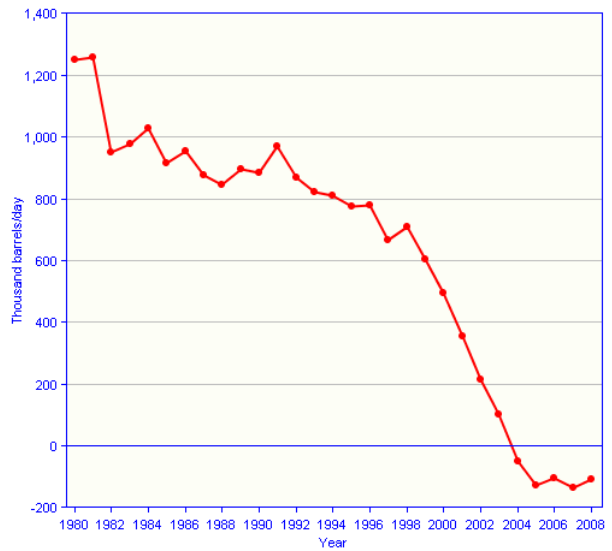
The recycling of an ever increasing amount of petro dollars was one contributing factor for the global financial crisis. This game is no longer sustainable as global oil production is peaking.

Net oil imports (<http://tonto.eia.doe.gov/country/index.cfm>)

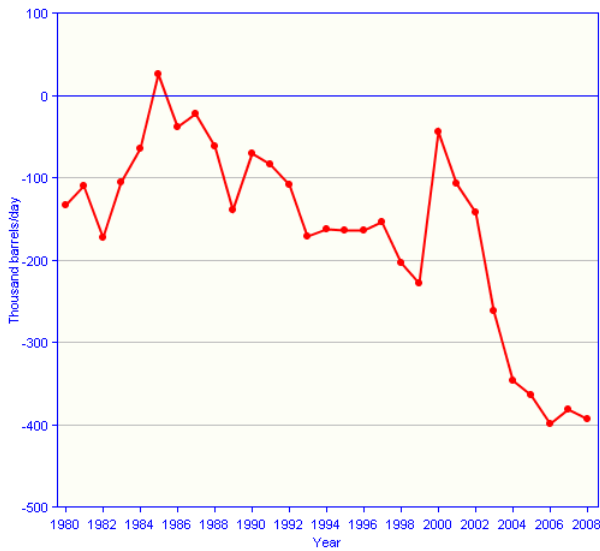
Global oil exports will decline faster than production so net importers will have increasing problems!
 Examples of oil producers who are net oil importers



