

# World Oil Crunch Looming?

Even those who believe there's plenty of oil left in the ground to meet rising demand are warning that the final crisis could come uncomfortably soon

Breathing a sigh of relief as the price of gasoline plummets toward \$2 a gallon and maybe beyond? Thinking \$100-a-barrel oil was just a passing inconvenience? Think again.

The fall in oil prices will likely be short-lived, say those in the know. Although price spikes and drops may recur for years, says economist Fatih Birol, "we think the era of cheap oil is over." He and colleagues at the Paris-based International Energy Agency (IEA) just released their *World Energy Outlook 2008*. IEA analysts see enough oil still in the ground to satisfy ever-rising demand for decades to come—assuming the price continues to rise. But they aren't at all sure that the Middle Eastern government-owned oil companies sitting on most of the remaining oil will be pumping it fast enough a decade or two from now to meet the unbridled demands of the rest of world.

Already, countries outside oil-rich OPEC (the Organization of the Petroleum Exporting Countries) seem unable to increase production further, even with the enticement of high prices. IEA's *World Energy Outlook* sees that plateau of non-OPEC oil production continuing, putting the burden on a reluctant OPEC to make up the shortfall, if it can.

"It's getting harder and harder to find an optimist" on the outlook for

the world oil supply, says Beijing-based petroleum analyst Michael Rodgers of PFC Energy, a consulting company. Indeed, the IEA report as well as one coming from the U.S. Department of Energy's Energy Information Administration (EIA, confusingly enough) see hints that the world's oil production could plateau sometime about 2030 if the demand for oil continues to rise. Unless oil-consuming countries enact crash programs to slash demand, analysts say, 2030 could bring on a permanent global oil crunch that will make the recent squeeze look like a picnic.

## Stagnation close to home

It took 140 years for the world to consume its first trillion barrels of oil, notes oil infor-

mation analyst Richard Nehring of Nehring Associates in Colorado Springs, Colorado. Now, if long-running trends continue, the world will demand its next trillion barrels within just 30 years. Some oil analysts working from their best estimate of how much oil remains in the ground—dubbed "peakists"—see world production reaching its limits in the next few years or a decade and then declining.

Signs of strain may already be emerging. Outside OPEC, oil production has not risen since 2004, even as prices soared. IEA sees no recovery in this non-OPEC production from conventional oil fields. Moreover, it projects that the plateau in conventional oil will turn into a decrease beginning in the middle of the next decade, accelerating through to 2030. Only the growth of production from expensive unconventional sources, such as mining tarry sands in Canada, will keep total non-OPEC production from falling during the next 20 years, according to IEA.

"Non-OPEC conventional production is definitely at a peak or plateau," says Rodgers. "That's starting to make people nervous. It's not what even pessimistic people anticipated." Three years ago, analysts in and out of the industry predicted that



Soon the norm? Gas-sipping vehicles would be de rigueur if OPEC doesn't come through with more oil.

**Don't stop.** Kansas will have to squeeze out more oil just to help keep non-OPEC production steady.

projects under way or planned would dramatically boost world production during the second half of the decade, sending prices back down (*Science*, 18 November 2005, p. 1106). Only in the 2010s would non-OPEC producers—who had boosted their output 35% in 25 years—falter and level off their production, analysts thought. That predicted plateau may be here already. “Despite all the work,” says Rodgers, “we can't grow non-OPEC.”

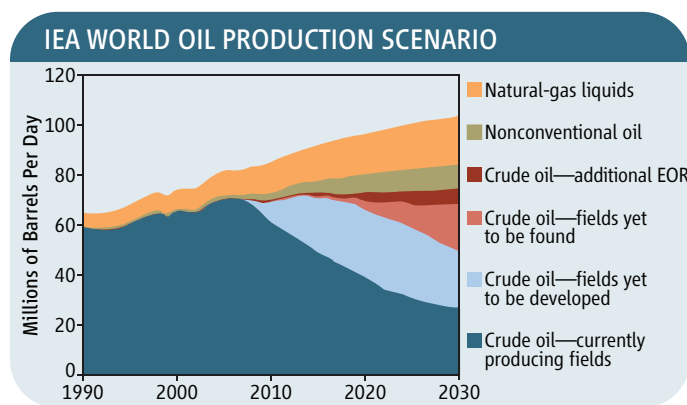
### That sinking feeling

A big part of any problem with slaking the world's thirst for oil, according to IEA's report ([www.iea.org/Textbase/npsum/WEO2008SUM.pdf](http://www.iea.org/Textbase/npsum/WEO2008SUM.pdf)), is the rapid decline of production from fields past their prime. Any new field produces increasing volumes of oil each year as more and more wells are drilled, but production eventually peaks and, in time, begins to decline. IEA studied 800 fields around the world that had already passed their peak production to see how fast they are declining—a rather rapid 6.7% decline per year, it turns out. And that rate could increase to 8.6% by 2030, IEA says, as the industry turns more and more from waning giant onshore fields to smaller fields and offshore fields, both of which decline faster after peaking.

