Vancouver & Lexington in Relief:

SSP Kentucky

2009

10^{2}

Planning for

10^{8}

10^{10}

Quantum

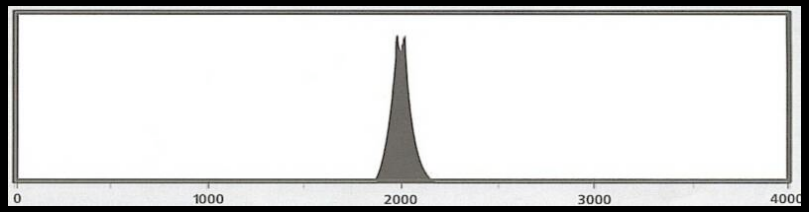
Change: Part Alpha: Comparative Differentials

Post Oil Reconfiguration of the Pattern of Community.

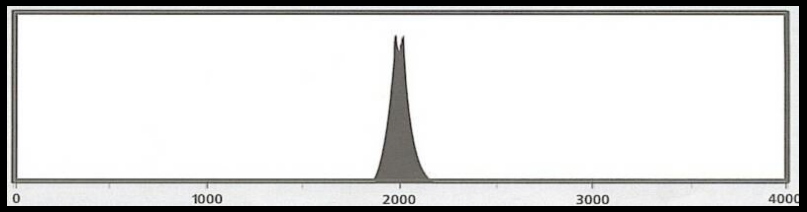
10^{7}

Our Point in Time:

Oil Curve in relation to history:

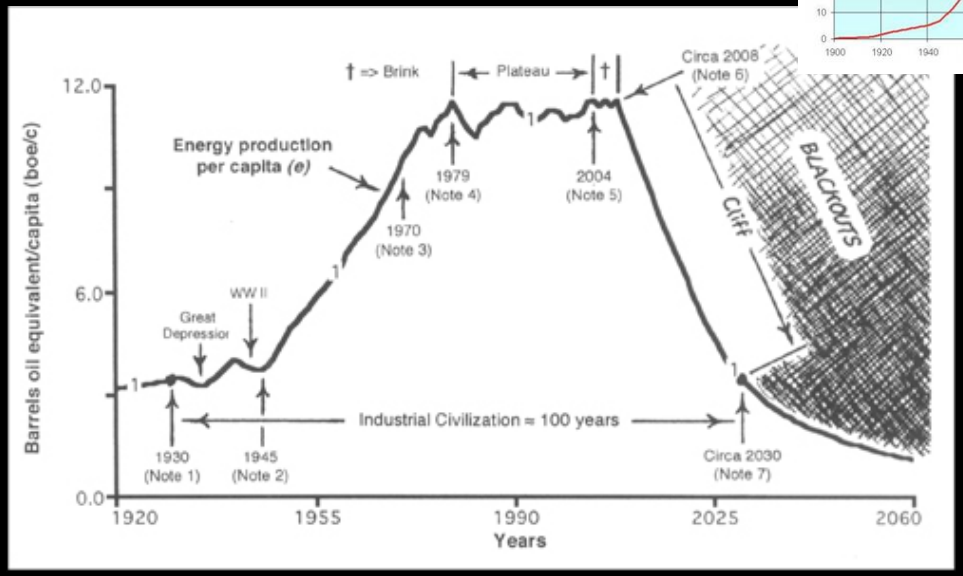


Human Population??????

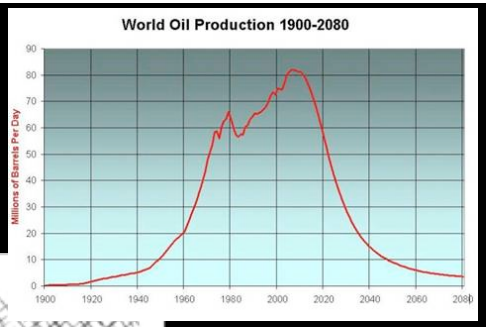


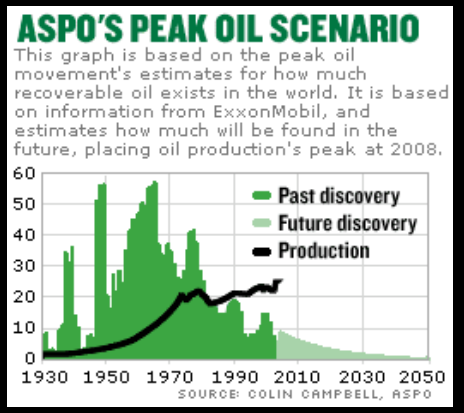
Current Culture and Civilization is blip in geological time.
We have harvested millions of years of stored solar energy & wasted it.
The human population explosion matches Hubbert's Curve on oil consumption.
Our numbers pretty well have to follow the oil depletion curve down.
Technical Solutions for energy replacement are not enough, nor reliable.
How do you follow the graceful adjustment and find a soft landing spot?

