

# Is 'peak oil' upon us?

*This year's Petroleum Geology Conference (PGC) – organised by the Geological Society, the Petroleum Exploration Society of Great Britain (PESGB) and the Energy Institute – was the latest of seven held over the past 30 years. Held at the QEII Centre, Westminster, it included for the first time three hour-long, lively lunchtime debates that were convened under the theme of topical 'Geocontroversies', in which two expert protagonists presented their views for and against three motions of direct relevance to the oil industry. The second of these debates tackled the issue of peak oil. John Underhill, Grant Institute of Earth Science, The School of Geosciences, The University of Edinburgh, reports.*

'Peak oil' was a term originally coined in the mid-1950s by M King Hubbert, a US Shell geologist, to describe the inflexion point at the top of a production curve at which peak production is achieved and after which the rate of oil extraction inextricably declines. Whilst the term could arguably be applied to individual wells and fields, it is most commonly used in the evaluation of prospective sedimentary basins, countries and, more especially, in geopolitical circles to describe global production. 'Hubbert's Peak', as it has become known, was surpassed in the US in 1971 and in the late 1990s in the North Sea as major fields discovered in the 1970s entered a phase of terminal decline. However, controversy surrounds whether the balance and offset between the cumulative effect of basin maturity and exploration success in new frontier basins has already been achieved or will soon be reached.

The following article summarises the debate on the motion that 'This house believes peak oil is no longer a concern'. Whilst David Jenkins, a former Technical Director and Board Member at BP, argued that peak oil is not of immediate concern, Jeremy Leggett of Solarcentury spoke against the motion. Julian Rush, the Chief Scientific Correspondent at Channel 4 News, moderated the debate and provides a personal reflection on the issues raised and the outcome of the debate.

A description of the first debate appeared in last month's issue of *Petroleum Review*. The third and final debate on the role and impact that national oil companies (NOCs) have upon our industry will be published in December.

## **For the Motion – David Jenkins**

'Historically the concerns about peak oil have focused on the inability of supply to meet progressively increasing demand. The time of peaking relates to the degree of cumulative production from the resource base and, once it is passed, declining production is inevitable. Peak oil concerns are entwined in a wistful recall for the days when cheap energy underpinned the Organisation for Economic Cooperation and Development's (OECD) rapid economic growth.

Those days are now over and will never return. The world needs to become accustomed to expensive energy. If the present concerns about

carbon dioxide (CO<sub>2</sub>) persist, the concomitant requirement to decarbonise carbon-based fuels will mean a further significant increase in costs. In fact, rather than the supply peak around which commentators have fretted, high energy prices could even engender a demand peak for oil, something which the environmental movement would applaud.

It is important to recognise that there is no near-term resource peak for oil, nor gas or coal. That is quite clear from the 2005 International Energy Agency's (IEA) *World Energy Outlook*. This gave an assessment of 'available oil resources' at over 3.5tn barrels – and this did not include any contribution from gas-to-liquids or coal-to-liquids technologies, which could become significant sources of liquid petroleum at prices above \$100/b.

The question of whether or when we experience peaks in production is fundamentally about market forces and definitely not related to a resource peak, as exemplified in the classic King Hubbert model. We had a production peak in 2008. It was caused by a very sharp speculative run up in price and led to the inevitable cut back in demand. Although the price has since come back it remains high in historic terms and demand is continuing to decline. Investment though has also been cut back dramatically and we can certainly expect a supply shortfall sometime in the next four to seven years. This shortfall will also not be related to peak oil, but it will cause a further spike in price as occurred in 2008 and then, as last year, demand will again drop. The pattern in the future is likely to be one of an extended irregular production plateau, punctuated by abrupt swings in prices leading to abrupt changes in demand.

Although at the moment we rely almost exclusively on liquid petroleum for road, marine and air transport fuels, and because mobility is so fundamental to our way of life and standard of living, we cannot conceive how we could change. This perceived dependence has underpinned our worries about global oil supply peaking. Decarbonising energy because of the fear of climate change, however irrational that fear may actually prove to be, would have the effect of forcing such change. Moving away from the internal combustion engine to an elec-

tric drive train, associated with greatly increased production of biofuels, is soon to be technically feasible and could very plausibly produce a scenario that eliminated further growth in global demand for oil. Combine this with the production capacity available from the global resource base and a future world of expensive carbon free energy, then peak oil clearly becomes an artefact of a prior economic world. In this somewhat bleak future it will definitely not be one of our many concerns.'

### Against the motion – Jeremy Leggett

“Early peakers” like me fear that the oil industry has lapsed into a culture of over-exuberance about both the remaining oil reserves and prospects of oil yet to be discovered, and about the industry’s ability to deliver capacity to the market even if enough resources exist. In the corporate world, early peakers include the recently-formed UK Industry Taskforce on Peak Oil and Energy Security (ITPOES), members of which include Virgin, Arup, Foster and Partners, Scottish and Southern Energy, Solarcentury, Stagecoach and Yahoo.