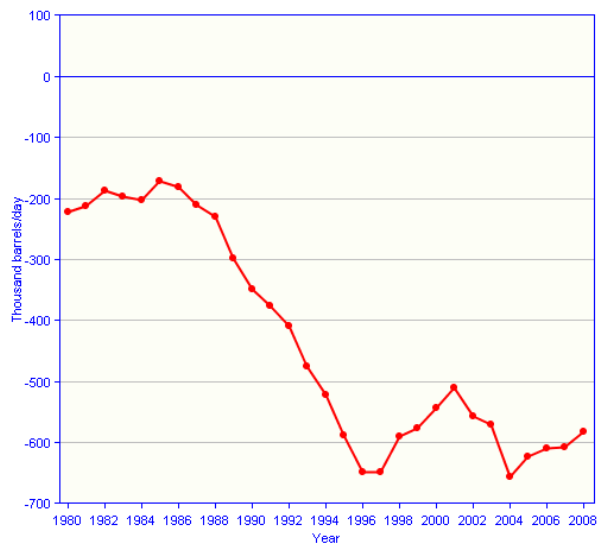
Egypt



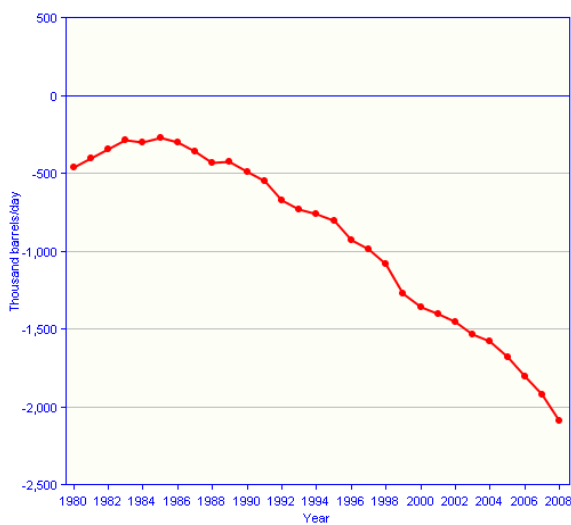
Indonesia



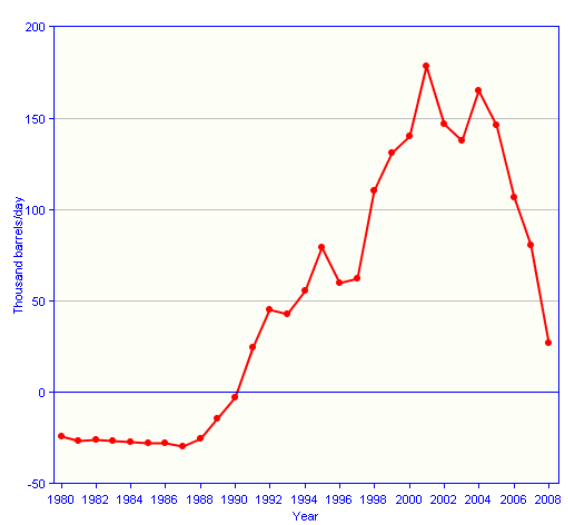
Australia



Thailand

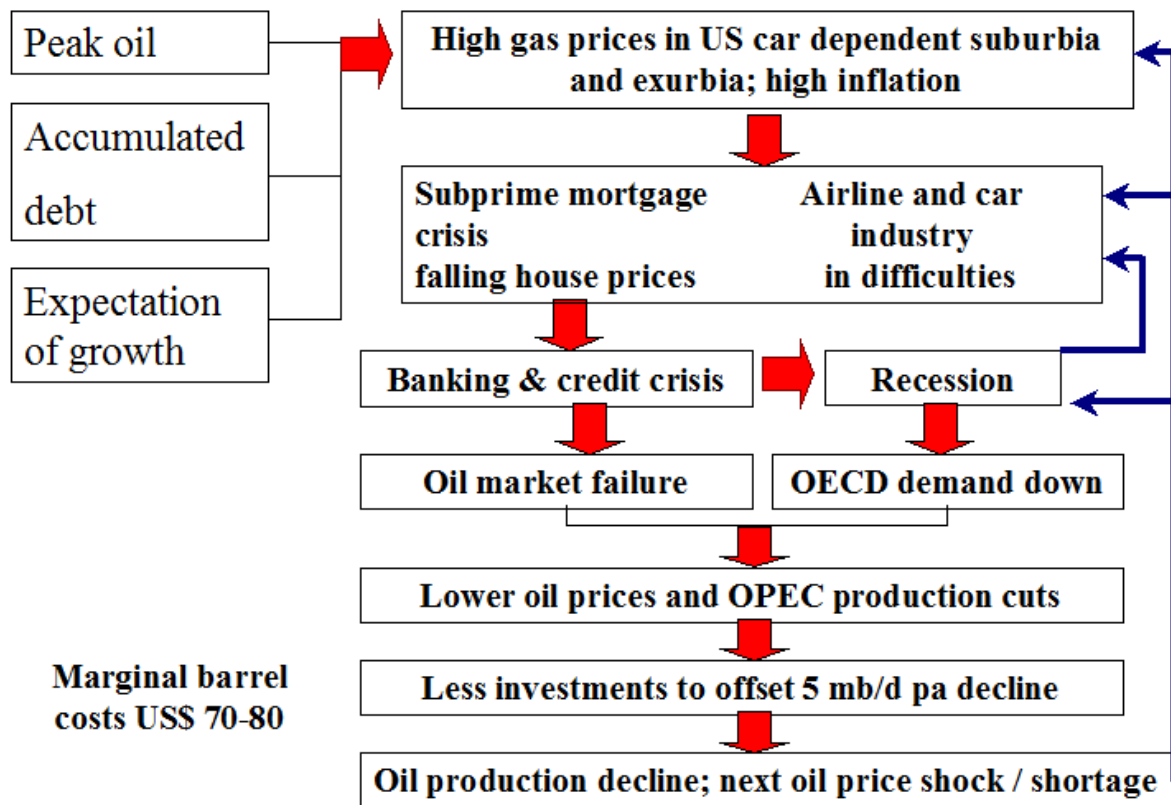


India



next candidate: Vietnam

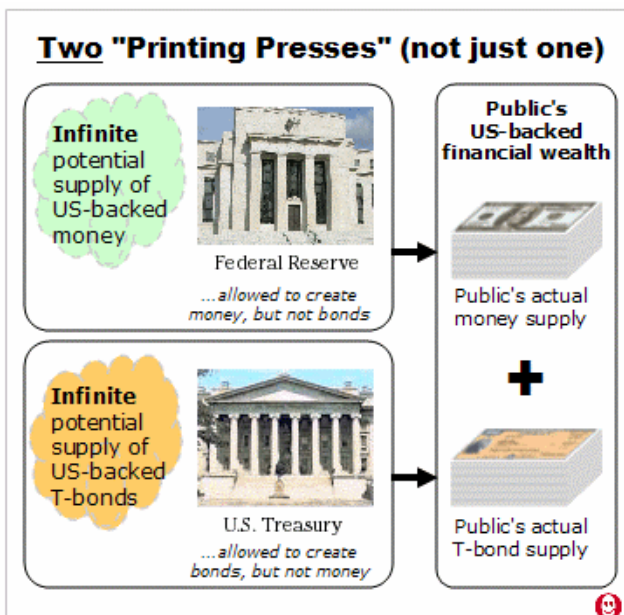
Financial crisis and peak oil



Marginal barrel costs US\$ 70-80

Top: The world economy may have entered a vicious cycle in which financial crisis, recession, declining oil production and new oil price shocks could lead to a downward spiral steeper than dictated by oil geology.

From: http://www.optimist123.com/optimist/2006/06/two_printing_pr.html



Left: Current "solution" of money printing is not sustainable

"China warns Federal Reserve over 'printing money'"

China has warned a top member of the US Federal Reserve that it is increasingly disturbed by the Fed's direct purchase of US Treasury bonds

Richard Fisher, president of the Dallas Federal Reserve Bank, said: "Senior officials of the Chinese government grilled me about whether or not we are going to monetise the actions of our legislature." Mr Fisher, the Fed's leading hawk, was a fierce opponent of the original decision to buy Treasury debt, fearing that it would lead to a blurring of the

line between fiscal and monetary policy – and could all too easily degenerate into Argentine-style financing of uncontrolled spending"

<http://www.telegraph.co.uk/finance/financetopics/financialcrisis/5379285/China-warns-Federal-Reserve-over-printing-money.html>

More financial trouble to come:

Sub prime meltdown over; now comes the bad news (mortgage resetting phases 2 & 3)

<http://www.economicpopulist.org/?q=content/subprime-meltdown-over-now-comes-bad-news>