The decline rate “is a major challenge in itself,” says Birol. “We have found that if we want to stand still—that is, continue producing 85 million barrels per day—for the next 22 years, we need new production of 45 million barrels per day to compensate for the decline. That means four Saudi Arabias.” Add on a demand increase of the sort seen the past couple of decades—equivalent to another two Saudi Arabias—and the world will have to work that much harder to meet rising demand, Birol says.

Even given the extra effort, IEA in its “reference scenario” of future world oil production (see figure) has the world production of conventional crude leveling off early in the next decade. Only a considerable increase in unconventional oil and natural-gas liquids—an oil-like byproduct of natural-gas extraction—keeps world production rising to 2030. With non-OPEC conventional production in this scenario leveling out and then falling, “this time [the effort] needs to come from the national oil companies,” says Birol.

Those are the government-owned companies with the biggest reserves of oil in the ground, principally the OPEC countries of the Middle East. “This aspect is more uncertain,” Birol adds. In the past, IEA and its U.S. equivalent, EIA, have assumed that OPEC could and would make up for any shortfall in non-OPEC production. But this year, IEA's *World Energy Outlook* warns that although there's enough oil in the ground to meet growing demand through 2030, there “remains a real risk” that oil companies—OPEC's in particular—will soon fail to invest enough in exploration and production efforts. That could precipitate a calamitous oil crunch as early as the middle of the next decade, the report says. “There can be no guarantee that [oil resources] will be exploited quickly enough” to meet expected demand, the report says.



**It'll work, if ...** In this scenario from IEA, the world's rising demand for fluid fuels will be met by growing unconventional oil and natural-gas liquids production, but only if OPEC expands its production of crude oil.

### Less encouraging still

In its first look ever beyond 2030, the U.S. EIA is finding even less support for a rosy oil scenario than IEA is. Its report is yet to be released, but EIA's Glen Sweetnam of the Washington, D.C., offices outlined preliminary results at an EIA conference in April ([www.eia.doe.gov/conf\\_pdfs/Monday/Sweetnam\\_eia.pdf](http://www.eia.doe.gov/conf_pdfs/Monday/Sweetnam_eia.pdf)). Moving beyond their usual approach of simply depending on OPEC to make up any shortfall, EIA analysts considered four factors that bear on how much oil of all sorts—conventional, natural gas liquids, and unconventional—gets produced: demand (high, intermediate, and low scenarios), how much oil was in the ground to start, what fraction of that oil will ever be extracted (some always remains no matter how great the effort), and OPEC's willingness and ability to respond to increasing demand.

Things look fine right through the rest of the century if, starting now, the whole world

severely curbs its appetite for oil, the EIA analysis suggests. In this low-demand scenario, the lingering demand for oil could be met even if the nondemand factors were unfavorable.

Still on the optimistic side, if demand were to continue rising as before and level off starting in 2030—say, in response to crash programs to increase efficiency and develop alternatives—demand could be met into the second half of the century even if a single factor were unfavorable, with one exception. If OPEC does not increase its production beyond its current 34 million barrels per day, world production will plateau within a few years, reminiscent of the potential crisis IEA sees in the middle of the next decade. Most ominously, EIA's high-demand scenario—higher demand to 2030, then business-as-usual increases in demand thereafter—“may be difficult to meet even with favorable supply assumptions,” said Sweetnam. Unbridled consumption does not seem to be an option.

### A hard place

The energy agencies “have done a good job of describing the fix we're in,” says energy analyst David Greene of Oak Ridge National Laboratory in Knoxville, Tennessee. “They're recognizing that the non-OPEC world won't be able to increase production much if at all. The IEA correctly points out the massive investment required” to meet any increase in demand. In fact, it's not clear to Greene or other analysts that OPEC has any intention

of upping production to keep the price of oil relatively low, which would not be in its self-interest. Better to keep more oil in the ground, pinching supply, and sell that oil later at a higher price. And some OPEC countries, such as Iran and Iraq, may not be capable of making the required investment, even though they have the oil.

The United States can help itself, Greene notes, but it's going to be tough. Insulating the economy from the worst oil price effects “takes a long time, 10 to 15 years. You have to do just about everything you can think of,” from further improving the efficiency of cars and light trucks to bringing on biofuels to producing more oil in the United States. “You have to have a comprehensive structure and a measurable goal. We don't have that now. I just hope the Obama Administration doesn't look at the [current] price of oil and shove the problem to the back burner.”

—RICHARD A. KERR