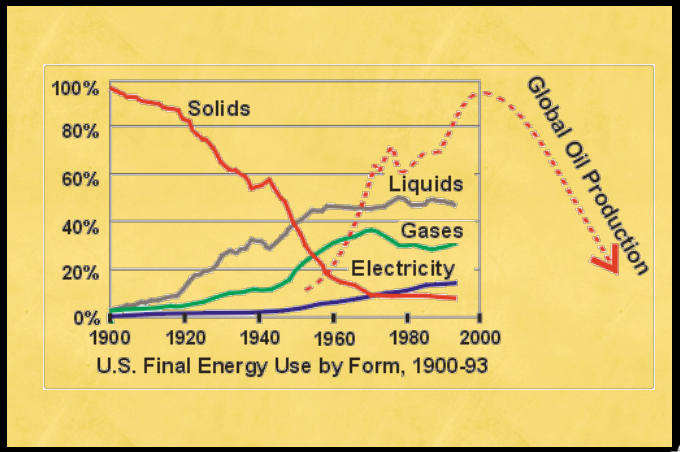
1930-2030



Richard Duncan: Olduvai Theory: 100 years of Civilization

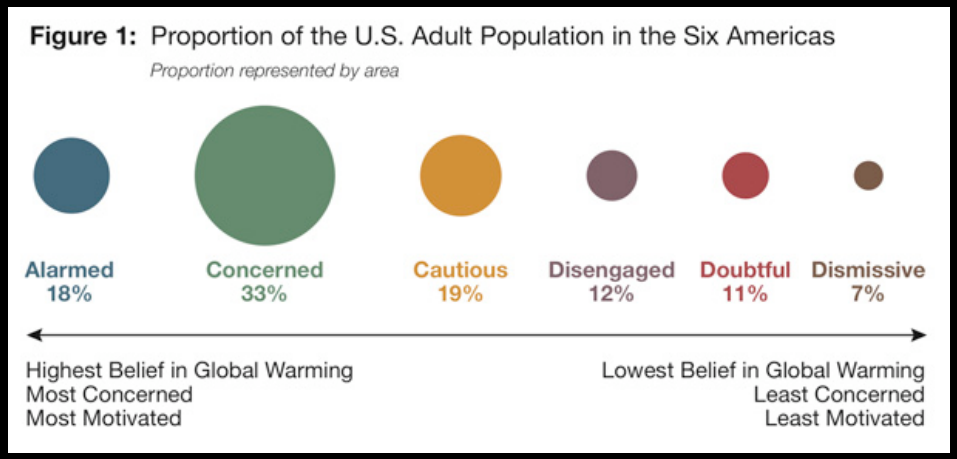






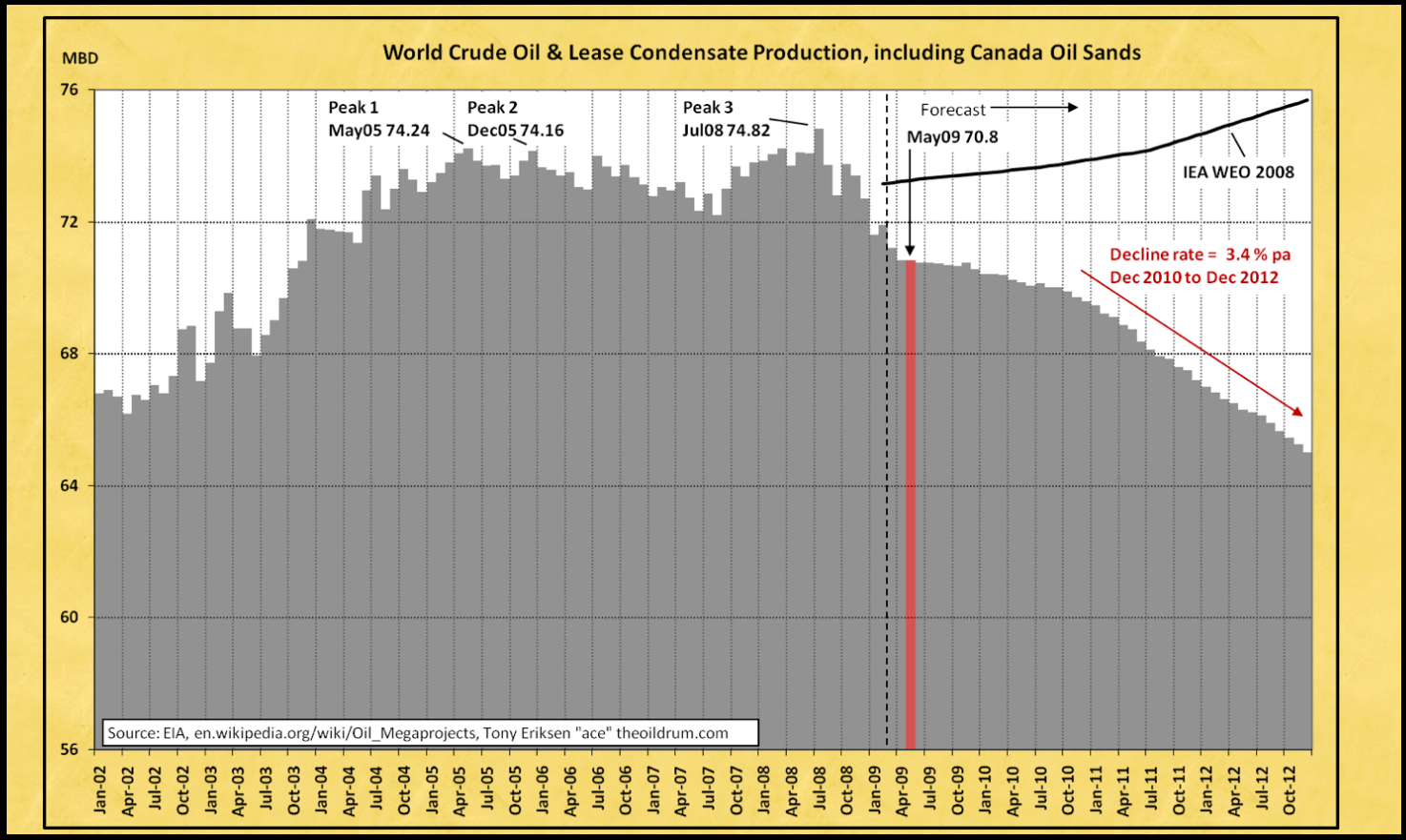
SSP?

- Is this process about disaster planning? Yes, in part.
- Is it about remedial planning to correct past mistakes? Yes.
- But mostly it is about Preventative Actions, because even though this is all too late in many ways, there are major steps we can still take to slow down our negative impact on the planet and give our children a chance to succeed us.



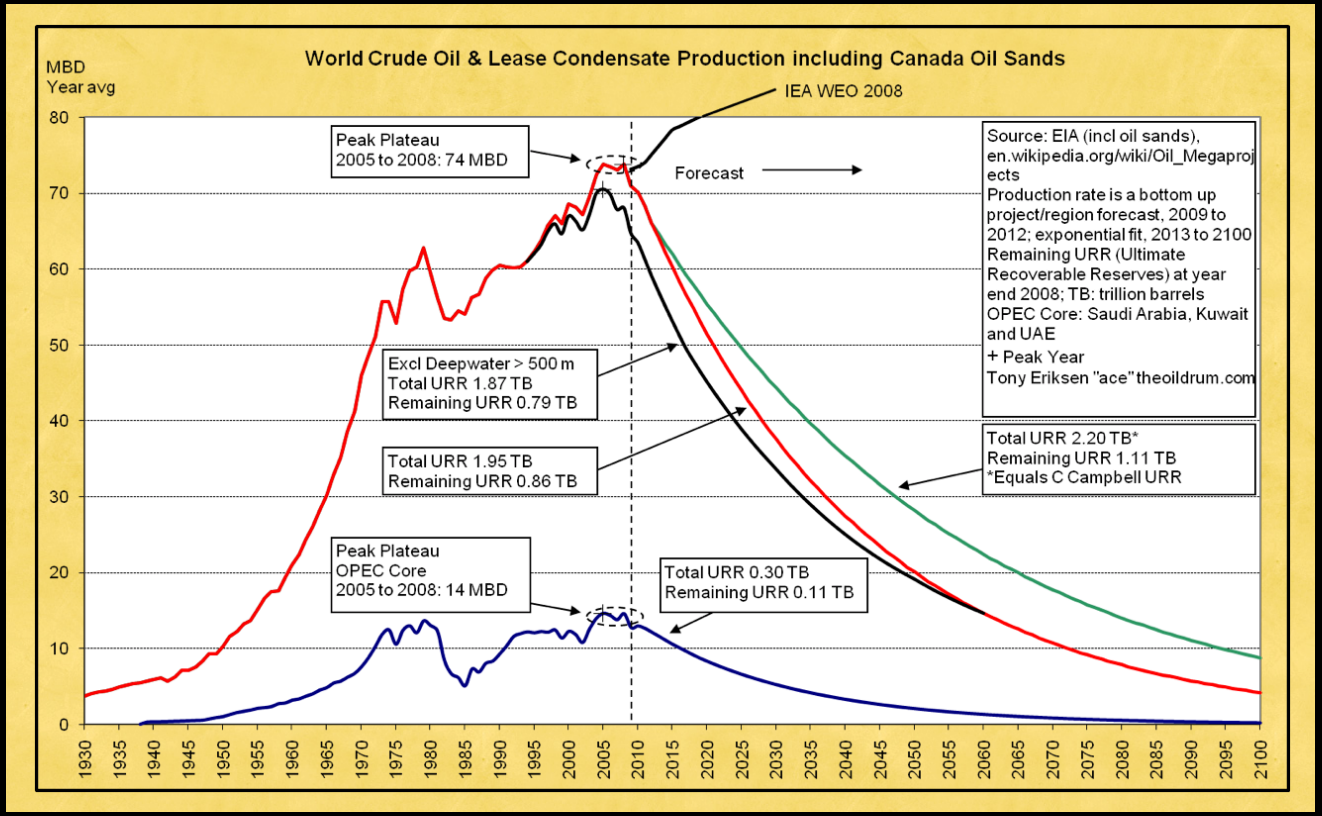
Here we are: no oil soon.