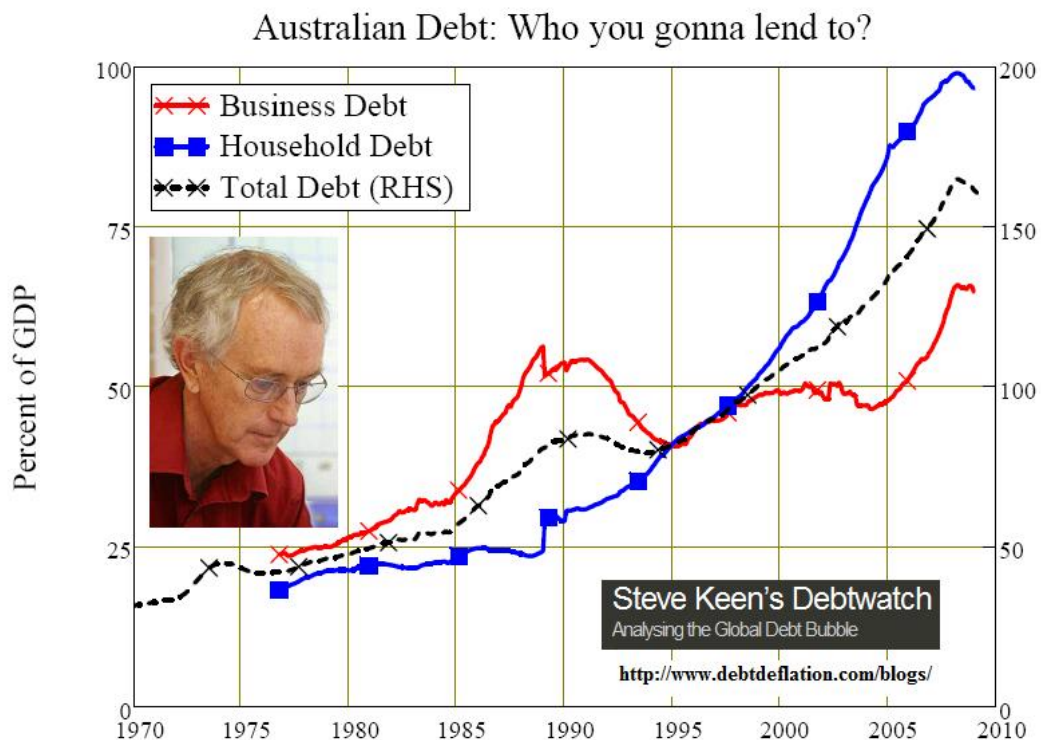
Saudi Saad Group's ratings withdrawn

<http://www.pr-inside.com/saudi-saad-group-s-ratings-withdrawn-r1294173.htm>

June 26 (Bloomberg) -- Ahmad Hamad Algozaibi & Brothers Co., the Saudi family holding company whose Bahraini bank has defaulted, owes 34.6 billion Saudi riyals (\$9.2 billion) to more than 100 banks, two people familiar with the situation said

<http://www.bloomberg.com/apps/news?pid=newsarchive&sid=a0KwkB25WLRM>

Prof. Steve Keen's debtwatch site: <http://www.debtdeflation.com/blogs/>



COUNCILS are planning to lay off staff and ditch roadworks after the State Government rejected 10 requests for a special rate increase. (July 2009)

<http://www.smh.com.au/national/jobs-roads-lights-and-pools-face-the-chop-20090707-dbw2.html>

Another good site to read regularly is:

<http://www.financialsense.com/>

Brink of Debt Disaster (Jan 2009)

www.financialsense.com/Market/shedlock/2009/0122.html

Richard Loomis and Jim Puplava discuss energy >>>

The debt problem is NOT solved. It has just been moved into government hands.

Causes and Consequences of the Oil Shock of 2007-2008 (James Hamilton)

http://dss.ucsd.edu/~jhamilto/Hamilton_oil_shock_08.pdf

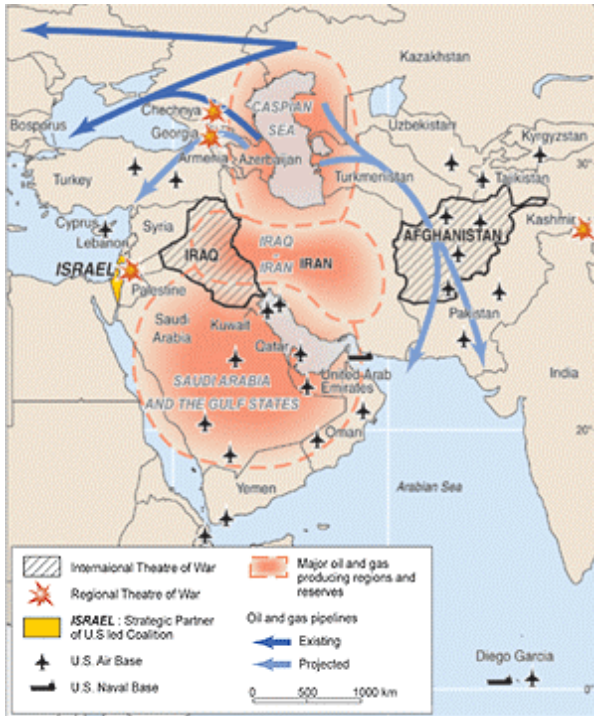
Financial Sense Multimedia

Reality Check

July 7, 2009



Geopolitics



The Middle East is a tinder box. Unfortunately, peak oil and declining oil production will not evolve peacefully. It is only a matter of time until something happens there in which case there will be physical shortages in Australia within 2 weeks as there is no Strategic Oil Reserve.

