

The Economist reports:

The day of the huge integrated international oil company is drawing to a close.

ON THE surface, things look pretty good for the big, listed oil companies. The world wants more of what they produce than ever before. The price it sells for is high and the profits are rolling in. Exxon Mobil, with a market capitalisation of \$417 billion, vies with Apple as the world's most valuable listed company. Royal Dutch Shell is the most valuable firm on the London Stock Exchange. Chevron employs 62,000 people; Total operates in more than 130 countries. In BP's case the big numbers are more calamitous—it may end up paying out \$90 billion in fines and compensation stemming from the Deepwater Horizon disaster. But its ability to do so and stay standing is a perverse sign of the company's underlying strength.

In the 1990s, when the oil price dipped, a round of mergers turned the “seven sisters” of the 1950s—BP, Esso, Gulf Oil, Mobil, Royal Dutch Shell, SoCal and Texaco—their descendants and some smaller fry into this new set of “supermajors”. Soon afterwards global economic expansion further increased the demand for oil that had grown for a century, and set its price soaring (see chart 1). Things looked good for the new giants. But the rapid growth of emerging markets also exacerbated a half-century-long trend for power over that oil to shift to the countries where it is found.

In the 1950s the seven sisters controlled some 85% of global reserves. Today over 90% of reserves are under the control of national oil companies (NOCs) which are owned, at least in part, by the governments sitting on the oil in question. In the past the NOCs relied on the technological expertise, project-management skills and global reach of the big international oil companies to produce, refine and sell their oil. These days more and more NOCs are able to do without the supermajors' help.

Twinned peak

This means the supermajors are increasingly reliant on oil which is hard to get at: either because of geology (oil buried deep underwater and far from any shore); or because of chemistry (oil mixed up in tar sands and the like); or because of politics (oil in countries politically difficult to deal with). Their size, know-how and experience serves the companies well in such plays. But they are spending more and more money to produce less and less of global oil output. That is fine as long as the world goes on wanting more and more oil. But what if it doesn't?

For years some researchers have been claiming that the world's production of crude oil would soon start to decline at more or less the speed it had risen, citing the drop off in production in the lower 48 states of America after its early-1970s peak as precedent. So far they have been proved wrong. Extraction technology has improved, allowing firms to exploit previously inaccessible resources. Unconventional oil seems abundant, if more expensive to extract. But some analysts are now pointing to the possibility of another peak—one not of supply, but of demand.

The forecasts of future demand used by the supermajors show oil sales rising inexorably as more cars hit the roads, more trade crosses the oceans and more aircraft take to the skies. The International Energy Agency (IEA), a rich-country club, and other independent forecasters tend to agree. Oil is mainly a transport fuel, with 60% of it used to move things (the rest goes on power, petrochemicals and other industrial uses) and the world wants more transport. BP reckons that emerging economies will push demand for oil from just under 90m barrels a day (b/d) now to 104m b/d by 2030. Exxon sees the thirst reaching 113m b/d by 2040, a growth rate of around 0.8% a year.

None of this growth is expected in the rich world, where the supermajors are based. Oil demand in developed countries has been falling since the mid-2000s, the result of more efficient vehicles and of demographic trends that have seen car-ownership and car use peak, as well as of a recession. Instead, it is expected that demand will boom in the rest of the world, rather as it did in rich countries two generations ago, except on a scale that reflects the far larger populations getting mobile.

But emerging economies will never see the sort of gas guzzlers that Detroit used to churn out in the 1950s and 1960s, when governments which took much less care of the environment had little reason to constrain the use of gasoline. The world's new cars will have ever higher fuel efficiencies as time goes on. In March China introduced stringent fuel standards of 6.9 litres per 100km (34 miles per gallon) by 2015 and 5l/100km (47 mpg) by 2020. Such measures will not on their own cancel out the effects of the number of cars growing by 7% a year, but they will cushion them. With cars getting 3-4% more efficient each year, and trucks improving at about half that rate, analysis by Citi, a bank, shows demand in 2020 3.8m b/d below what it would be without such efficiency gains (see chart 2).

So most vehicles will be burning less petrol. Some will be burning none at all. The opening up of unconventional natural-gas reserves in America has made natural gas there a quarter the price of petrol, and as a result it is replacing oil at the fuel pump (and in the petrochemical plant). Compressed or liquefied gas is finding its way into the tanks of trucks, buses and delivery vans. A fifth of America's buses run on natural gas, as do two out of every five new garbage trucks. Caterpillar and GE, two large engineering companies, are both working on natural-gas-powered railway trains. TOTE, a shipping company, has ordered the first container ships built to run on liquefied natural gas.

