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Peak oil: the summit that dominates the horizon

Crude is still being discovered; existing fields are not being exploited to the full. So it's hard to predict the exact point at which the world's dwindling reserves will precipitate a crisis. But it's coming

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Aerial view of oil extraction at Alberta oil sands, northern Canada. Photograph: John Vidal

Massive new oil finds off the southern states of America and Brazil plus exciting discoveries in currently non-producing countries such as Ghana and Uganda sit uneasily with claims the world is running out of crude.

BP recently boasted about a "giant" strike on the Tiber field in the Gulf of Mexico and BG, the former exploration arm of British Gas, talked of its "supergiant" at the Guará prospect off South America, yet critics argue they cannot make up for the fast depletion of existing fields.

These "peak oil" believers say the high point of oil output could even have passed already. They argue it will take 10 years to develop the likes of Tiber while a string of similar discoveries would have to be made at very regular intervals to move the peak point back towards 2030 the projection used in some scenarios put forward by the International Energy Agency.

The debate has intensified in recent weeks after whistleblowers claimed the IEA figures were unreliable and subject to political manipulation – something the agency categorically denies. But the subject of oil reserves touches not just energy and climate change policy but the wider economic scene, because hydrocarbons still oil the wheels of international trade.

Even the Paris-based IEA admits that the world still needs to find the equivalent of four new Saudi Arabias to feed increasing demand at a time when the depletion rate in old fields of the North Sea and other major producing areas is running at 7% year on year.

"The fields which are producing today are going to significantly decline. We are very worried about these trends," says Fatih Birol, the chief economist at the IEA, who has gradually ramped that depletion figure upwards and has expressed deep concerns at a huge fall-off in the current levels of investment in the sector.

Birol and the wider industry are certainly well aware that the days of "easy" oil are over. The big international companies such as BP and ExxonMobil are struggling to find enough new oil to replace their exploited reserves year-on-year and Shell found itself on the end of a major fine for exaggerating its reserves report to the Securities & Exchange Commission in the US.

The energy groups used to rely on the easily exploited shallow waters in the Gulf of Mexico, politically friendly areas of the Middle East and geologically simple reservoirs off Britain to feed their refineries and petrol stations. But as these wells begin to run dry, Big Oil is being forced into ever more physically or politically demanding areas to bring home the crude – at much greater financial cost.

The Tiber find is just one example. There may be as many as 4bn barrels of oil in place – as much as the North Sea's Forties field – but the hydrocarbons are located in 4,100 feet of water, which makes them very expensive to extract. And BP admits there can be no guarantee exactly how much can be recovered from the lower tertiary sands of the Gulf.

The same is true of BG's find in the Santos Basin off Brazil. The company says at least 2bn "recoverable" barrels are in place, part of an estimated 150bn in what are, again, very deep waters – and in a part of the world that has bittersweet memories for the foreign oil producers.

Peter Odell, professor emeritus of international energy studies at Erasmus University in Rotterdam but with close links to Opec, says the new finds really are highly significant. "It shows the industry is capable of finding more oil than it uses and shows we have not come to any peak."

But that is not accounting for politics and the rise of the "resource nationalism" that has made the multinationals persona non grata in some of the great oil-bearing regions. BP was among the companies that saw its assets seized in a $30bn grab by president Hugo Chavez in Venezuela during 2007, while Exxon resorted to London's high court to try to wrestle back its interests there.

Developing countries such as Venezuela, Nigeria and Russia have increasingly been moving down the road to self-reliance, developing their own state-owned firms at the expense of the international players. But this can mean that western know-how and finance is sacrificed, slowing down the rate of oil development if not losing new reserves completely.

BP, Shell and Exxon have all had tussles with the Kremlin over their oil holdings in Russia, while Shell has found the government in Nigeria increasingly truculent over attempts to re-open the Niger Delta oil wells shut down due to guerrilla action.

The western firms see part of their salvation coming from being able to enter markets from which they have previously been barred, such as Iraq. But, leaving aside continuing questions about physical safety, both BP and Exxon have signed deals there in recent weeks on terms so tight they would have been inconceivable only a few years ago.

Exxon repeatedly threatened to walk away from any new involvement in Iraq – still one of the biggest reserve holders in the world – but in the end accepted a paltry deal, under which it would be paid $1.90 per barrel produced. It had been arguing for $4 but originally wanted control of the reserves, not just what amounts to a service fee for production.

Increasingly, Big Oil is also moving into environmentally sensitive areas that put it in collision with environmentalists, such as the Barents Sea off Norway, the waters around Alaska and – if it can get its hands on it – the Arctic itself.

In the meantime, the oil companies have moved into all sorts of "unconventional" projects such as "gas-to-liquids" (converting natural gas into petrol and diesel) and, most controversially, the tar sands of western Canada. These reserves offer enormous new quantities of oil but can only be extracted by mining or other methods which themselves require large amounts of energy and water.