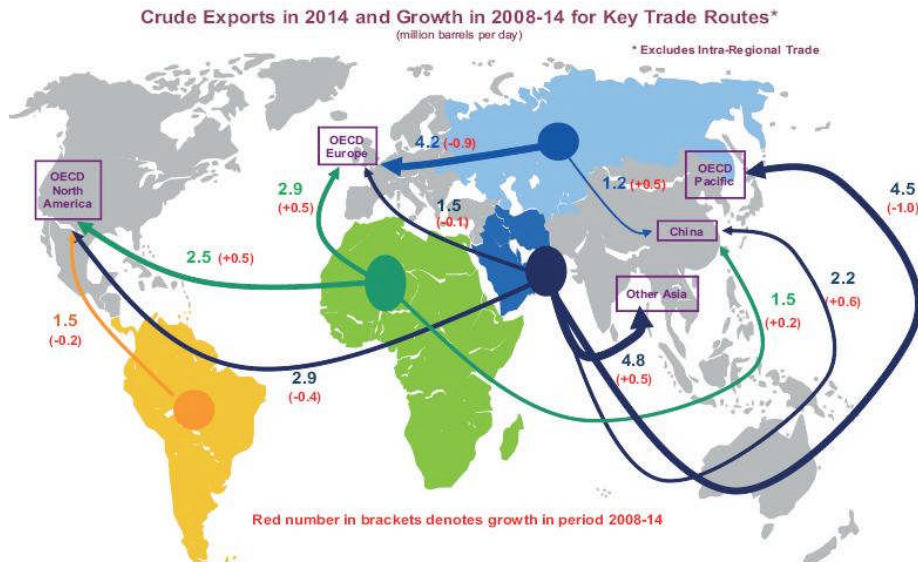
Left: map of war games

Down: World Oil Transit Chokepoint Straits of Hormuz. Another bottleneck is the Straits of Malacca, on the way to Singapore, where Australia gets a lot of refined petroleum products from.

The map of the world's oil flows is from the IEA Medium Term Oil market Report 2009



[http://www.eia.doe.gov/cabs/World Oil Transit Chokepoints/Full.html](http://www.eia.doe.gov/cabs/World%20Oil%20Transit%20Chokepoints/Full.html)



The end of our car culture

Let's have a look what the oil decline means for Australian motorists, assuming optimistically that the difference between local decline and global decline can be filled by imports:

Sector	2005-06	PJ
Transport subtotal	1,302	
Road transport subtotal	1,019	
Passenger vehicles subtotal	639	
Personal	339	
Commuting	163	
Business	137	
Motor cycles	3	
Light commercials subtotal	158	
Personal	31	
Commuting	25	
Business	102	
Rigid trucks	81	
Articulated trucks	117	
Non-freight trucks	2	
Buses	19	
Railway transport	27	
Water transport	54	
Air transport	202	
Industry	244	
Mining	147	
Agriculture	86	
Lubes, bitumen, solvents	63	
Commerce & services	25	
Residential, mainly LPG	12	
Totals	1,879	

By 2020, assume there will be 30% less = 564 PJ. All essential uses in business, commerce, agriculture, mining etc. should be maintained. Efficiency improvements business, trucks, air, industry, mining 20-25% 220

Rest to be saved by personal and commuting use 564 – 220 = 344

Passenger Vehicles 2006	532
Efficiency gains 10%	53
Enforced saving	344
Remaining	135

Reduction to 135/532 = **25% of current levels** for all passenger vehicle use personal and commuting, city and rural

Sources: ABARE 2008 Road transport vehicle type allocations of fuel usage from DEWHA 2006 Passenger and Light commercial fuel usage allocations from ABS 2007; Modelling by Anawhata Associates
<http://anz.theoil Drum.com/node/3867>

- (1) Peak oil (2005-2008) would have required starting a transition to new fuels and/or technologies 10-20 years ago (Hirsch report).
- (2) Denial mode: government departments think peak oil can be endlessly debated. That's why no action is taken until oil shortages arrive at filling stations
- (3) The oil decline is too steep for car factories to adapt
- (4) The decline after peak oil is accompanied by too many discontinuities in the next 10 years
- (5) Simultaneously, weird weather caused by global warming will force us to abandon coal much earlier than naively assumed =>> huge primary energy crisis. So we won't have electric cars in large numbers
- (6) Permanent credit crisis = car finance will remain a continuing headache as resource depletion will limit economic activity and hence the repaying capacity for loans.
- (7) All Australian sugarcane converted to ethanol will yield around 5 litres per week per car
- (8) The laws of thermodynamics (loss of usable energy when transforming energy) will not allow to introduce fuels like liquid hydrogen
- (9) Compressed natural gas is a solution but is not being pursued speedily enough. Priority will have to go to buses, emergency & service vehicles and trucks transporting food to the cities
- (10) LPG is not a long lasting solution. Half of the LPG comes from refineries (with declining output) and half from wet natural gas. On the East coast, LPG IS IMPORTED, on the West coast LPG is exported, but that is mainly butane, not propane
- (11) The number of licensed gas mechanics (3 year training) will be a limiting factor
- (12) Tar sands and oil shales need a huge energy input up-front and have therefore very low energy profit ratios. Hydrogen (from natural gas) is needed to form liquid hydro carbon chains suitable for pipeline transport. The marginal full cycle cost is \$90/barrel, which is close to the point where our economy goes to its knees. High oil prices will kill the economy BEFORE these alternative fuels come on-stream.
- (13) Un-employment will mean less cars are bought

Limitations to alternative fuels due to urgent need to reduce CO2 emissions

We cannot afford, in large quantities, alternative fuels like syncrude from tar sands and oil shale, coal to liquids etc. Moreover, these fuels have a low energy profit ratio and will be very expensive.

