

The Crash, Peak Oil and Resilient Cities

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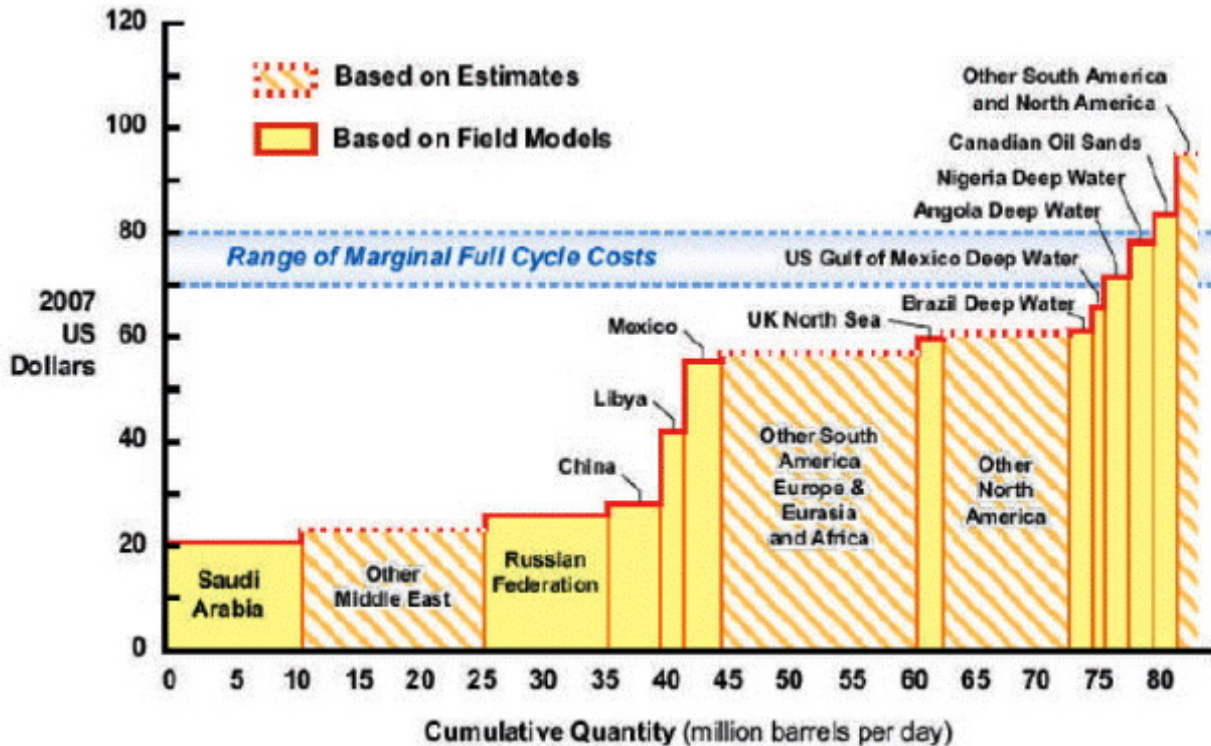
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How did the crash happen? Over-inflating the economic balloon with debt that was vulnerable to rises in oil price. What do we do about it? Use non-oil-based projects and approaches to generate economic growth or else we are going to make things worse. In detail....

- Peak oil theorists have been squabbling about when the geological peak will happen but in economic terms it happened in 2005 when the production of conventional oil (cheap oil which can be produced under about \$65/bbl) peaked. The five mega Major oil companies peaked in their oil production in 2005 and have gone down since.
- The price of oil was then based on the marginal production from unconventional oil (deep water, remote and dirty oil like shale). Oil rapidly increased in price from \$40 to \$140 between 2005 and July 2008.
- The first financial fall-out was the exposure of debt in sub-prime mortgages based primarily in highly car dependent urban areas. Tripling of fuel prices made it impossible to pay mortgages. Non-recourse financing meant that people in many vulnerable areas walked away from their homes without carrying the debt with them (cant do this in Australia).
- All global debt began to be pulled into the crash as the vulnerability to oil underlies just about everything. As Colin Campbell predicted in 2005:
 "...the banks lent more than they have based on confidence that the resulting expansion was sufficient collateral for today's debt. But unrecognised was that this expansion was not just money it was good old cheap energy... We face this monumental kind of weakness of our entire banking and financial sector." Peak Oil Newsletter 53, May 2005.
- Imploding debt spread around the world as the debt-based economic balloon began deflating. The assumption of cheap oil now lay in tatters and challenged the ability of any bank to be able to repay its debt.
- How far will this go? US debt alone is over \$110 trillion (world annual GDP is \$66 trillion)... which represents \$386,000 per person. Even 30% of this being vulnerable would suggest that the crash could go a lot further.
- With the economic balloon deflating rapidly the oil price has dropped even more rapidly to less than \$40 (in early December, 2008). What kind of price is going to result is now of much debate – see <http://www.theoil Drum.com/node/4846>

