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HEADLINE: Let's Look Harder Before We Leap

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BODY:

Though no one has ordered a new nuclear power plant in the United States in more than 20 years, there is talk of a nuclear renaissance. With rolling blackouts in California, natural gas prices spiking, and debate over how to reduce greenhouse gas emissions, advocates say the time has come to begin building new reactors. More support for nuclear power is almost certain to be one controversial element of the Bush administration's forthcoming energy plan.

But the question of whether to rely more heavily on nuclear energy really has two parts. First, should we extend the operating lives of existing plants? Second, should we build new ones?

The answer to the first question is a qualified "yes." The 103 reactors that provide 20 percent of U.S. electricity are performing better than ever, and many reactors' construction costs are paid off, making the power they produce comparatively cheap. Last winter, production costs of electricity (meaning fuel plus operation and maintenance, but not amortization of the initial investment in the power plant) averaged 1.83 cents per kilowatt-hour for nuclear energy, compared with 2.07 cents for coal and 3.52 cents for natural gas.

Given those numbers -- plus the current sellers' market for electricity -- reactors considered virtually worthless a few years ago are now generating billion-dollar bidding wars. And given their improved safety records, most surrounding communities have accepted the reactors' continued operation.

But the 40-year operating terms of America's nuclear plants will start expiring in 2006, and all but two will do so by 2030. (Some plants ordered in the 1970s didn't go into service until the 1990s.) If reviews by the Nuclear Regulatory Commission (NRC)

confirm that the plants can operate without reduction in safety for 20 more years, it would make sense to extend their licenses for that period -- as has already been done for the Calvert Cliffs power station in Maryland and another plant in South Carolina.

But what about building new reactors? That is a more difficult case to make. New reactors will not make sense without improvements in cost, safety, radioactive waste management and safeguards against the proliferation of nuclear weapons. Getting all of this right is a tall order. Success is not guaranteed.

Let's start with cost. For new reactors to be economically attractive, their total generation costs -- including amortization of construction -- must be competitive with the total generation costs of other energy sources. This will not happen unless construction and licensing times for nuclear plants are shortened considerably. (Delays run up big interest charges.) Moving faster will require better management by the nuclear industry and regulators alike, plus a degree of public trust that will only come from the conviction that the most worrisome issues are under control.

The public is rightly concerned about safety. True, nuclear plants have far fewer unplanned shutdowns and other "safety events" today than 20 years ago. And new reactor designs are likely to improve the record because they have passive safety systems that do not depend on failure-prone sensors, valves or human operators.

But the potential for deadly accidents remains throughout the nuclear industry. When workers at a Japanese nuclear fuel processing plant mistakenly added too much uranium to a vat in September 1999, the resulting uncontrolled fission killed two workers and exposed hundreds more to radiation. Regulations can reduce but not eliminate such human error -- and American watchdog groups charge that the NRC often does not enforce its own regulations. To support new plants, the public will have to be convinced that their safety systems are virtually foolproof.

Progress is also needed on the disposal of radio- active waste -- the "spent" fuel rods discharged from reactors after they can no longer sustain a chain reaction. A typical large power reactor discharges 20 to 25 tons of spent fuel rods per year, in bundles 14 feet long and weighing about 1,400 pounds. Still highly radioactive, these are stored temporarily in tanks resembling swimming pools, whose water provides both cooling and shielding. After some years, when their radioactivity has diminished, they can be removed and transferred to longer-term dry storage.

Currently nearly all spent fuel is held at the reactors where it was generated, but some plants are running out of storage space. The Department of Energy missed a 1998 deadline to begin taking spent fuel off of utilities' hands because DOE had no place to put it.

DOE has been investigating an underground site at Yucca Mountain, Nev., as a potential permanent repository, but this process has taken much longer than expected. Geologically, the site's complexity has surprised scientists more than once; politically,

Nevadans hotly resent being singled out as hosts for all the high-level radioactive waste from U.S. reactors (none of which are in Nevada). Whether and when Yucca Mountain will open for business is therefore unknown -- in the best case, it would be no sooner than 2010.

This continuing uncertainty undercuts support for nuclear power. In reality it is safe to store spent fuel at reactors for several decades -- and more capacity could be built at reactors now lacking it -- but without clear progress toward a longer-term option, neither the public nor investors are likely to support building new reactors.

Nuclear energy's links to nuclear weaponry may prove even harder to manage. Civilian nuclear programs have provided cover, technology and trained personnel for weapons programs in countries including France, India and Pakistan. And such operations could become sources of nuclear-explosive materials for countries that don't yet have nuclear weapons, or for criminal groups.

The principal materials of concern are plutonium and highly enriched uranium. All U.S. power reactors and nearly all foreign ones use uranium fuel that is enriched to a level still too low to make a nuclear weapon.

Bomb-usable plutonium, however -- formed in uranium-based reactor fuels as an unavoidable side effect of the chain reaction -- is another matter. Fortunately, it is quite inaccessible in spent fuel: The rods are too massive to steal easily, too radioactive to handle safely, and very difficult to process to extract plutonium in a pure form.

On the other hand, if spent fuel is reprocessed -- as it is in some other countries -- plutonium is separated out and becomes a major proliferation danger. Flows of separated plutonium can be difficult to measure and monitor, and one year's spent fuel from a large power reactor contains enough plutonium to make some 50 nuclear bombs. Therefore, the United States should continue to reject reprocessing of nuclear fuel. And if nuclear energy is to spread worldwide without undue danger, greater effort will be needed to persuade other countries that they should reject it as well.

It is not clear whether all of these obstacles can be surmounted, but the potential benefits make it worth trying. Strangely, although Vice President Cheney has called nuclear "a safe, clean, and very plentiful" energy source, the Bush administration's fiscal 2002 budget proposal offers little help with these challenges.

For the past few years, DOE has been carrying out a Nuclear Energy Research Initiative focused on improving nuclear energy's cost, safety, waste management and resistance to proliferation. The program was funded at about \$ 35 million in the budget for fiscal year 2001. The 2002 Bush budget proposal cuts that by 48 percent, and cuts funding for radioactive waste management by nearly 30 percent.

A sensible national energy strategy would look to expanding the use of nuclear energy -- but it must also have other ingredients. Its cornerstone ought to be increased efficiency in

energy use, which cuts pollution, reduces dependence on foreign oil and saves money. Renewable energy sources such as wind and solar power also offer much promise, as do advanced fossil-fuel technologies. But Bush's 2002 budget proposal cuts R&D for all of these energy-supply possibilities by at least 25 percent.

Not just for nuclear energy, then, but for the whole array of ingredients in a sensible energy mix, the country awaits a strategy -- and a budget -- commensurate with the administration's rhetoric.