Between a NOC and hard place

Filling up with natural gas is sure to spread as fracking and other new production techniques pick up beyond America; using gas to drive vehicles will in many cases be easier than liquefying it for export or putting it into pipelines. This could slice another 3.5m b/d from oil demand by 2020. Copious gas is also being used instead of oil in places where oil is still burned to generate electricity, such as the Middle East, potentially putting 3m b/d more oil onto global markets. If nuclear power takes off in the region—two plants have been started in the UAE—that will

displace oil demand, too. Reduced subsidies for oil use, common in oil-producing countries but increasingly unaffordable, will also dampen demand. Citi, using the most aggressive assumptions about gas substitution, calculates that oil demand could peak at less than 92m b/d in the next few years, far below what the supermajors expect. A study last year by Ricardo, an automotive-technology firm, came to a similar conclusion.

It may be that Citi and Ricardo are overestimating the factors that will reduce the thirst for oil; peak demand may not be so close or so low. But if the IEA and the oil companies are overestimating demand it would not be for the first time. In the late 1990s the IEA thought that by 2020 the world would be getting through 112m b/d. Now it puts the figure at about 97m b/d.

If demand levels out sooner than expected and prices start to fall, the firms extracting oil at the highest cost will suffer because they are shut out of cheap oil. According to Bernstein Research, the marginal cost of producing new barrels of oil from inhospitable countries or terrains is now around \$100 a barrel, roughly the same as the current price. And it is in those expensive production sites that the supermajors do more and more of their business.

Half the supermajors' long-term capital spending now goes on costly unconventional or deep-water oilfields, largely because production-sharing arrangements and licences to drill in the NOCs' backyards are increasingly hard to find. The big NOCs now make up six of the ten largest oil producers in the world (see table). Some of the NOCs still lack the know-how and the capital to get to their oil on their own, and thus seek out supermajors to help. But others can do everything for themselves. Saudi Aramco, Brazil's Petrobras, Petronas of Malaysia and others think they have learned what the supermajors have to teach them. Their governments have used oil revenues to build up the big pots of cash needed to fund giant oil- and gasfields.

What is more, the supermajors are no longer the only game in town when it comes to providing the NOCs with any help they may need. Oilfield-service companies started to burgeon in the 1980s when big companies thought it wise to outsource drilling and other aspects of production. Oil was relatively easy to come by, and operating a rig was a low-margin business.

Firms which grew up then, such as Halliburton and Schlumberger, can now offer NOCs a wide range of support services. These companies are also moving beyond just providing services for a fee; they are taking on project management and shouldering some of the financial risk in projects they are involved in.

Shale fail

Helped by the service companies, the larger and more ambitious NOCs are not merely less dependent on supermajors than before—they are increasingly competing with them on big projects outside their home markets and in the development of new technologies. According to Bain & Company, a consultancy, the supermajors invested \$4.4 billion in R&D in 2011. The oil-service companies invested \$2.3 billion. But five of the biggest NOCs invested \$5.3 billion. Since

2005 the R&D budgets of those five NOCs have been growing twice as fast the supermajors'. Brazil's Petrobras is now second to none when it comes to ultradeep oil exploration. China's Sinopec and some other NOCs are developing in-house service firms to offer to other NOCs the know-how that once came from the big international companies. The expertise that used to be particular to the supermajors and their predecessors is ever more dispersed and available.

Assuming the risk of big projects, a role in which the supermajors excelled, is another area where they face competition. Deep-pocketed NOCs, often with access to capital from their governments on much better terms than a supermajor can get it from the markets, are spending heavily to acquire undeveloped fields in emerging territories such as Africa. Chinese oil companies are particularly keen to spread their wings, partly because China, short of domestic supplies, is keen to secure crude where it can, and partly because international expansion gives Chinese oil firms, like CNOOC and Sinopec, an opportunity to operate with a good deal more freedom than they can at home.

This comes at a time when the supermajors have had less success than they would have wished in opening up fields. They did a decent job of finding new places to drill in the deep waters off Angola and Nigeria and the giant gasfields in Kazakhstan in the early 2000s. More recently smaller and nimbler independent oil firms specialising in exploration and production have started stealing a march in new territories and technologies.