The Athabasca sands being developed by Shell and others in Alberta are a number one hate target for Greenpeace and the new breed of socially responsible investment funds run by the Co-op and others. They could hold reserves of 170bn barrels, making Canada number two behind Saudi Arabia, but are only considered commercially viable if the crude price remains above at least $50 a barrel. In the first three months of the year, Shell alone lost $42m on its oil sands operations as the price of world oil slumped from its 2008 high.

The oil companies cut back their exploration and development spending in the face of lower crude prices and reduced demand from a recession-hit world. But as central banks continue to pump money into their economies, stock markets recover and China's industrialisation kicks back into gear, demand for oil has been growing.

And this is expected to continue. The IEA predicted in the just-published 2009 World Energy Outlook that oil demand would grow from 85m barrels a day today to 88m in 2015 and reach 105m in 2030. The organisation presumes that the challenge of meeting that demand can equally be met with a mixture of higher Opec production and considerably more output from unconventional sources.

These assumptions became the centre of an explosive debate three weeks ago after the *Guardian* spoke to IEA insiders who expressed deep concerns about the methodology and "politicisation" of the figures. Some senior figures are unhappy about what they see as over-optimistic forecasts coming out of the agency which represents the interests of 28 consumer countries, particularly the US.

One whistleblower said: "Many inside the organisation believe that maintaining oil supplies at even 90m to 95m barrels a day would be impossible, but there are fears that panic could spread on the financial markets if the figures were brought down further. And the Americans fear the end of oil supremacy because it would threaten their power over access to oil resources."

These expressions of concern have stoked the fires of the "peak oil" community, which has been warning for some years that global politicians are failing to move fast enough to conserve oil and move to a low-carbon economy. The dissidents include experienced oil investors such as Matt Simmons of Simmons & Co, committed green entrepreneurs such as Jeremy Leggett of Solarcentury, as well as many more impartial MPs such as John Hemming and apparently independent academics.

Kjell Aleklett, professor of physics at Uppsala University in Sweden, is one of the latter. His new report, "The Peak of the Oil Age", claims crude production is more likely to be 75m barrels a day by 2030 than the "unrealistic" 105m projected by the IEA. This would clearly lead to massive price escalation in a world that expects to see demand grow to feed the expanding economies of China and India even while politicians try to grow wind, solar and other low-carbon energy sources.

Aleklett, who runs the Global Energy Systems Group at Uppsala university, describes the IEA's report as a "political document" developed for consuming countries with a vested interest in low prices and says he too has talked to sceptics inside the Paris organisation.

The IEA has dismissed suggestions of internal ructions over the figures and has dismissed as "groundless" suggestions that the US was influencing the outcome of its forecast deliberations.

Meanwhile it has defended its overall projections and pointed out that 200 "independent" experts are given sight of its findings, satisfying its demands for peer assessment. Birol says: "We are very proud of our analysis and independence. We have a lot of critics. It's not possible to make everyone happy."

But the row rumbles on. John Hemming has just written to the IEA challenging a range of its figures while urging the UK government to take "peak oil" more seriously. The UK Industry Task Force on Peak Oil, which includes a variety of companies such as Virgin, Scottish & Southern Energy and Stagecoach, has also written to ministers calling for action.

These critics are united in their fear that "economic dislocation" is likely once the world wakes up to the potential for shortages and the price of oil races back up, not only to last summer's $147 a barrel, but more likely to $200. They point out that the world's big recessions tend to have been generated at least in part by sudden escalations in energy costs.

"The risks to UK society from peak oil are far greater than those that tend to occupy the government's risk thinking, including terrorism," says Will Whitehorn, a senior Virgin executive. "We fear this is because of over-estimation of reserves by the global oil industry, underinvestment in exploration and production, or a combination of the two."

The Department of Energy and Climate Change denies it is complacent, saying it accepts there is a "significant challenge" to attract the kinds of investment needed to keep the oil flowing.

It points out how it has been working with governments individually and collectively to speed up crude production levels while joining the other G20 members in calling for more transparency from producing countries over key aspects of energy output and depletion.

"We are training ministry officials in Nigeria and Iraq, for instance, to help them with licensing and other aspects of oil which will help them speed up the rate of production," explains a DECC spokeswoman.

She declines to comment directly on the IEA figures that caused the recent row but points out that Britain relied on a wide source of information and not just the agency's figures.

The UK Industry Task Force, which will produce a new report in January, is still upset that the Wicks review on energy security published this summer concluded "there is no crisis" – a position accepted by the government. Leggett, a member of the task force, argues that it was a similar lack of urgency that led to the implosion in the financial markets.