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## Oil Officials See Limit Looming on Production

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A growing number of oil-industry chieftains are endorsing an idea long deemed fringe: The world is approaching a practical limit to the number of barrels of crude oil that can be pumped every day.

Some predict that, despite the world's fast-growing thirst for oil, producers could hit that ceiling as soon as 2012. This rough limit -- which two senior industry officials recently pegged at about 100 million barrels a day -- is well short of global demand projections over the next few decades. Current production is about 85 million barrels a day.

The world certainly won't run out of oil any time soon. And plenty of energy experts expect sky-high prices to hasten the development of alternative fuels and improve energy efficiency. But evidence is mounting that crude-oil production may plateau before those innovations arrive on a large scale. That could set the stage for a period marked by energy shortages, high prices and bare-knuckled competition for fuel.


The current debate represents a significant twist on an older, often-derided notion known as the peak-oil theory. Traditional peak-oil theorists, many of whom are industry outsiders or retired geologists, have argued that global oil production will soon peak and enter an irreversible decline because nearly half the available oil in the world has been pumped. They've been proved wrong so often that their theory has become debased.

The new adherents -- who range from senior Western oil-company executives to current and former officials of the major world exporting countries -- don't believe the global oil tank is at the half-empty point. But they share the belief that a global production ceiling is coming for other reasons: restricted access to oil fields, spiraling costs and increasingly complex oil-field geology. This will create a global production plateau, not a peak, they contend, with oil output remaining relatively constant rather than rising or falling.

The emergence of a production ceiling would mark a monumental shift in the energy world. Oil production has averaged a 2.3% annual growth rate since 1965, according to statistics compiled by British oil giant BP PLC. This expanding pool of oil, most of it priced cheaply by today's standards, fueled the post-World War II global economic expansion.

On Oct. 31, Christophe de Margerie, the chief executive of French oil company Total SA, jolted attendees at a London conference by openly labeling production forecasts of the International Energy

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**OIL CEILING**

- **What's New:** Some oil CEOs are now saying the world is approaching a production plateau beyond which oil output can't keep rising.
- **What's at Stake:** If oil supply can't keep pace with rising demand, the potential exists for higher prices and energy shortages.
- **More Oil?** Some industry insiders, however, believe oil production can meet demand through 2030, at least.

Agency, the sober-minded energy watchdog for industrialized nations, as unrealistic. The IEA projects production will grow to between 102.3 million and 120 million barrels a day by 2030. Mr. de Margerie said production by 2030 of even 100 million barrels a day will be "difficult."

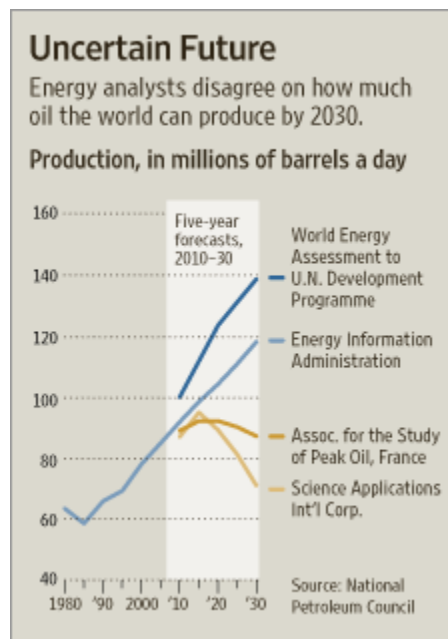
### Speaking Clearly

This is "the view of those who like to speak clearly, honestly, and [are] not just trying to please people," he bluntly declared. The French executive said many existing oil fields are being depleted at rates that will damage their geologic structures, which will limit future output more than most people allow. What's more, some nations endowed with large untapped pools of oil are generating so much revenue from their current production that they feel they don't need to further develop their fields, thus putting another cap on output.

Earlier this month, James Mulva, the chief executive of ConocoPhillips, echoed those conclusions in a speech at a Wall Street conference: "I don't think we are going to see the supply going over 100 million barrels a day.... Where is all that going to come from?" He questioned whether the industry has enough support services and people to execute projects to add that much oil production.