The Oil Drum Update May 2009



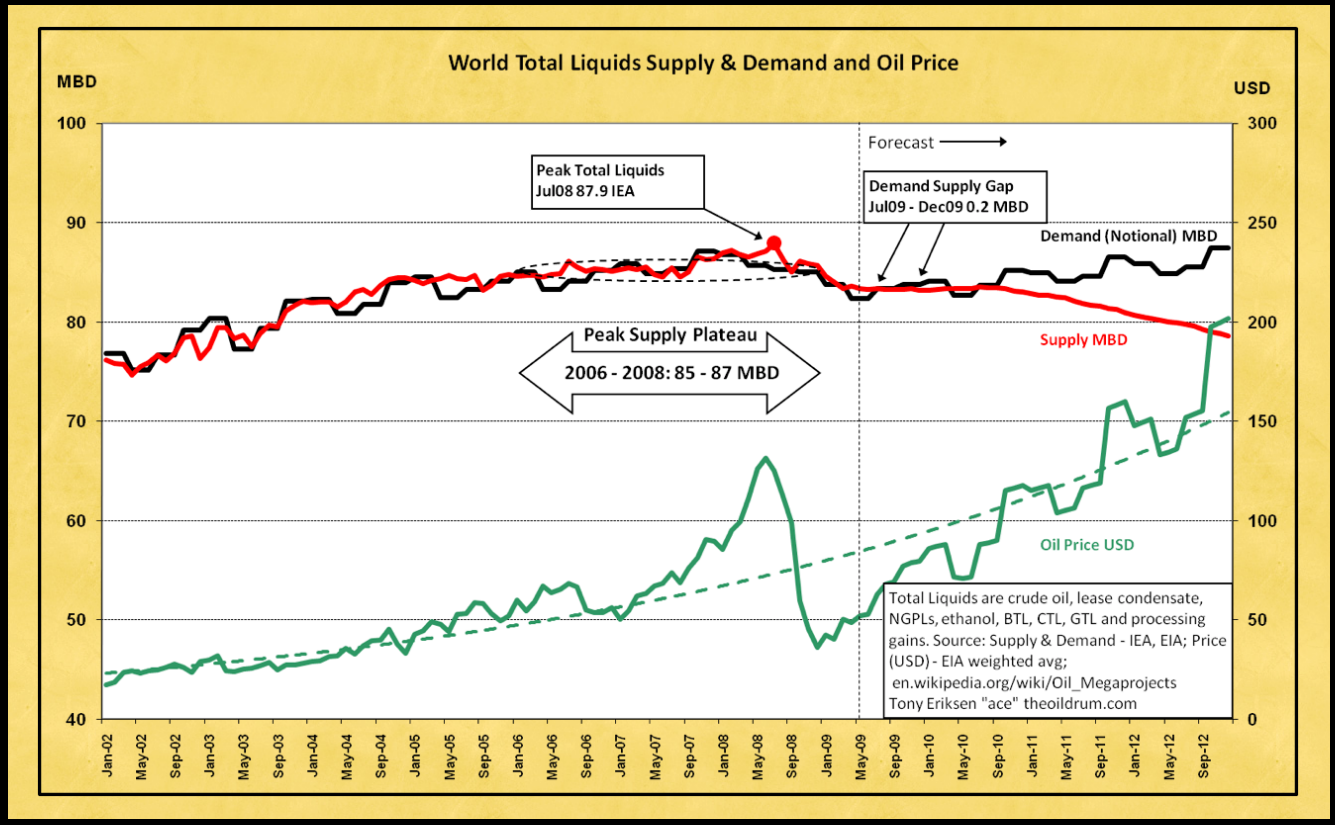
As we said....

The Oil Drum Update May 2009



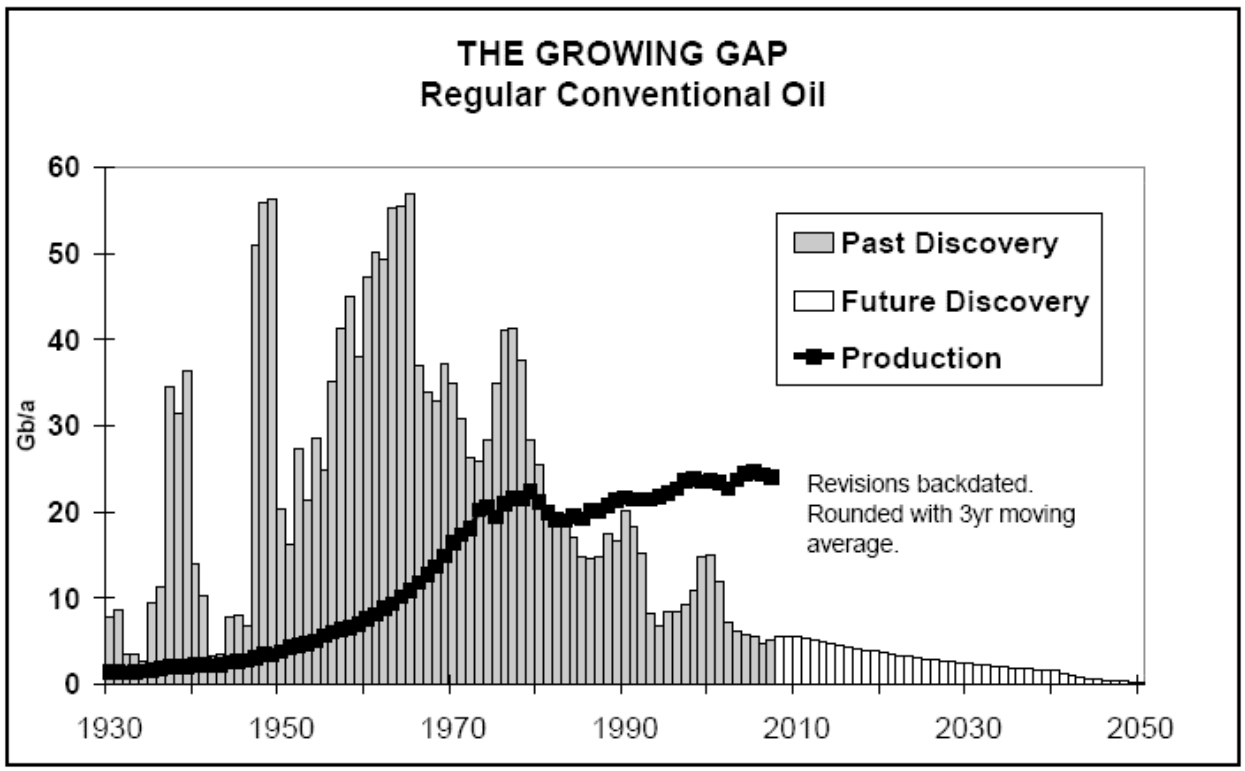
Supply & Demand Departure

The Oil Drum Update May 2009



What do you think of pricing?

