Peak oil: why it will not help the climate change problem

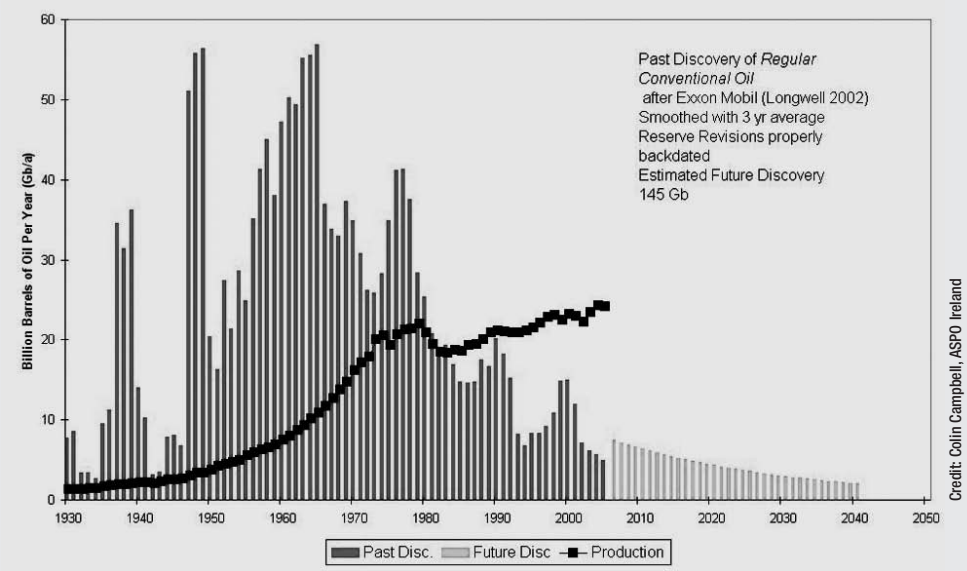
Mandy Meikle argues that the problems of peak oil and climate change must be tackled together.

While climate change is finally starting to receive significant political attention, there is a parallel energy problem that is not: peak oil. Referring to the point at which global production of conventional oil reaches a maximum, peak oil is an economic problem that will compound the environmental and social problems associated with climate change.

Peak oil is about the end of cheap energy – not about oil 'running out'. Addressing peak oil should not divert attention away from tackling climate change: they need to be considered together. After all, we cannot talk about building a low-energy (or low-carbon) future without considering where we will get the energy from to construct such a future.

It is important to distinguish between conventional and non-conventional oil. Peak oil refers to the peak in production of conventional oil: the oil we associate with 'gushers', the oil that fuelled the 20th century. What confuses the issue is that there are also billions of barrels of non-conventional oil yet to be exploited in the form of heavy oils, tar or oil sands, oil shale, bitumen and deep-water reserves (that is, those lying at more that 1,000 feet below the seabed). These non-conventional reserves require more work (i.e. energy input) to yield each unit of usable oil. If that energy comes from fossil fuels, the resulting CO_2 emissions per unit are higher than for conventional oil. (Note that all work done to release energy will result in CO_2 emissions if the energy comes from fossil fuels – whether it is used to extract oil or to build a wind farm.)

Although we do not know exactly when this peak in conventional oil production will occur, we do know that conventional oil *discovery* peaked in 1965, and since 1981 we have been using more oil than we find (see Figure). Peak production arrives when roughly half of the global resource has been extracted. However, we do not know exactly how much oil is left today, how much will be found in the future nor what new technologies will allow more recovery from existing fields. Peak production also depends on rates of consumption. If we drastically reduced our oil consumption then the peak, assuming we have not yet reached it, would be offset somewhat (although this will not help to avert catastrophic climate change if we do so by turning to coal and non-conventional oil for our energy). Similarly, if we continue to pump every barrel we find as fast as we can, the peak will come sooner. So we will only see peak oil through the rear view mirror.



Credit: Colin Campbell, ASPO Ireland

Conventional crude oil – past and future discovery compared with production

Energy return on energy invested (EROEI)

Oil reserves, often called 'reservoirs,' are in fact sedimentary rocks containing oil and gas trapped in tiny, interconnected pores. These reserves exist under great pressure; the first oil to leave a well does so under the influence of that pressure. As nature does most of the work, the 'energy return on the energy invested' (EROEI) is high. As more oil is extracted, this pressure drops and eventually reaches a point where enhanced recovery methods are required, such as injecting water or gas.

The EROEI for conventional oil used to be over 100 – so one unit of energy invested produced 100 units of usable energy returned, leaving 99 units for doing work. Today, discovering and producing oil is increasingly energy-intensive and the EROEI has fallen to below 50. This is still a good energy return when compared with, for example, bio-ethanol[1] but it is considerably less than we have been used to. Although non-conventional oils are more expensive to produce, the price of conventional oil has risen so far that they are now becoming economic to extract. Crude oil hit another new high – $100 per barrel – as this article went to press.