Even some officials from member states of the Organization of Petroleum Exporting Countries, which has long insisted on its ability to supply the world with fuel for decades hence, are breaking ranks and forecasting limits. The chairman of Libya National Oil Corp. said at the same London conference the world will have difficulty producing more than 100 million barrels a day.

A former head of exploration and production at Saudi Arabia's national oil company, Sadad Ibrahim Al Hussein, has also gone public with doubts. He said in London last month that he didn't believe there were enough engineers or equipment to ramp up production fast enough to keep up with the thirsty global economy. What's more, he said, new discoveries are tending to be smaller and more complex to develop.



Many leaders of the industry still dismiss the idea that there is reason to worry. "I am no subscriber to the theory that oil supplies have already peaked," said BP's chief executive, Tony Hayward, earlier this month in a speech in Houston.

Exxon Mobil Corp. Chief Executive Rex Tillerson has said that if companies had better access to the world's oil reserves, production would increase and prices would go down. "Sufficient hydrocarbon resources exist to play their role in meeting this growing global demand, if industry is allowed to access them," he said in a speech this month. If access were granted, Exxon Mobil believes the industry would be able to raise fuel production to meet demand in 2030 of 116 million barrels a day.

The oil industry has long been beset by doom-and-gloom scenarios, which so far haven't panned out. "The entire oil industry in the late 1970s was convinced the price [of oil] would be \$100 by 1990 and we would need huge oil shale mines" to exploit oil locked away

tightly in rock, says Michael C. Lynch, president of Strategic Energy & Economic Research Inc. Of course, that didn't happen, as discoveries ushered in new eras of low-priced oil in the mid-1980s through the late 1990s.

U.S. government experts are optimistic -- to a point. The Energy Information Administration, the data arm of the Energy Department, forecasts world oil production will hit 118 million barrels a day by 2030.

But the agency warns that its prediction might not pan out if resource-rich nations such as Venezuela and Iraq don't invest enough in their operations.

"We know that the world is not running out of energy resources, but nonetheless, above-ground risks like resource nationalism, limited access and infrastructure constraints may make it feel like peak oil just the same, by limiting production to something far less than what is required," said Clay Sell, deputy secretary of energy, in a speech in October. Resource nationalism refers to tightening state control of oil fields to achieve political aims, often by restricting outsiders' ability to develop the oil for world markets.

### **'Undulating Plateau'**

Two or three years ago, it was far more common for oil analysts and officials to trumpet the potential of new technology to harvest more oil. In a report last year, Cambridge Energy Research Associates, a prominent adviser to energy companies, made the comforting prediction that oil production could reach 110 million barrels a day by 2015, and "more than meet any reasonable high growth rate demand scenario we can envisage" up to that date. Because of progress being made in extracting oil through new methods, CERA said it found "no evidence" there would be a peak in oil flows "any time soon." In a later report, CERA said world oil production won't peak before 2030 and that even when it does, production will resemble an "undulating plateau" for one or more decades before declining gradually.

Oil companies have seen several years of bull-market prices, and thus of trying to produce more. This has given their executives a better sense of what is and isn't possible.

One limit: Many people think most of the world's giant fields already have been discovered. By 1970, oil-industry explorers had discovered 10 giants that could each produce more than 600,000 barrels a day, according to Matt Simmons, chairman of energy investment banking firm Simmons & Co. International. Exploration in the next 20 years, to 1990, yielded only two. Since 1990, despite billions in new spending, the industry has found only one field with the potential to top 500,000 barrels a day, Kazakhstan's Kashagan field in the Caspian Sea. And Mr. Simmons notes it is proving expensive and difficult to extract.

Big strikes are still possible. This month, Petróleo Brasileiro SA announced a deep-water find off Brazil's Atlantic coast that appears to be the largest discovery since Kashagan.

But some of the most promising geological formations are in locations that are inhospitable, for reasons of geography or, especially, politics and strife. Output from Iraq's rich fields is unlikely to grow much until security improves and outside investment returns. The future of Iranian and Nigerian production is likewise clouded by geopolitical and local instability.