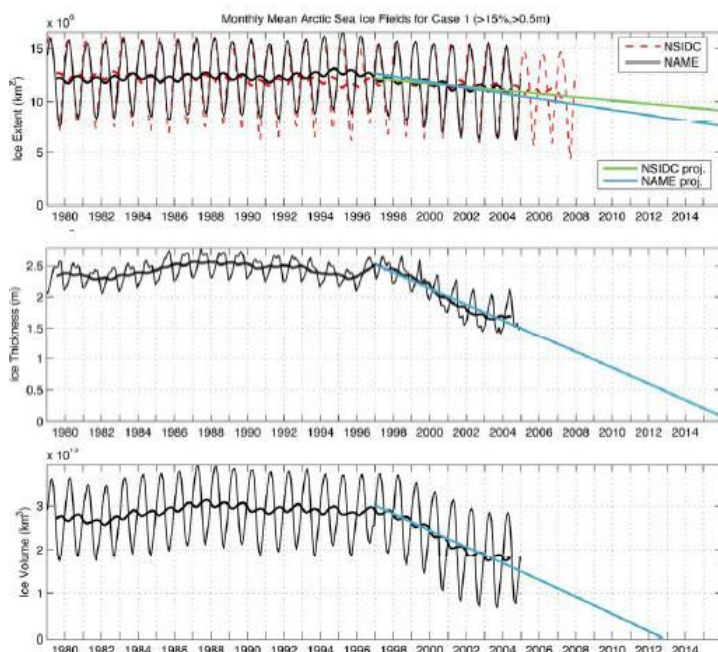
Tipping elements in the Earth's climate system (National Academy of Sciences of the USA) "We conclude that the greatest (and clearest) threat is to the Arctic with summer sea-ice loss likely to occur long before (and potentially contribute to) GIS melt. Tipping elements in the tropics, the boreal zone, and West Antarctica are surrounded by large uncertainty and, given their potential sensitivity, constitute candidates for surprising society"

<http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2538841>

ANDY PITMAN, UNSW: I think you need to talk about probabilities, unfortunately. There is a probability that we have gone past serious tipping points.

<http://www.abc.net.au/lateline/content/2008/s2486751.htm>

1979-2004 time series of Ice Extent, Area, Volume, Thickness



- Between 1997-2004:**
- annual mean sea ice concentration has decreased by ~17%
 - mean ice thickness has decreased by ~0.9 m or ~36%
 - ice volume decreased by 40%, which is >2x the rate of ice area decrease

If this trend persists
the Arctic Ocean will become ice-free in summer by ~2013!

[http://www.nwc.navy.mil/cnws/wardept/documents/State of Arctic Sea Ice \(NPS\).pdf](http://www.nwc.navy.mil/cnws/wardept/documents/State%20of%20Arctic%20Sea%20Ice%20(NPS).pdf)

Follow the events here: <http://nsidc.org/arcticseaicenews/>

When that happens, it will become clear we have to extract CO2 from the atmosphere to go back to 350 ppm, J. Hansen: http://www.columbia.edu/~jeh1/2009/Copenhagen_20090311.pdf

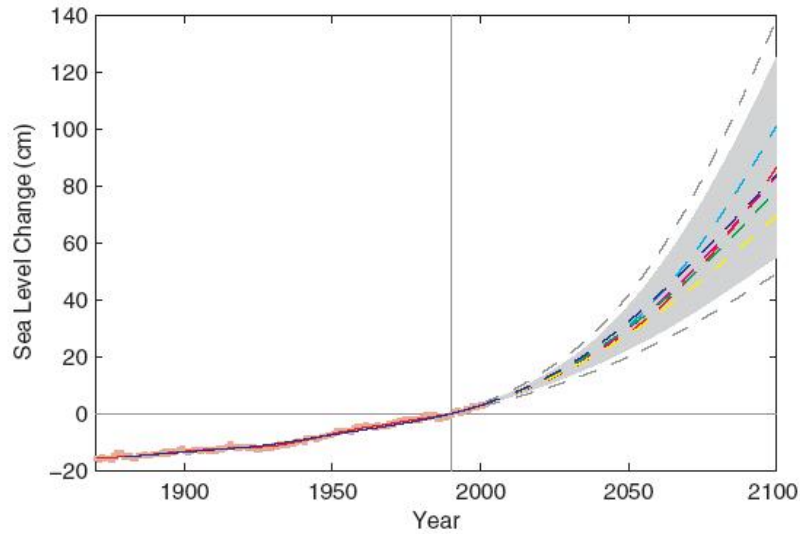
All CO2 reduction targets for 2050 are theoretical: IPCC 2007, WGII Chapter 10, p 493