Consider Canada's tar sands, or oil sands as they are increasingly known, which are deposits of sand coated in a bituminous material. They lie in relatively shallow layers ranging from a few metres below the topsoil to several hundred metres down. Oil sand exploitation involves huge, opencast mine workings to extract the deposits, followed by washing in hot water to separate the oil from the sand. The 'oil' released is actually bitumen, a very thick, heavy and sticky hydrocarbon that requires a lot more energy to transform it into useful product than does conventional oil. The extracted bitumen is diluted with a solvent to enable it to be piped to an upgrading facility, where it is hydrogenated to produce synthetic crude oil. Only now is it fit to enter a refinery.

The amount of energy – in the form of gas – required to produce the heat to extract the bitumen and the hydrogen for downstream processing is vast. In a 2004 strategy paper, the Alberta Chamber of Resources announced that oil sand production should reach 5 million barrels per day by 2030, despite also acknowledging that achieving this

would consume 60% of all the gas available in western Canada each year. Even the consultant who wrote the report described this as unsustainable and likened the process to "turning gold into lead"[2].

Two tonnes of oil sand must be mined to yield one barrel of oil. To put this into perspective, while one barrel of conventional oil takes the equivalent of 2.5% of the energy contained within that barrel to produce (EROEI of 40), an average barrel of oil sand oil takes a massive 33%[3], an EROEI of 3. It is hardly surprising that we have not used this resource until now.

Peak oil, EROEI and tackling climate change

There are many reasons to link peak oil and climate change, especially given that peak oil is not about the oil running out but is about its extraction becoming messier and more energy-hungry. The situation raises some big questions. How are we going to reduce CO_2 emissions if we rely increasingly on energy-intensive, non-conventional oils? What about those countries (including China and the USA) that in response to soaring oil prices, plan to extract more coal to make liquid hydrocarbon fuels or to burn directly? What sources of energy will be available to build a new low-energy future, or to relocate vulnerable low-lying communities from coastal locations, or to do to any of the myriad tasks required to mitigate the effects of climate change?

The task ahead of us is vast. As the Arctic ice-cap melts, several countries are vying over who has the mineral rights. Is this tackling climate change?

Action is needed on a number of levels – individual, commercial and political. Sadly, the political will to tackle climate change and the looming energy crisis seriously is absent. There do not appear to be many (or any) businesses planning for a world without cheap energy, in which profits no longer spiral upwards. However, there are glimmers of hope on the horizon.

In 1977, the Centre for Alternative Technology (CAT) in Wales produced Britain's first Alternative Energy Strategy, directed at central government and policy-makers. Sadly, they did not listen. Thirty years on, CAT has developed a new strategy, called 'Zero Carbon Britain', which takes Britain's current fossil fuel consumption down to zero in two decades and powers up renewable energy to meet the reduced energy demand. The report considers Britain as a self-sufficient 'island' (this is just a modelling constraint; in reality we would not exist in energy isolation, making the assumptions in the report more likely to be achievable), and it sets its 20 year strategy within the global strategy of 'Contraction and Convergence'[4]. Energy demand reduction is led by Tradable Energy Quotas (TEQs), a certain amount of which are supplied to individuals for free and to businesses via an auction system according to the carbon budget required to limit global temperature rises to 2°C.

TEQs are only used for buying fuel (e.g. petrol or coal) but because businesses are also included in the scheme, prices on the high street will relate to the embedded energy within various products. Therefore, locally produced, low-energy products would be cheaper than equivalent, imported, energy intensive products. Government also has an allowance of TEQs, meaning that, in theory at least, it too must alter its behaviour. (The downside is that those with the means can buy more than their allocated share of TEQs). It is a fascinating strategy, full of more ideas than there is space to discuss here, but I recommend readers to download a copy of the report, *Zero Carbon Britain*, from the CAT website[5].

What can we do as individuals? Making every effort to cut down personal fossil fuel use (e.g. commuting) offers a good start. One inspiring community response is the growth of the Transition Towns movement[6,7]. Transition Towns are communities (not all 'towns') addressing the transition from oil dependency to a low energy future. People plan how to transform their community into one that is sustainable and abundant in a low energy future in 20 years time. While many Transition Towns have formed in response to concerns about peak oil, they also offer a good strategy for allaying climate change.

The Transition Towns movement started in September 2004, in Kinsale, West Cork, where Rob Hopkins was teaching a permaculture course at the local college. Rob watched the peak oil film, *The End of Suburbia* with his students, which spurred them to devise the Kinsale Energy Descent Action Plan the following year. Rob moved to Devon, where he helped to set up Transition Town Totnes in late 2005, and is now researching a PhD at Plymouth University on energy descent planning.

The Energy Descent Action Plan looks at most aspects of life, including food, energy, tourism, education and health, and is structured in such a way as to enable other communities to adopt a similar process. Given the likely disruptions that loom ahead, a community that is self-reliant for the greatest possible number of its needs will be considerably better prepared than communities dependent on globalised systems for food, energy, transportation, health and housing.

There is a growing wish by people to do something about climate change. I believe that understanding peak oil makes the choice between action and inaction much clearer.

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