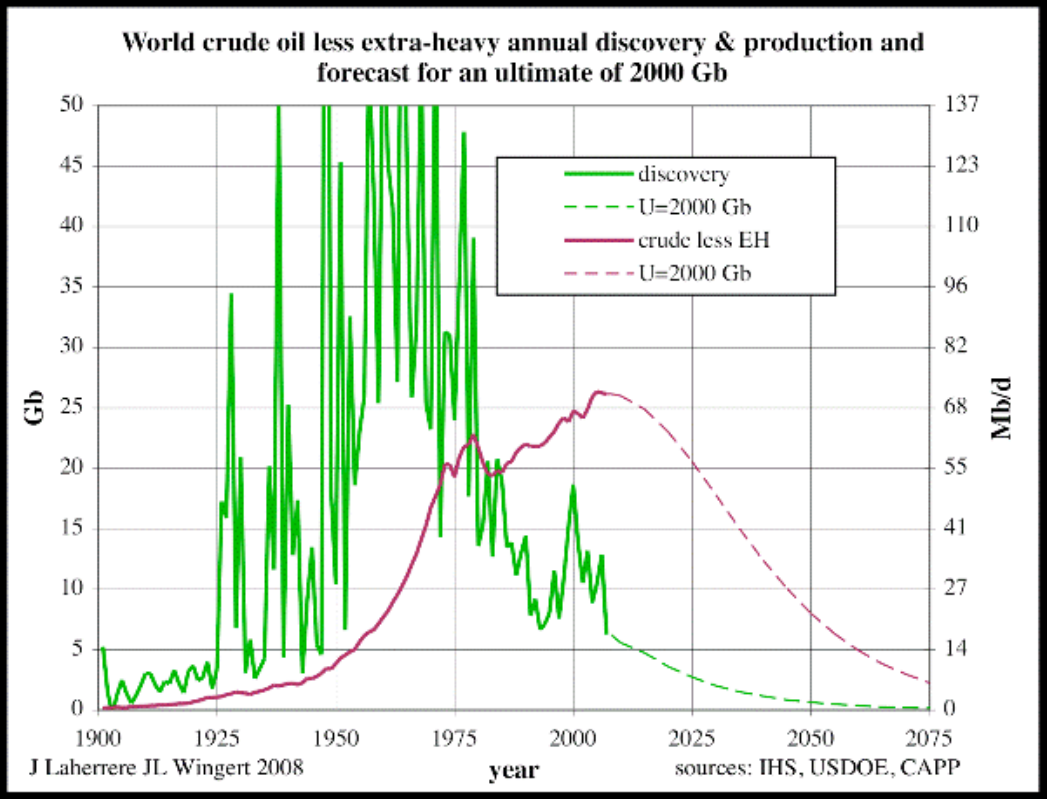
The Oil Drum Update May 2009



The Oil Drum Update May 2009

Facts coming in.....

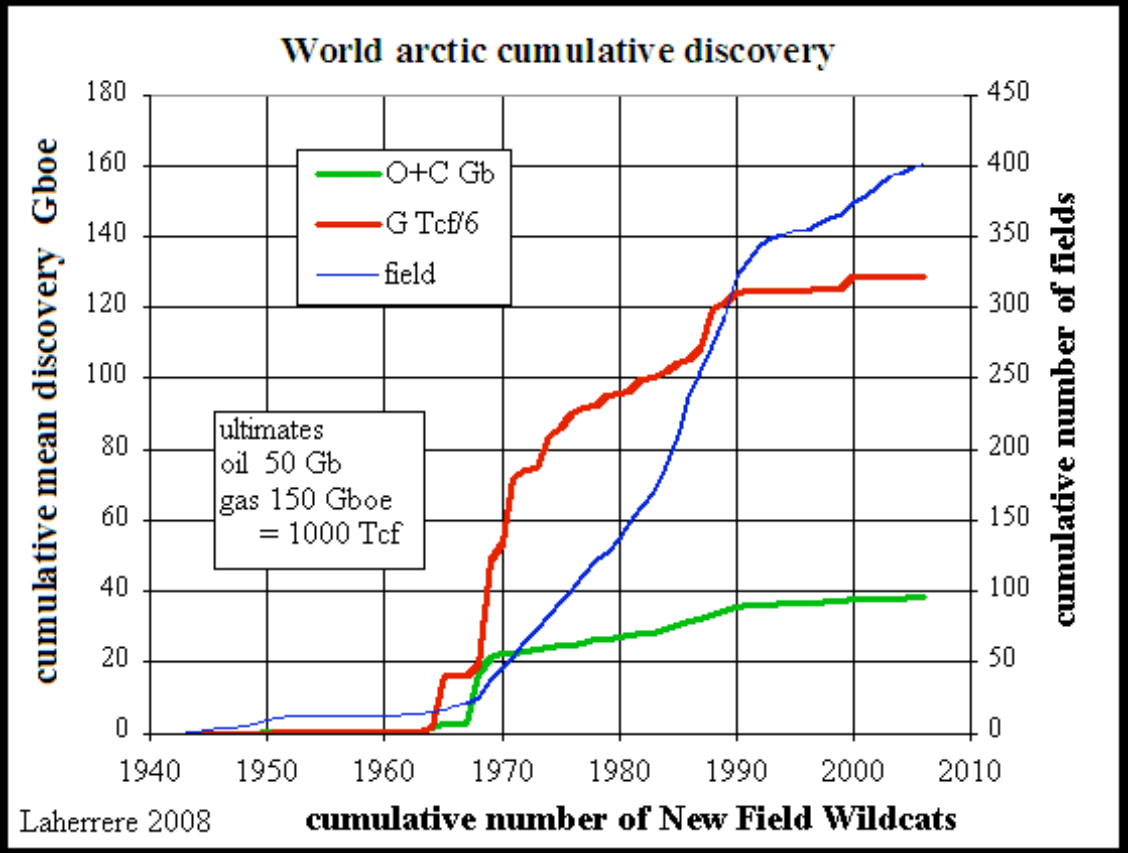
Jean Laherrere also produced a discovery and production chart below from his **2008 presentation.** Future discoveries, represented by the area under the dashed green line, are about 120 Gb being slightly higher than Campbell's estimate. Laherrere's discovery curve includes deepwater discoveries and also indicates that production peaked in 2008. Many of these future discoveries are likely to be either deepwater or in arctic regions. These discoveries may be significant but the time between discovery and first oil can easily be ten years which will probably not change the peak production year of 2008 but should lessen the future production decline rate.



The Oil Drum Update May 2009

Arctic Dreams: short satisfactions

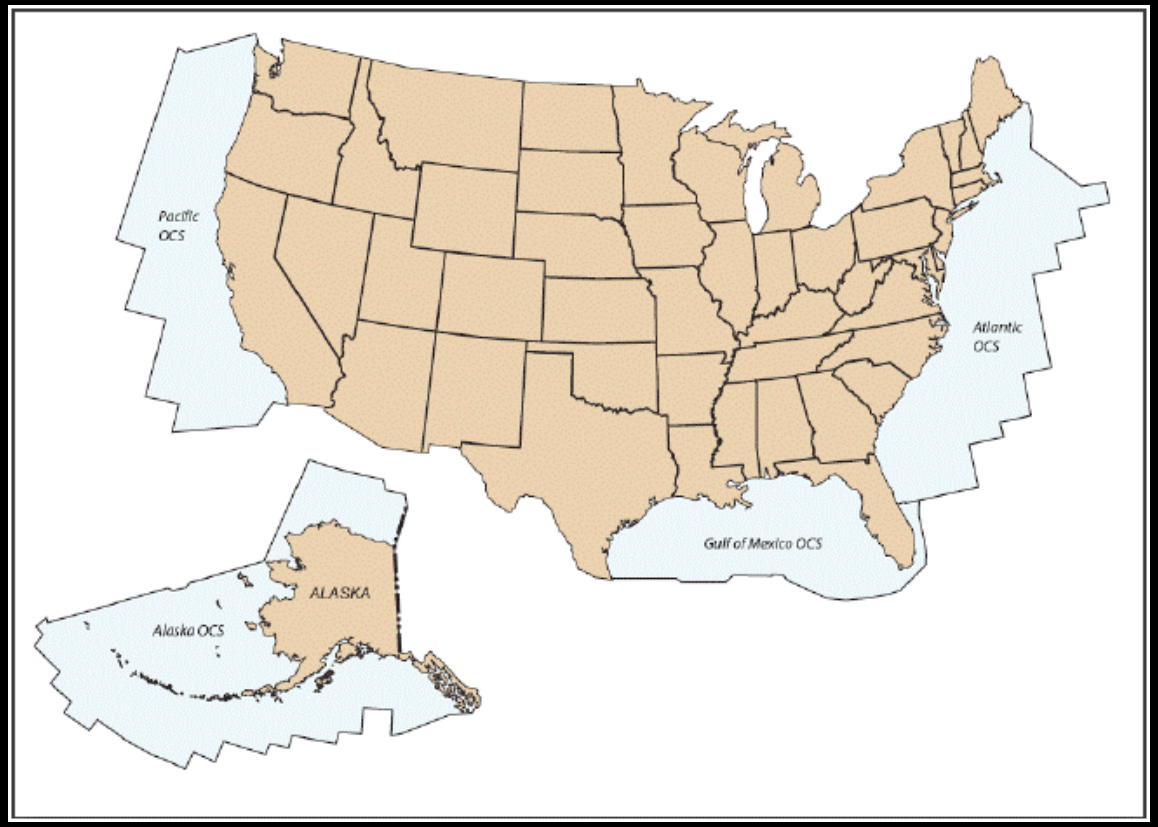
Other regions considered prospective are the US outer continental shelf (OCS) and Alaska's Arctic National Wildlife Refuge (ANWR). (Please note that the oil production potential of ANWR has also been included in the discussion above of the arctic). At this **OTC. 09 panel presentation** on energy challenges, there was much **discussion** about allowing further drilling on the OCS and the ANWR. The American Petroleum Institute (API) was represented by its CEO at the panel and the API recently released this **ICF report** detailing potential reserves and future production from currently restricted areas in the OCS and the ANWR. This report concluded that an additional 1.1 (middle case) to 2.0 mbd (alternative case) of oil production, the majority from ANWR, might be possible by 2030 if drilling was allowed in these restricted areas. This additional production would benefit the US but would not change the peak oil date of 2008.