- The oil price crash means that most higher price oil alternatives are now being dropped or moth-balled. The figure below shows that in production costs alone oil over \$40 a barrel is much more likely than oil under \$40 a barrel. The deep water and dirty oil (shale) options are all over \$100 as are most biofuel projects without their subsidies.



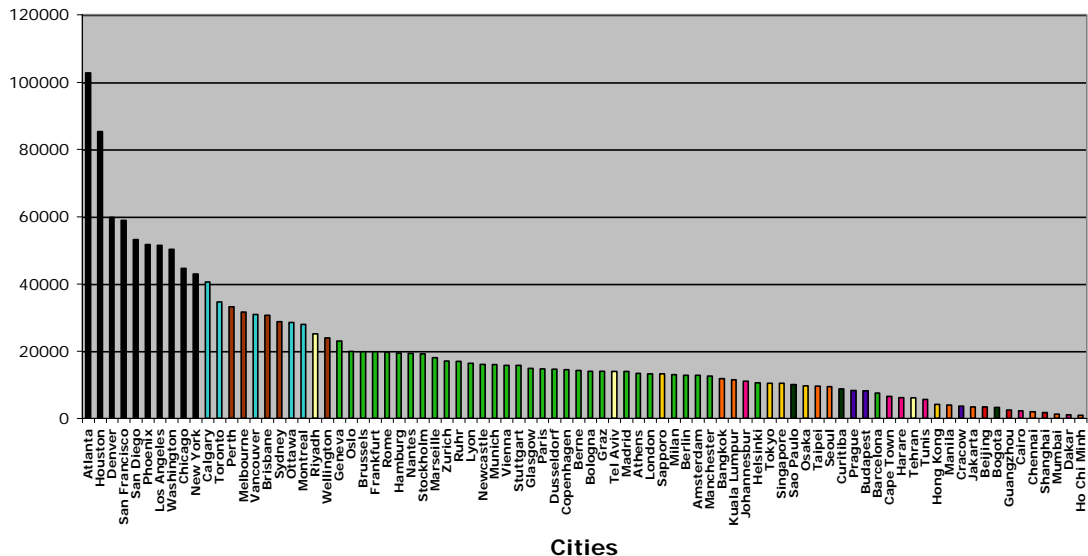
Source: CERA

<http://www.horizonoil.com.au/Press%20Releases/2008/November/HZN%20Chairmans%20address%20and%20presentation.pdf>

- The marginal cost of oil production is thus around the \$70 to \$80/bbl mark so the price could be expected to hover around there until demand pushes it into the more expensive options. As long as oil markets and financial markets return to something like a sane process.
- What is very clear is that **no further economic expansion can occur based around oil prices that are less than \$40 a barrel** which was the assumption of most in the financial community until recently. Projects with debt based around that assumption remain vulnerable. This includes a swathe of suburban and peri urban developments as well as many toll road projects.
- A similar analysis can be made based around climate change. Lack of confidence in any fossil fuel-based growth has seeped into all financial markets since the work of Nicholas Stern and Ross Garnaut demonstrated the importance of early action over climate change. Climate change governance will now progressively push the price of carbon up, making suspect those projects already debt financed using assumptions of cheap carbon.