The first report of the ITPOES group of companies, released in November 2008 at the London Stock Exchange [see *Petroleum Review*, February 2009], presented evidence that total global oil production will begin declining early in the next decade. The main argument is that new capacity flows coming onstream from discoveries made by the oil industry over the preceding decade will begin dropping at that time. This problem will be compounded by other issues, including the accelerating depletion of the many old oil fields that prop up much of global oil production today, the probable exaggeration by OPEC countries of their reserves, and the failure of the “price-mechanism” assumption that higher prices will lead to increased exploration and expanding discoveries.

In the same week as the ITPOES report was released, the IEA published its latest weighty annual report, the *World Energy Outlook*. In 2008, for the first time, the IEA conducted an oilfield-by-oilfield study of the world’s existing oil reserves. It revealed that the fields currently in production are running out alarmingly fast. Crude oil production from all the world’s existing fields climbs unevenly from just below 60mn b/d in 1990 to a peak – more exactly a brief plateau – of just over 70mn b/d between 2005 and 2008. In 2009, however, crude production begins a steep descent, falling

steadily all the way below 30mn b/d by 2030. To meet the projected demand figure by 2030, up to 64mn b/d of totally new production capacity would be needed onstream within 22 years. That, the IEA points out, is fully six times the production of Saudi Arabia today.

The oil industry is not discovering giant oil fields at anything like the rate it did in the 1960s – the peak decade for discoveries. This is the case even with much better equipment for exploration today, and even after four years of rising oil prices from 2004 into 2008, when exploration was not hampered by lack of funds for investment. When the oil companies do make big discoveries, the lead times from discovery to first new oil delivered to market are long – often more than 10 years. In addition, the oil industry has profound infrastructure problems, and major issues with underskilling and underinvestment. Many drilling rigs, pipelines, tankers and refineries were built more than 30 years ago, and according to some insider experts the physical state of the global oil infrastructure is a major problem even at current rates of oil production, much less the significantly higher levels anticipated in the future. The average age of personnel in the oil industry is 49, with an average retirement age of 55 – little less than a human-resources time bomb. To add to the challenges, the industry’s overall exploration budget has actually fallen in real terms in recent years. The ITPOES fears that these issues will synergise to compound the peak oil crisis, gravely impairing society’s collective ability to respond.

In conclusion, this debate is all about the risk of a mighty global industry having its asset-assessment systemically overstated, due to an endemic culture of over-optimism, with potentially ruinous economic implications.

That couldn’t possibly happen could it?’

### Peak oil summary – Julian Rush

‘I’m old enough to remember the furore surrounding *The Limits to Growth* from the *Club of Rome* in the early 1970s. It was published while I was an undergraduate studying Engineering and Economics, and I recall it prompted considerable debate. Much maligned for predictions it didn’t actually make, not least the infamous ‘forecast’ that oil would run out in 1992, it did serve to start a debate that continues to this day about the way Earth’s growing human population uses and exploits the planet’s resources.

The debate is rightly wider now than the narrow issue of supply and demand, as both speakers implicitly recognised. It is no longer a debate based on the assumption that resources are infinite and demand enduring and inflexible, but one coloured by the realisation that peak oil must happen; it is a necessary precondition for the successful adaptation of humanity to climate change.

The issue, then, is not a matter of if, but when? And the timing is critical, especially if you accept the latest warnings from IPCC (Intergovernmental Panel on Climate Change) scientists of the need for greenhouse gas emissions cuts way beyond those currently contemplated in international negotiations.

Can peak oil be managed so there is a smooth transition to replacement technologies or fuel sources with urgency but without excessive societal disruption? Both contributors agreed oil prices will rise in the next few years; the trick for the world’s leaders is to put in place timely policy responses to use such rising prices so they act as a driver to accelerate the switch to a low-carbon economy and infrastructure. Arguably, they have been dismally slow to do so.

Or will unfettered market forces drive up oil prices so quickly, as oil companies seek to recover the costs of extraction from increasingly difficult environments like the deep sea or tar sands, that wealthy Western societies, at least, are left with difficult choices about unaffordable lifestyles? For the politicians, that is a distinctly uncomfortable scenario, one likely to be made of their own reluctance to act. The problem is, as both David Jenkins and Jeremy Leggett make clear, particularly acute when it comes to transport.

Then there are the oil companies. ‘Business as usual’ is a superficially attractive option for those unwilling or unable to adapt. Already we see many of the majors retrenching to their core businesses. But by adopting strategies designed to delay peak oil in order to protect their short-term vested interests, they risk not only exacerbating climate change – for which they are unlikely to be forgiven – but their very survival as well when their bluff is eventually called.’ ●

*Following a vote by those attending, Jeremy Leggett won the debate – the audience concluding peak oil was of concern, not so much because of its impact on the industry, but because of its importance to the planet.*