"Glaciers in the Himalaya are receding faster than in any other part of the world and, if the present rate continues, **the likelihood of them disappearing by the year 2035** and perhaps sooner is very high if the Earth keeps warming at the current rate"

<http://www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4-wg2-chapter10.pdf>

„If you start to melt the Himalayan ice cap, the Yangtze, the Yellow River, these great rivers in China will actually go dry in the summer, and flood in the winter and China will become unliveable.”
<http://www.abc.net.au/lateline/content/2008/s2621836.htm>

Sea level rises (estimates for 2100):



http://www.pik-potsdam.de/~stefan/Publications/Nature/rahmstorf_science_2007.pdf

Table 3. SLR projections based on kinematic scenarios. Thermal expansion numbers are from (22).

	SLR equivalent (mm)		
	Low 1	Low 2	High 1
<i>Greenland</i>			
Dynamics	93	93	467
SMB	71	71	71
Greenland total	165	165	538
<i>Antarctica</i>			
PIG/Thwaites dynamics	108		394
Lambert/Amery dynamics	16		158
Antarctic Peninsula dynamics	12		59
SMB	10		10
Antarctica total	146	128	619
<i>Glaciers/ice caps</i>			
Dynamics	94		471
SMB	80		80
GIC total	174	240	551
Thermal expansion	300	300	300
Total SLR to 2100	785	833	2008

<http://www.sciencemag.org/cgi/content/abstract/321/5894/1340>

Left: From Prof. Tad Pfeffer, INSTAAR

Current policies of the NSW government (new coal mines, additional coal trains in the Hunter, 3rd coal loader in Newcastle etc) will contribute on a pro rata basis to the sea level rises as indicated in these graphs and tables.

NSW has no plan to de-commission coal fired power plants and to replace them with renewable power. Therefore, additional population means more CO2 emissions. Nature will not allow this:



Revenge of Gaia: coal ship stranded

Every coal ship is another nail in the

<http://instaar.colorado.edu/people/bios/pfeffer.html> coffin of our coastal cities and another international liability to accept climate refugees. Governments expose themselves to future human rights litigation. UN document: <http://www2.ohchr.org/english/issues/climatechange/>
http://www.sportsfish.com.au/forum/uploaded/Casey/2007618101919_SELKIRK_SETTLER_1.jpg

10 Point Program	
Events/impacts/problems	What to do
Next oil price shock and/or fuel shortages any time after 2010. When the truth comes out about OPEC's oil reserves (overstated by 80%) confidence in oil reserves will evaporate and oil markets will freeze. Iran will no longer export oil by around 2015. Catch 22: Diesel shortages will delay implementation of essential rail and clean energy projects.	(1) Immediate moratorium on new freeways, airport and port expansions, car-dependent shopping centers and subdivisions, multi-level car parks and other oil dependent infrastructure. No more business as usual. (2.1) Set aside – by legislation – oil and gas fields for diesel, petrol and CNG supplies to civil works needed to mitigate the impact of peak oil and to de-carbonize our economy. Example: Turrum oil field on-stream by 2011. (2.2) Build up Strategic Oil Reserve
Public largely unaware of the physics of the coming oil, energy & climate crisis. Political system and corporate sector in denial mode and unable to grasp magnitude and urgency of problem. Too many untested assumptions around.	(3) Public education program; participation of public is absolutely essential. Nation needs to be put on a war footing; change of value system is needed. Prepare motorists for petrol rationing and car-pooling as this is the only “solution” if a physical oil crisis were to hit tomorrow, e.g. during the next oil or oil-proxy war.
Best alternative transport fuel in Australia is natural gas.	(4) Develop compressed natural gas (CNG) for buses, trucks, construction and mining machinery. This must get priority over LNG exports.
Peak oil means end of internal combustion engine which wastes 90% of energy as heat. Oil decline is so steep that there is no time for any transition to electric, hydrogen or ‘green’ cars. We have a clean primary energy problem, not a technology problem. EVs run on coal are dirty.	(5) Abandon unrealistic car dreams Electrification of land transport system is required which must be more efficient by an order of magnitude; urban rail on all free-ways (Transperth) and major roads; all genuinely renewable energies produce electricity, not fuels. Time is now running out for these solutions; too late for large scale rail and metro tunnel projects
Globalization built on cheap oil will go backwards; bunker oil shortages for ships will limit import/export volumes.	(6) Re-industrialization of Australia on the basis of renewable energies; focus on essential tools, products and parts.
Peak oil will quickly turn into food production and distribution problem	(7) Bio fuels to run farming machinery, trucks and other vehicles to transport agricultural produce and implements; revive rural rail lines
Proximity to 4 (out of 10) tipping points in the next years will force us to abandon coal (without geo-sequestration of CO2) much earlier than generally assumed. 1. Disappearance of Arctic summer sea ice 2. Increase of melt lakes on Greenland and hydraulic cracking of glaciers 3. Release of methane over permafrost 4. Destabilization of West Antarctic ice sheets http://realclimate.org/	(8) Replacement program for all coal fired power plants; re-tool car factories and suppliers (BEFORE they go out of business after peak oil) to mass-produce components for wind farms, solar power plants, solar water heaters. A 1,000 MW coal fired power plant requires the continuous sequestration 150 Kb/d of liquid CO2. NSW alone has 12,500 MW installed. Australian oil handling capacity around 500 Kb/d. 1,000s of km of CO2 pipelines needed. Huge challenge. Difficult while oil production is declining. May come too late to fix climate.
Power shortages unavoidable	(9) Drastic power down and energy efficiency. Permanent Earth Hour.
Airlines first hit by high oil prices, now by financial crisis	(10) Interstate rail development and electrification; both passenger and freight; replace domestic flights with night trains; coastal shipping for freight