The Oil Drum Update May 2009

Last Grasp for oil...

Example: LA
Post Oil?
After no water?
Rising oceans?
migration in & out?
what basic economy?

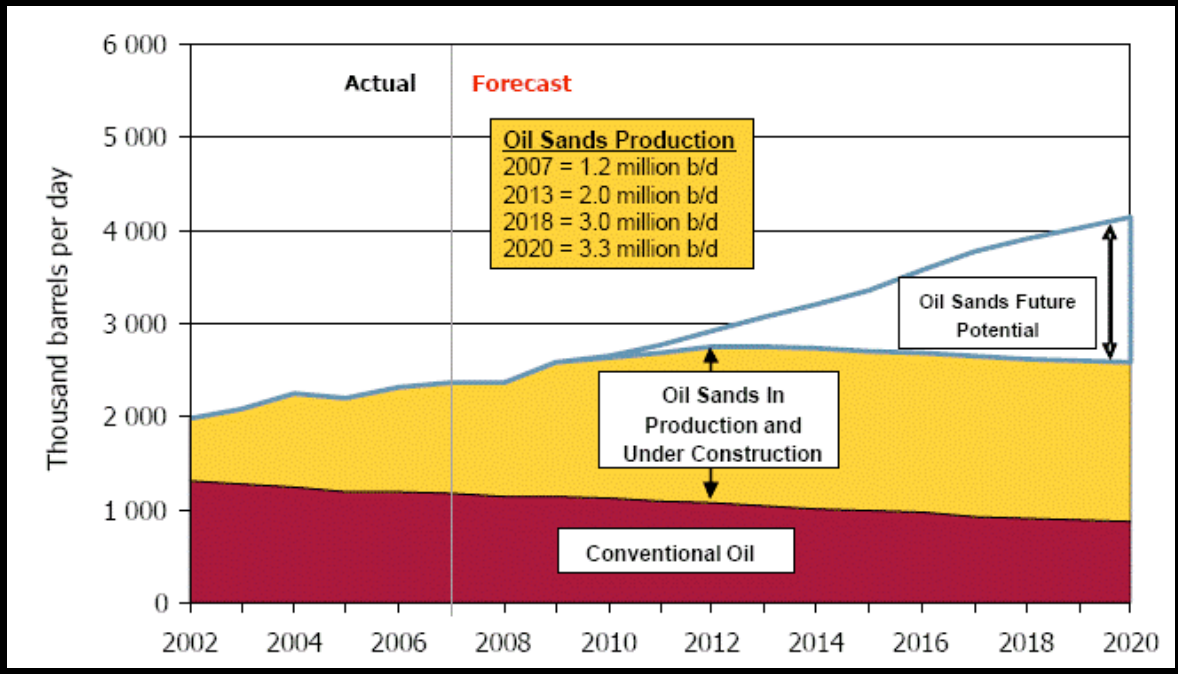


The Oil Drum Update May 2009

Tar Sands to small rescue....

Oh yes, and whose tar sands?

Canada often states that its oil reserves are almost 180 Gb. However, it is critical that **173 Gb** of these reserves relate to oil sands which are not easy to produce. The chart below is from a **recent presentation** by the Canadian Association of Petroleum Producers and indicates the potential of Canada's total oil production to reach over 4 mbd by 2020. The forecast indicated by the red line in Figure 2 assumes that Canada oil sands production will reach a maximum of 2 mbd. Oil sands production was 1.2 mbd in 2007 and the International Energy Agency (IEA) is forecasting 2009 oil sands production to be slightly greater at **1.34 mbd.** David Hughes, a Canadian geologist estimates that oil sands production will stay **below 2.5 mbd** due to constraints on natural gas, water and diluents. Oil sands production may reach 2.5 mbd but will not change the peak oil year.



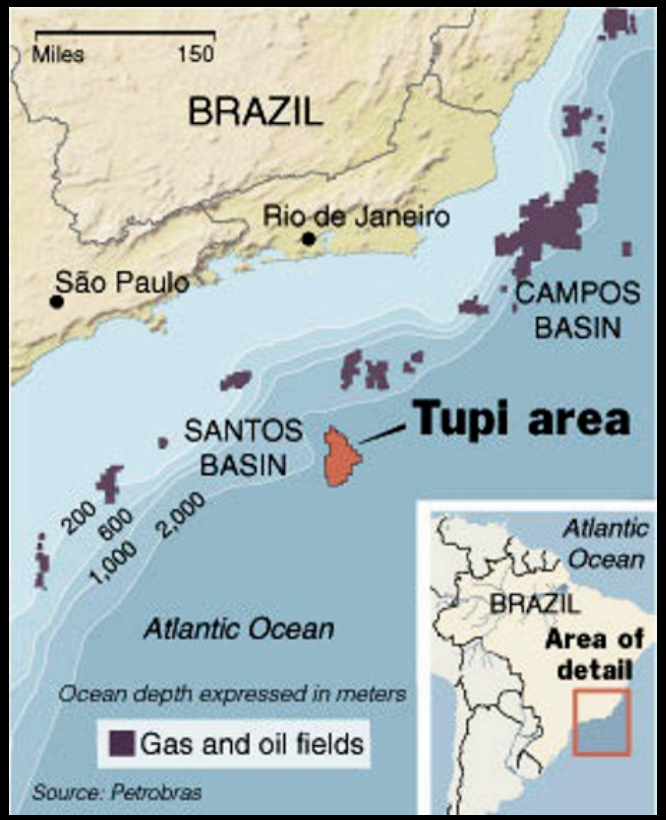
= 5% of US 'demand' but would be half of Canada's, did Canada stop being a consumer????

The Oil Drum Update May 2009

Next we take Brazil.....

A promising area of future liquids production is the Santos basin, offshore Brazil. There are technical challenges, explained during a **Petrobras OTC.09 presentation,** with the pre-salt discoveries such as very high pressures and temperatures but Petrobras is optimistic about the Santos basin, stating that this basin may almost **double Petrobras' oil reserves.** This implies that the Santos basin could hold as much as 15 billion barrels of recoverable oil. However, it is always important to focus on the potential future production rates in addition to the size of the reserves.