- The economy of cities everywhere are thus vulnerable to oil. However some cities are much more vulnerable than others as shown in the figure below based on data we collect on global cities.
 - i. These data are for city regions in 1995 and include all the gasoline and diesel for private passenger travel.ⁱ They show:
 - ii. US cities dominate in their oil consumption and car use with a significant difference between Atlanta at 103 GJ/person, Houston 75 GJ/person and New York at 44GJ/person. (Note: 1 GJ of fuel equals 28.8 litres of gasoline equivalent or 7.8 gallons).
 - iii. Australian, Canadian and New Zealand cities follow this with 30 to 40 GJ/person.
 - iv. All European cities use less than 20 GJ/person and reach as low as 12 GJ/person in Helsinki and 8 GJ/person in Barcelona; Eastern European cities are even lower between 5 and 10 GJ/person with Cracow lowest at 2GJ/person.
 - v. Wealthy Asian cities (Sapporo, Taipei, Tokyo, Osaka, Seoul, Hong Kong and Singapore) are also extremely low with 5 to 10 GJ/person.
 - vi. Cities in developing countries are scattered throughout this array but apart from Riyadh and Tel Aviv are less than 8 GJ/person and mostly are less than a few GJ/person.
 - vii. The developing cities to the right of the graph (Jakarta, Beijing, Bogota, Guangzhou, Cairo, Chennai, Shanghai, Mumbai, Dakar and Ho Chi Minh City) are hardly measurable on the same scale as those to the left of the graph.

Private Passenger Transport Energy Use per Person, 1995



- Vulnerable cities such as those in North America and Australia need to respond to the crash in much more dramatic ways than those cities where gasoline and diesel are only a small part of their economies.
- All attempts at expansion of their economies based on further use of oil will cause serious impacts on their future ability to adapt. This particularly applies to new high capacity road systems.
- **How can oil-vulnerable cities create an economy that reduces their oil use and creates a more resilient future?** In our new book 'Resilient Cities: Responding to Peak Oil and Climate Change' (Newman, Beatley and Boyer, Island Press) we set out a range of technological, land use and governance options based on experience of where these are beginning to be demonstrated. Simply put....
- **Electrified transit.** This means high capacity electric Metros and Suburban Rail (heavy rail) with their associated dense centers or Transit Oriented Developments. It also means plug-in electric buses (already quite common in some cities) and electric light rail with their associated local corridors of denser linear development.
- **Electrified vehicles.** This means plug-in electric vehicles (and plug-in hybrids) which together with a range of smaller electric vehicles like scooters, gophers and golf carts, are associated with more dispersed land uses. The key value in these plug-in vehicles is that they enable renewable energy to be 100% of a city's grid through providing a storage mechanism (they are likely therefore to be part of the transport systems in denser parts of the city as well, though supplementary). We call this **Renewable Transport**. See www.sustainability.curtin.edu.au/publications.
- Electrified rail and the associated denser land uses will be cheaper and more resilient than the road-based dispersed kind of development as we have shown in a number of

publications, including a recent assessment of the costs of urban development for Parsons Brinckerhoff (www.sustainability.curtin.edu.au/publications). However most cities have a combination of these land use types and although dispersed land uses will be more vulnerable they cannot be abandoned - some extremely dispersed parts of cities may need to be.

- Ruralising cities based around local food production is unlikely to occur as cities will still need to be cities providing a range of opportunities not available in rural areas. However cities can incorporate greater local food production as in Cuba though they will remain primarily urban and not rural in function. Ruralised land uses in peri urban areas that are highly car dependent are likely to die first.
- Plans to rebuild local economies will need to factor in how to reduce car use and create more walkable and bikeable local areas. Green buildings and green industries will not create green cities unless they are based around electric renewable transport or non motorised transport.
- It is time to refill the economic balloon based around these innovations, not try to reinflate the old oil-based urban development paradigm.

ⁱ Data are from Kenworthy J and Laube F (2001) **The Millennium Cities Database for Sustainable Transport.**, UITP, Brussels, which was a study of 100 cities (16 were incomplete) and 27 parameters using highly controlled processes to ensure comparability of data. See also Kenworthy J., Laube F., Newman P., Barter P., Raad T., Pobooc C. and Guia B. (1999). **An International Sourcebook of Automobile Dependence in Cities, 1960-1990.** Boulder: University Press of Colorado.