Catching up with such opportunities by buying the exploration-and-production companies involved is harder for the supermajors than it used to be, because the NOCs are after them too. According to Deloitte, a consultancy, NOCs spent \$113 billion on such deals in 2012, more than three times what they spent in 2011 and nearly half the total. All told, the supermajors are now responsible for only 25% of capital spending in exploration and production. Exxon has been the world's biggest spender on exploration and production since the mid-1980s. This year, according to Barclays, a bank, PetroChina will take its place.

Shale gas is an obvious example of a novelty the supermajors did not expect. The American gas boom was driven by small companies such as Mitchell Energy (see our Schumpeter column). Bain points out that this was bad for the big companies not just because they missed an opportunity to produce more gas. They also missed an opportunity to master new technology that they could then have profited from and exported around the world.

The gasman cometh

Chinese firms have targeted smaller American shale drillers such as Chesapeake Energy for investment to get their hands on technology that can be transferred to their vast shale bed at home. Exxon, always the shrewdest oil company, cottoned on the fastest and acquired XTO, an American shale firm, for \$41 billion in 2009. But coming late it paid too much for it. Gas prices in America have since languished because of the glut that shale has brought.

The supermajors also overlooked east Africa, where the independents Tullow, Anadarko and Ophir are in the driving seat. Larger independents, BG and Hess,

were prominent in Brazil's massive pré-sal ("below the salt") offshore finds.

As well as missing some good opportunities, the supermajors seem to be pursuing some dubious ones. Shell's misfiring attempts to explore the Arctic, now abandoned until 2014 after damage to vital equipment, look like an extreme example of lack of choice. BP's protracted and ham-fisted attempts to discard its Russian partners, TNK-BP, in favour of another liaison in Russia with Rosneft also suggested a firm desperate for new sources of growth, however risky, rather than the steady income that TNK-BP brought. Exxon's investments in Central Asia, and its own recent joint venture with Rosneft, are hard to square with the company's well-honed modus operandi of aversion to risk coupled with a brutal pursuit of return on capital employed.

Poor choices and increased competition may explain deteriorations in the supermajors' reserve replacement ratios (RRRs), a measure of the amount of oil discovered compared with production. In 2012 total hydrocarbon replacement (including gas) at Shell was a slender 44%. BP's was 85% and Total's 93%; that means reserves at all three are shrinking. Exxon's RRR, which has not fallen under 100% for decades, was a more comforting 115%, and Chevron's was 112%. But of Exxon's 1.8 billion barrels, high-cost shale oil from the Woodford and Bakken fields in America accounted for almost 750m. Around 50% of Exxon's reserves are now in heavy, unconventional or deep-water oil, compared with 17% in the early 2000s.

The supermajors are now spending \$100 billion a year between them on exploration and production. But this level of effort has not impressed investors; their share prices (with the exception of Chevron's) have been flat for years. Nor has it yielded net new oil; their output fell by 2% between 2006 and 2011. What it has delivered is greater gas production, a likely harbinger of things to come. The supermajors are finding themselves increasingly in the gas business. For most of them gas is currently more than 40% of their production—for Shell and Exxon it is more than 50%.

Oil and gas differ in several respects, none of them very good news for the supermajors. Because it requires the construction of expensive pipelines or liquefaction plants, gas is less profitable. It also needs to be marketed, with customers secured upfront to finance the vast cost of extraction at scale. And it could be susceptible to a steep worldwide drop in prices. The era in which most gas is sold at prices indexed to that of oil is coming to an end. Fields currently under development could provide a glut of gas in the second half of the decade which might put paid to indexation altogether.

What can the supermajors do about these threats? Spending heavily on replacing reserves to keep investors happy is not working. Selling off bits of the firms that no longer make sense, such as refineries, can help; ConocoPhillips hived off its upstream exploration and production from refining in 2011. But it hardly counts as a long-term growth strategy. Reviving unique in-house technology might help.

It will be an unhappy thought to many, but BP's travails in the wake of the Gulf of

Mexico disaster may be guide to the supermajors' future. Forced to sell assets to raise cash to pay fines, it has found that those sales are often followed by a rise in the company's share price. This suggests that investors like the idea of smaller, fitter oil firms. Rather than push towards ever more esoteric frontiers, the supermajors might do better to slim down and turn away from the oil that they prize so highly but that the world may no longer want ever more of—and that others can exploit equally well. They will find this hard, though. "Oil supermajor" has a much better ring to it than "fairly large gas producer".