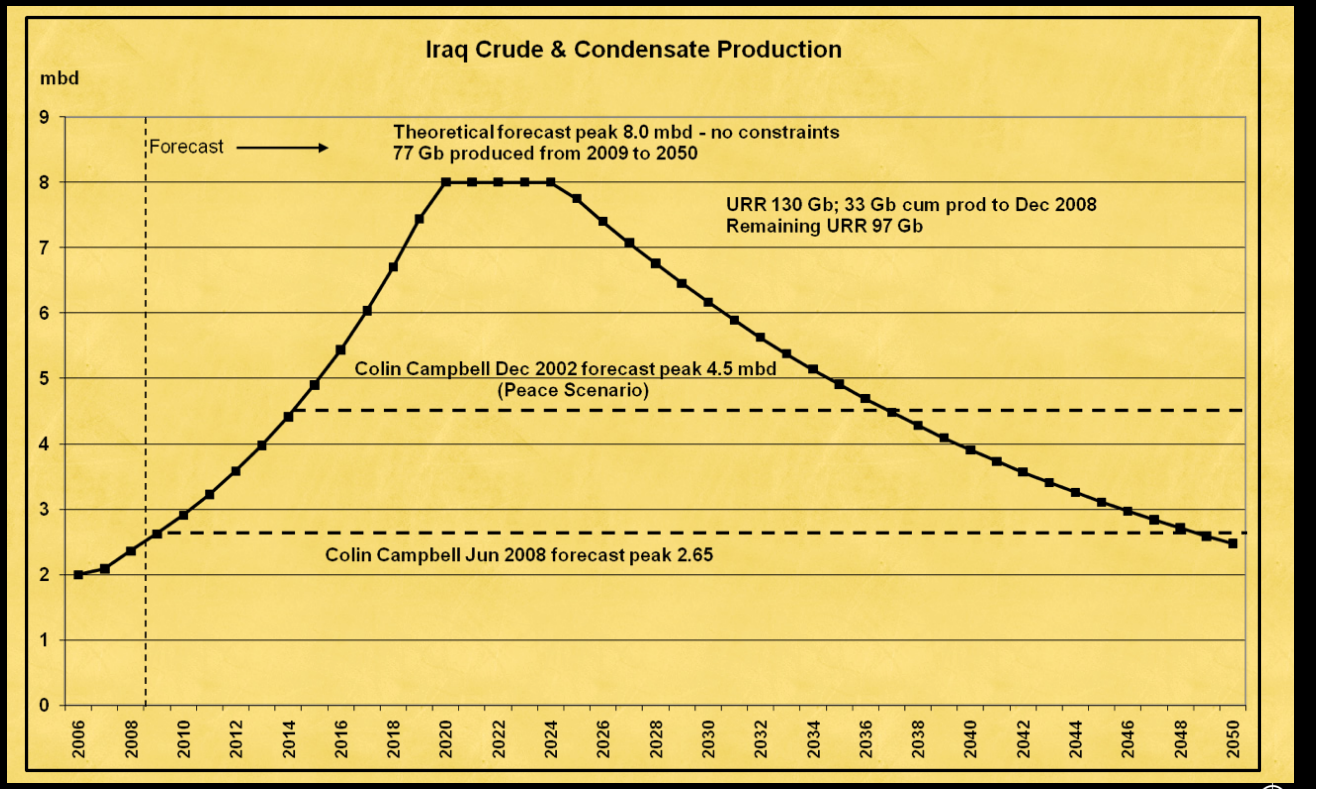
The **Tupi field** was discovered in November 2007 in the Santos basin and an extended well test (EWT) started in early May at a rate of 15 thousand barrels per day (kbd), to be increased to 30 kbd by the end of 2009. The **Tupi EWT** will run for about 16 months to better understand the flow characteristics of the pre-salt reservoir. If this EWT performs well, then a pilot test of 100 kbd should start in late 2010. If the pilot test is satisfactory then plans for full scale commercial production would be implemented. However Petrobras CFO expects a long ramp up period with Tupi **peaking at over 200 kbd** at the earliest in 2017. A Wood MacKenzie analyst predicted that Tupi could peak at around **1 mbd in 2022** which appears significant but Petrobras will need this increased production from the Santos basin to maintain total production at 2 mbd. The reason is that declines from existing offshore fields are about 10% or 0.2 mbd per year as **confirmed by the Petrobras CFO.** Future production from the Santos basin will benefit Brazil but will probably have only a negligible impact on the world production past 2012 (see Fig 2 above).



Iraq? .... already taken....

The Oil Drum Update May 2009

Iraq is perhaps the most promising country in the world for future potential oil production. However, it has not been an attractive country for investment not just because of terrorism but also the **lack of petroleum legislation** which includes national revenue sharing from the oil fields of the semi-autononous region of **Kurdistan.** The chart below shows that Iraq's production might reach 8 mbd by 2020 if sufficient investment was available, peace prevailed and satisfactory petroleum legislation was passed. The ultimate recoverable reserves of oil of 130 Gb is based upon **Laherrere's 2003 analysis.** Colin Campbell had originally forecast 4.5 mbd being reached by 2014 but now has revised that lower to 2.65 mbd in his **June 2008 newsletter.** In mid May 2009, the former Iraq oil minister said that Iraq's output could reach **4 mbd by 2014 and 7 mbd by 2019** if satisfactory petroleum legislation is passed in 2010. My forecast, shown by the red line in Fig 2, assumes that Iraq will produce 2.7 mbd in 2012. If the former Iraq oil minister's predictions become true then future production may be closer to the green line in Fig 2 rather than the red line. The peak oil year of 2008 would be unchanged.



The Oil Drum Update May 2009

Basic Conclusions:

The important conclusion is that higher decline rates must be applied to giant fields that enter decline in the future. Prolonged plateau levels and increased depletion made possible by new and improved technology result in a generally higher decline rates. Detailed case studies of giant oilfields suggest that technology can extend the plateau phase, but at the expense of more pronounced declines in later years.

In conclusion, this analysis shows that the average decline rate of the giant oil fields have been increasing with time, reflecting the fact that more and more fields enter the decline phase and fewer and fewer new giant fields are being found. The increase is in part due to new technologies that have been able to temporarily maintain production at the expense of subsequent more rapid decline. Growing average decline rates have also been noted by IEA (2008). The difference between using a constant decline in existing production and an increasing decline rate is significant and could mean as much of a difference of 7 Mb/d by 2030.

