Uranium Supply Questions

FINDING FUEL FOR AN EXPANDED FLEET

BY PAUL WENSKE

SEN. JOHN MCCAIN, THE REPUBLICAN Party candidate for U.S. president, in June called for the construction of 45 new nuclear plants by 2030. The bold statement cheered an industry experiencing a renaissance of interest in the wake of growing concerns for rising energy costs and global warming.

Yet, the optimistic goal is rife with uncertainties, not the least of which is whether enough uranium is available to fuel that many plants. It's a question vexing some energy experts.

After all, the world presently consumes 160 million pounds of uranium fuel per year but only produces 100 million pounds. The gap, up to now, has been supplied by stored inventories of earlier mined uranium and decommissioned, diluted warheads.

"We have a 60-million-pound gap in the supply," notes Samuel B. Romberger, a geological engineer at the Colorado School of Mines. "We can't even meet our needs now from primary production," he says.

It's not that Romberger and other experts who question the goal's reality are nuclear critics. But they say reaching McCain's goal may not be easy.

"It's a major issue that's not been discussed enough," Romberger says.

Industry insiders acknowledge the challenge. But they compare it to the chicken-and-egg analogy. The industry has been in limbo for 30 years. No new nuclear plants meant low demand for fuel. Uranium's price fell to $15 a pound, hardly enough to spur full-bore exploration.

Since the lowest price was reached, rekindled interest, the promise of loan guarantees and a flurry of new plant applications caused uranium's price to shoot up last year to more than $130 a pound before settling back to $64 a pound this year. The incentive of higher prices spurred exploration.

"We believe there is sufficient fuel," says Adrian Heymer, senior director of power plant deployment for the Nuclear Energy Institute, the industry's trade group. "The fuel issue was masked by the fact that there hasn't been much mining of uranium until recently. Now it's at $64 a pound. That puts a different number on the economics."

Heymer says that achieving construction of a first wave of plants built on budget and on time would inspire confidence in the licensing process that then could spur a second wave, prompting more demand and exploration. "You are going to see the demand/supply equation begin to balance out," he says.

The United States currently has 104 nuclear plants. Official estimates anticipate 34 applications for new construction will be filed by 2010. McCain's goal is partly based on a belief that adding another 11 plants over 20 years is not that much of a stretch. "It is feasible and can be done," Heymer says. "And like anything else, success breeds success."

Senator John McCain
SOURCE: AP/ PHIL MCCARTEN

Despite renewed exploration within its borders, the United States remains a lesser player, last year producing 4.5 million pounds and purchasing 47 million pounds from other countries. Top producers are Canada, Australia and Kazakhstan, whose higher-grade ore is also easier and more rewarding to mine.

But high-quality ore is limited even in these countries, leading critics to argue there is only enough

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high-grade ore to supply present needs for 40 or 50 years, not the 100 or more the industry touts.

Ian Lowe, president of the Australian Conservation Foundation writes that at the current rate of use, high-grade ores "will last about 50 years." He further contends that if the number of nuclear plants were expanded to replace all coal-fired plants, resources "would only last about a decade or so."

He also maintains that extracting and processing lower-grade ores will, in the end, require expending more conventional sources of energy and result in more greenhouse pollution.

Fellow Aussie Martin Sevior, a physics professor at the University of Melbourne, disagrees. He says exploration has already put a positive spin on the numbers. As a result, "world uranium reserves in the commercially proved category have increased by 66 percent since 2003," he says.

"From a bigger perspective, uranium is not a particularly rare mineral in the Earth's crust," Sevior continues. "It is approximately as common as tin, which has been mined by humans for over 5,000 years and is currently produced at the rate of 300,000 tons per year," he says, adding, "It is very likely the market will be supplied adequately in the near term."

Another way proponents hope to expand the supply of uranium is by recycling it. Plants in France, a country that relies on nuclear power for 77 percent of its energy, are already using recycled fuel. French-owned Areva NP operates a plant in La Hague that recycles spent fuel for a number of nations that besides France includes Japan, Germany and Belgium.

The plant extracts reusable uranium. Areva says it recaptures 96 percent of the spent fuel, which also means less waste that has to be stored. "We could do that for almost any nuclear power plant in the United States now," says Andrew Cook, Areva NP senior vice president of sales and marketing.

The process, however, has been criticized by environmentalists and is not approved in the United States. Recycling requires building a special plant and the process is expensive. Most experts say recycling is decades off in the United States, mainly because of the cost. But if the price of and demand for fuel grows, recycling may begin to look more attractive.

Areva is supporting a small U.S. demonstration project in partnership with the Department of Energy.

"The question now is what is most efficient and what is most economical," says Eileen M. Supko, senior consultant for Energy Resources International. "There are a lot of questions on how to move forward on recycling. We'd need new regulations put in place."

In the end, the biggest obstacle to meeting McCain's goal by 2030 is the availability of the heavy forgings, vessels and components to make the plants themselves. If the plants aren't built, demand and exploration for fuel will fall back into the doldrums.

Thirty years without building a new plant has essentially cost the nation its "fabrication infrastructure," says Paul J. Turinsky, professor of nuclear engineering at North Carolina State University.

"When you say we can build 45 plants, that's the thing I'm worried about. It's going to be pushing it. We aren't going to break ground at the earliest until the end of this decade," he says.

Currently the only manufacturing plant capable of building a reactor vessel for the new plants is in Japan. Utilities in the United States are waiting for components in a long line with contemporaries from other countries. China alone plans to build 30 new plants. So it's not too surprising that the estimated cost of a new plant is rising as high as $12 billion.

Cost overruns and delayed starts helped cripple nuclear power last time around. It didn't help that vendors came up with a variety of designs that stymied uniformity in the licensing process.

Now, experts say, the focus is on the licensing process. If new plants can be completed on budget and on time, confidence is assured, says Erich Schneider, an assistant professor of nuclear engineering at the University of Texas at Austin. "If it takes 11 years, forget it, that first plant will be the last one."

Still, in the end, meeting a goal of 45 new plants by 2030 may be less important than fitting nuclear power into a reliable, long-term energy policy along with other alternative sources, including wind and solar power, says Romberger of the Colorado School of Mines.

The best way to win over the public, he says, is to ensure access to affordable energy and address the threat of global warming. "That's the strongest argument to the average person," he says.

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