Labor and construction bottlenecks also are making it difficult to develop proven fields. One of the largest obstacles is the booming commodity markets themselves: The prices of raw materials used in oil-field platforms and equipment has escalated. And during the years of low or moderate oil prices in the 1980s and 1990s, companies didn't develop enough geologists and other skilled workers to supply today's needs. "Years of underinvestment in new talent have led to a limited and aging pool of skilled workers," noted Andrew Gould, the CEO of oil-service giant Schlumberger Ltd., last month.

High oil prices have also led to steep cost inflation for drilling rigs and other equipment. Costs have soared so much that the industry is falling behind in the investment needed to sate expected future demand. To meet demand forecasts of 90 million barrels of oil a day in 2010, the industry needed to have spent \$350 billion on drilling and producing in 2005, argues Larry G. Chorn, chief economist of Platts, the energy and commodities-information division of McGraw-Hill Cos. But the International Energy Agency estimates that spending on oil-field production in 2005 came to only about \$225 billion, he says.

A failure to spend enough in the past few years "may have already put the industry behind the spending curve," Mr. Chorn says. As a result, he predicts "temporary shortages over several years, causing debilitating price spikes."

Compounding the problem: Most of the world's biggest fields are aging, and production at them is declining rapidly. So, just to keep global production at current levels, the industry needs to add new production of at least four million daily barrels, every year. That need is roughly five times the daily production of Alaska, with its big Prudhoe Bay field -- and it doesn't assume any demand growth at all.

### **Rate of Decline**

Mr. Simmons scoffs at estimates that production from proven fields will decline only 4.5% a year. He thinks a more realistic rate of decline is 8% to 10% a year, especially because modern technology actually succeeds in depleting fields faster.

If he's right, the industry needs to add new daily production of at least eight million barrels -- 10 times current Alaskan production -- just to stay even.

Mr. Simmons thinks the world needs to shift its energy focus from climate change to more immediate concerns. "Peak oil is likely already a crisis that we don't know about. At the furthest out, it will be a crisis in 2008 to 2012. Global warming, if real, will not be a problem for 50 to 100 years," he says.

Oil executives who believe a production ceiling is coming are making plans to stay relevant in a world where oil production is constrained.

Mr. de Margerie said at Total's annual meeting this spring that the company was "looking into" nuclear-industry investments and had hired nuclear experts to help make strategic decisions. ConocoPhillips recently said it was considering building a commercial-scale plant to turn plentiful U.S. coal into natural gas.

Soaring energy prices have breathed new life into projects targeting "nonconventional" oil, such as that trapped in sand or shale. But these sources can't be tapped nearly as quickly or inexpensively as the big oil finds of the past.

### **Vivid Example**

Canada's massive oil-sands deposits, which hold the largest oil reserves after Saudi Arabia's, offer a vivid example. They contain an estimated 180 billion barrels of oil. But after years of intensive development and tens of billions of dollars of investments, the sands are producing only a little more than 1.1 million barrels of crude a day. That's projected to reach three million a day by 2015. The oil deposits are so heavy that companies must either mine them or slowly steam them underground to get the oil to flow out of the sand.

Randy Udall, co-founder of the U.S. chapter of the Association for the Study of Peak Oil and Gas, has written that these unconventional oil supplies are like having \$100 million in the bank, but "being forbidden to withdraw more than \$100,000 per year. You are rich, sort of."

As these uncertainties mount, there is growing hope that Saudi Arabia, which has about 20% of the world's oil reserves, would ride to the rescue if needed. Saudi Aramco, the national oil company, has embarked on an ambitious plan to increase its daily production by 30%, or three million barrels, early next decade, and thus reclaim the title of top producer from Russia. But Mr. Al Hussein, the former Saudi oil executive, now an independent consultant, said others aren't doing as much, leaving the world

entirely dependent on Saudi Arabia to provide extra capacity.

"Everyone thinks that Saudi Arabia will pull us out of this mess. Saudi Arabia is doing all it can," he says in an interview. "But what it is doing, in the long run, won't be enough."

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