Web links to the author's research

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http://sydneypeakoil.com/matt/SurfaceMetro_Not_TunnelMetro.pdf

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http://www.aph.gov.au/SENATE/committee/rrat_ctte/public_transport/submissions/sub48_amalg.pdf

Financial crisis and peak oil explained by actuary Gail Tverberg, Atlanta, Georgia. February 2009

<http://www.theoil drum.com/node/5047#more>

Report card 2008 entitled "Has the Federal Government prepared for oil decline and CO2 reduction?"

<http://sydneypeakoil.com/matt/ReportCard2008.pdf> January 2009

Submission #129 and #129a to Sydney's NW Transport Inquiry. November 2008

<http://www.parliament.nsw.gov.au/prod/parlment/committee.nsf/0/F6E420E701DDB4EACA2574F00001BF7E>
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Bumpy Crude Oil Plateau in the Rear View Mirror. April 2008

<http://www.theoil drum.com/node/3793> or:

http://sydneypeakoil.com/matt/Crude_Oil_In_Rear_Mirror.pdf

Submission to Garnaut report. April 2008

[http://www.garnautreview.org.au/CA25734E0016A131/WebObj/D0834046GeneralSubmission-MattMushalik/\\$File/D08%2034046%20%20General%20Submission%20-%20MattMushalik.pdf](http://www.garnautreview.org.au/CA25734E0016A131/WebObj/D0834046GeneralSubmission-MattMushalik/$File/D08%2034046%20%20General%20Submission%20-%20MattMushalik.pdf)

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<http://www.theoil drum.com/node/3664> or:

http://sydneypeakoil.com/matt/Worlds_Fragile_Oil_Flows_From_Declining_Reserve_Base.pdf

Did Katrina hide the real peak in world oil production? October 2007

<http://www.theoil drum.com/node/3052>

The End of Freeways. April 2007

http://www.infrastructure.gov.au/roads/F3toM7Review/pdf/SUBMISSION_47-Mr_Matt_Mushalik.pdf

Submission 69 to the Senate Inquiry on oil supplies:

Peak oil Ante Portas followed by global warming, Feb 2006

http://www.aph.gov.au/Senate/committee/rrat_ctte/oil_supply/submissions/sub69.pdf

Critique of BTRE working paper 61 "Is the world running out of oil? A review of the debate"

http://www.infrastructure.gov.au/aviation/nap/files_green_paper/MUSHALIK_Matt-CritiqueBTRE_WP61.pdf

Lessons from EIA scenarios, Jan 2005

http://www.pc.gov.au/_data/assets/pdf_file/0004/45643/sub075attachment1.pdf

Next intelligence failure: 300 Gb OPEC oil missing, Dec 2004

http://www.pc.gov.au/_data/assets/pdf_file/0005/45644/sub075attachment2.pdf