Additional Information Sources

World Oil Production Peaked in 2008, March 17, 2009

Saudi Arabia's Crude Oil Production Peaked in 2005, March 3, 2009

Non OPEC-12 Oil Production Peaked in 2004, February 23, 2009

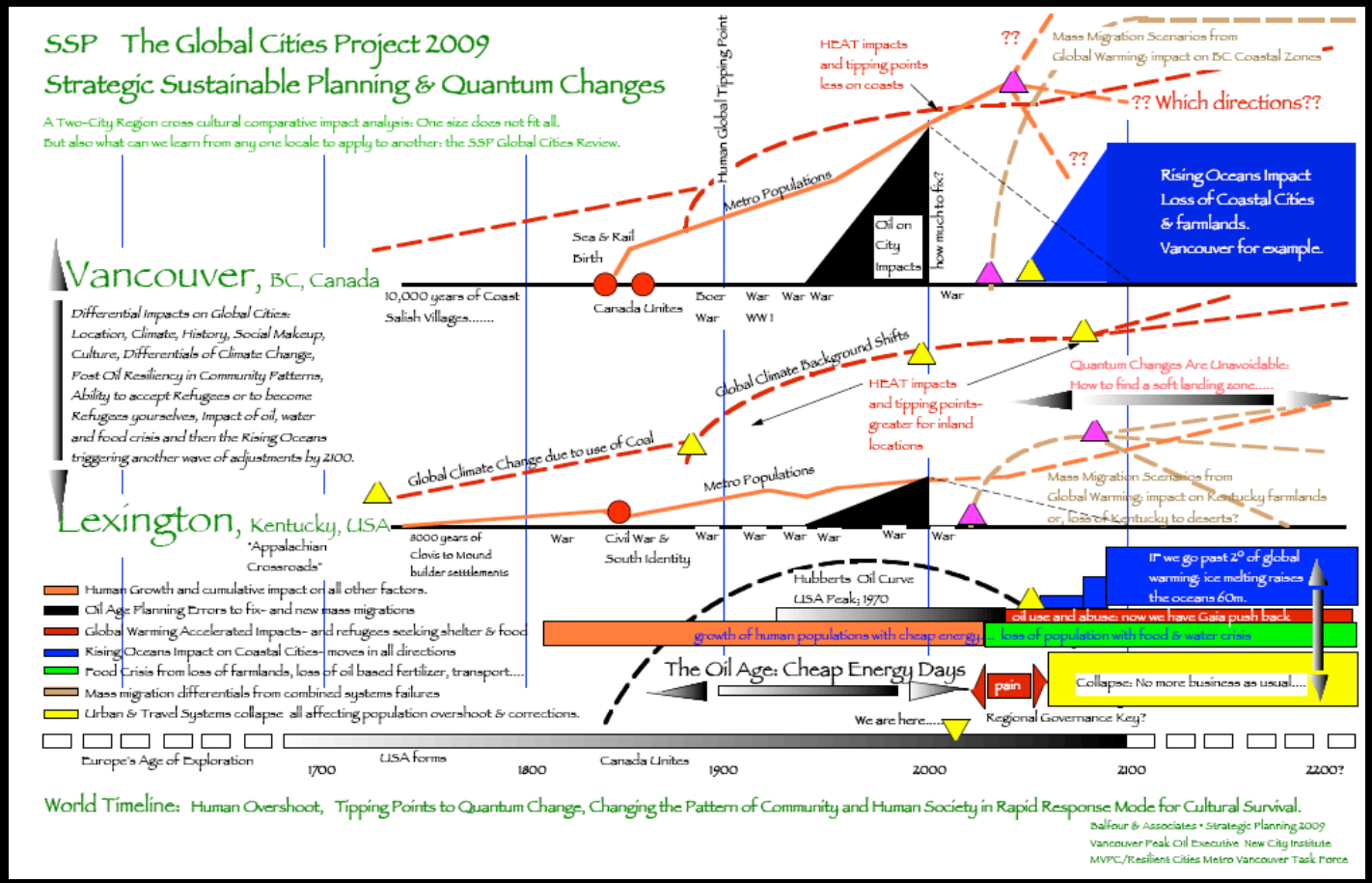
USA Gulf of Mexico Oil Production Forecast Update, February 9, 2009

Disclosure: The author, Tony Eriksen, has investments in the oil and gas sector. The **American Petroleum Institute (API)** sponsored the author's attendance to the **Offshore Technology Conference (OTC.09)** in Houston, Texas on May 4-7, 2009 of which the presentations reaffirmed the author's views on declining world oil production.

There are other technologies such as injection to increase pressure in the reservoir. Natural gas, water, nitrogen and carbon dioxide injection can all help to maintain reservoir pressure and production rates. In 2008, Saudi Aramco injected a massive **13.7 mbd of water** to maintain reservoir pressure so that 8.9 mbd oil could be produced. Fracing or fracturing the reservoir formation is another technology which can help increase production rates. The **fracing** can be done by forcing fluid into the formation causing fractures which are held open by special frac sand. **Acid** can also be used for fracing as the acid can dissolve some of the rock and increase permeability.

New technologies can extract the oil faster but can the recovery factor be increased? Schlumberger has stated that the average recovery factor for all reservoirs is **about 35%.** This **BP study** stated that the average global recovery factor is about 30-35% based on 9,000 fields from the IHS Energy database. Conversely, Saudi Aramco stated in its **2008 Annual Review** that they are targeting recovery factors of 70 percent partly through the use of reservoir nano-bots known as Resbots. These Resbots would be deployed with the fluids injected into a reservoir to record pressure, temperature and fluid type which could be retrieved later in an effort to increase recovery rates. The **OTC.09 Panel Presentation on Technology** discussed the importance of technology and one of the presenters believed that technology will allow companies to **recover over 3 trillion barrels** of oil. It appears that recovery factors can be increased by using new technology but the magnitude of the increase is not clear yet. However, it is unlikely that the improved recovery factors will cause oil production to exceed its 2008 peak.

Comparative Analysis for Strategic Planning for Quantum Change:



Different landscapes,
cultural landscapes,
histories,
ethnic mix,
scale of community,
ability to adapt,
adjustment for impacts,
temporal directions,
& hope.....

Temporal Focus: Tipping Point

Near past, a lifetime of a generation making decisions for a culture, and our near future....

Existence of USA to date:

You are here.....

The Cheap Oil Age

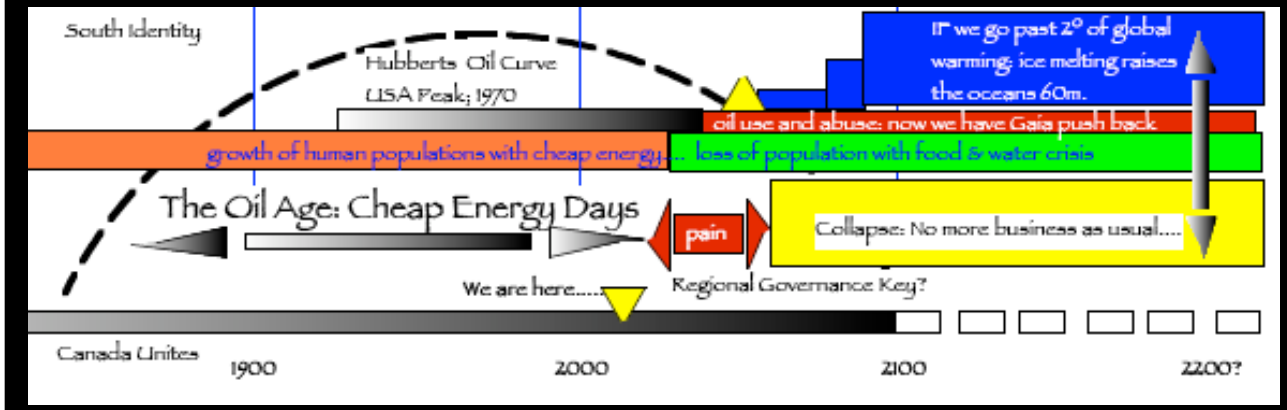
Towns planned for mobility, not conservation of resources

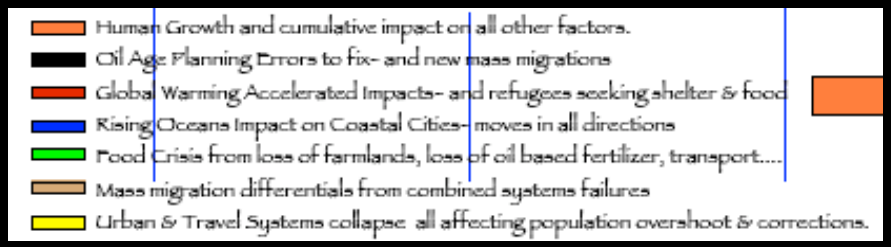
Time for new decisions and rapid adjustments

Are you ready for what is to follow?

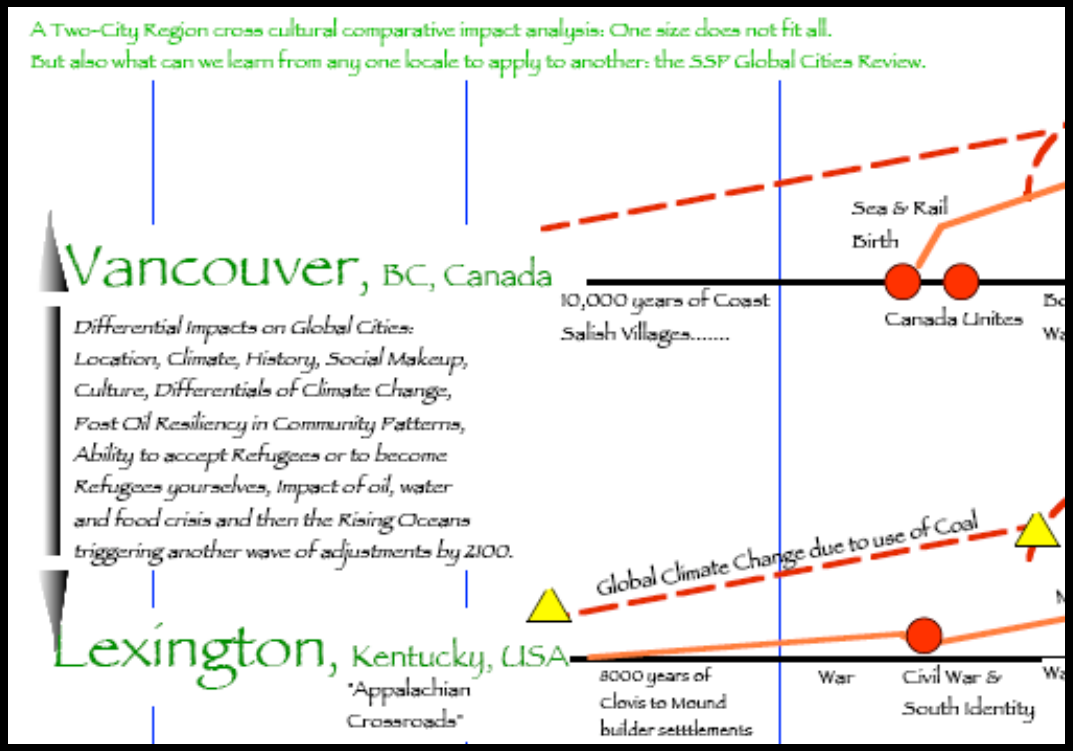
Tipping Points & Cascade of Changes

People > Resources > Overshoot > Adaptations



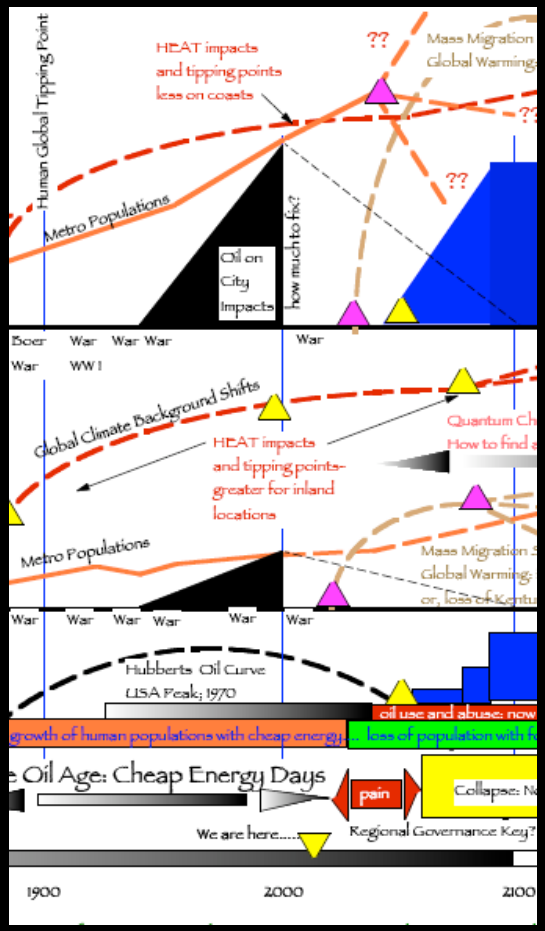


Pre-Oil Cultures, slow growth...



Lexington vs. Vancouver

Lexington: long history, slower growth, inland crossroads
Vancouver: seaport, rapid growth, mixed ethnicity.
Both are benign areas for future post oil refugees & climate change migrations
Each has a distinct window of conditions during unstable global events.



Earlier adjustments to the end of key resources by new conservation & rapid changes to our pattern of community can allow for a "soft landing". Ignoring the need for change assures painful adjustments for all.

Transitions or Collapse?

Population, Food, Water, Energy, all have Limits to Growth: we have exceeded the planet capacity and the environment is pushing back..

Oil Culture Triage:

The impact on our cultural landscape from oil and car age planning is going to take more time, perhaps too long, and we experience pain & failure, or we recognize the need for emergency level planning for urban triage, find solutions and move fast to adjust to a time of fewer resources.

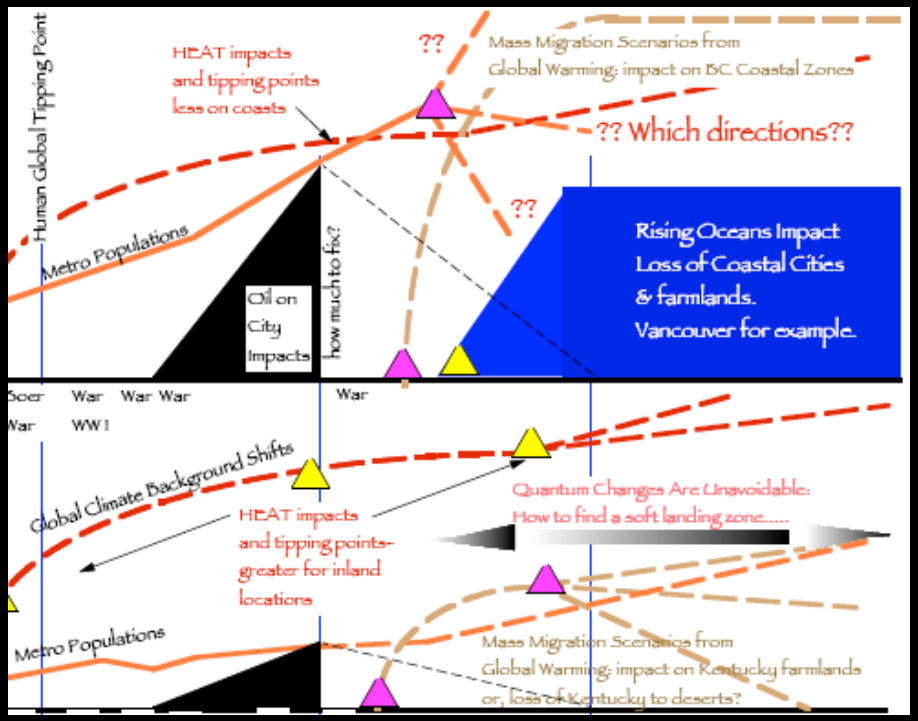
There is no technical fix, or means to capture alternate energy unless we also cut consumption and cut population numbers.

Technical fixes require the last of the oil to create the technologies: can we make that sacrifice too?

Decision making: Quantum Style

Vancouver

Lexington



Vagaries in conditions shift new populations into areas at different times but further changing conditions may cause abandonment of the refuge areas: from inland growth of deserts affecting Lexington, to rising ocean levels decimating existing urban landscapes like Vancouver.

Where are the long range safe places?

Learning to Judge the Terrain.

- Look at any city or metro area like the leader of a Rescue. The current lifestyle is not going to last. Be prepared to act now.
- The marshaling of resources, the conservation of land and energy, food and water are paramount. Civilization is at risk.
- Urban Triage and marbelization of the landscape are events and solutions which permit effective change for a Transition Town.
- The first step for community adjustment is to raise public consciousness about the need for community resilience.