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## Nuclear Go-Ahead?

California's nuclear-power debate has ended in a compromise. By defeating the stringent Nuclear Power Plant Initiative on the June 8 ballot, the electorate has permitted a more moderately restrictive legislative package to go into effect, one which will slow but not preclude nuclear power development in the state. Admittedly, the legislation passed last week will prohibit future nuclear plant construction unless the State Energy Commission confirms that certain safety conditions have been met, and additional delays could result from legislative overview procedures. But the new law will not apply to the state's three existing plants nor to the four others under construction, and it will not require removal or waiver of the Federal government's limits on nuclear-accident liability as a condition for the construction and full-scale operation of nuclear plants. With the utility industry's fears alleviated in this regard, Californians may avoid the power shortages and sharply higher electrical costs that could have resulted from passage of the Initiative.

### **Nuclear plans**

Electric utilities are counting on nuclear energy to satisfy a major portion of California's future growth in electrical demand. Recession cutbacks in demand, combined with the OPEC-related upsurge in energy prices, reduced electrical consumption in the state by 3 percent in 1974. But consumption recovered last year, and the utilities expect electrical usage to grow at a 5-percent average annual

rate during the next two decades, even if present conservation practices remain in effect and if energy prices continue to increase in real terms. This rate of growth—although well below the 8-percent average rate experienced during the 1960-73 period—would still require utilities to triple their electric generating capacity by 1995.

At present, three nuclear power plants are in operation in California. These plants, with an annual capacity of 1,440 megawatts, supplied about 6 percent of the state's total electrical requirements last year. But the utilities are planning to add at least 32 reactors by the year 1995—including three in Arizona—raising their total nuclear generating capacity to about 32,000 megawatts. If these plans are realized, nuclear-power capacity will increase far more rapidly than other energy alternatives, and thus supply almost one-half of the state's electrical requirements by 1995.

The utilities also are planning to expand coal-fired capacity significantly. At present, there are no coal-fired plants in the state, but California utilities own shares of several Mountain state facilities which supply about 8 percent of the state's total electrical needs. By the year 1995, these and other facilities could supply roughly one-fourth of the state's needs.

The utilities plan to focus their expansion efforts on nuclear and coal-fired capacity because of the problems they foresee with regard

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to the cost and availability of natural gas and oil. Natural gas may have to be phased out completely as a boiler fuel within the next decade, due to its continued shortage as well as the higher priority which residential and commercial customers will have on available supplies. Indeed, natural gas now supplies only about 15 percent of the state's electrical requirements—in contrast to its 55 percent share in 1970.

To make up for the natural-gas deficit, the utilities have had to turn increasingly to fuel oil—derived largely from imported crude—so that oil currently accounts for about 42 percent of the state's total electricity. Although oil is by far the most costly fuel per kilowatt-hour of electricity, the utilities anticipate becoming even more dependent on that fuel as a replacement for natural gas. Oil could account for 52 percent of the state's electrical requirements within the next decade. However, its share should drop sharply thereafter—perhaps to as little as 12 percent by the year 1995—as coal, nuclear and other sources take over.

Disruption of electricity supplies might have been avoided in the wake of a favorable vote on the Nuclear Initiative, but this would have necessitated the substitution of oil- and coal-fired generating capacity for nuclear power, as well as a sharp increase in fuel imports into the state. Yet given the extremely large block of nuclear power that would have been lost, it is highly unlikely that the utilities

would have been able to install the necessary alternative generating capacity in the time and amounts required to prevent serious shortages, particularly in the 1985-95 period. Nor is it certain that they would have been able to secure sufficient oil and coal supplies at acceptable price levels to make up for the loss of nuclear capacity, especially since their present plans already call for a sharp increase in the use of those fuels. The difficulties would have been accentuated if other states also had adopted nuclear moratoria or had been unwilling to export electricity or coal to California.

### **Cost savings**

The utilities thus look to nuclear energy as an assured source of adequate electrical supplies, as well as a promising source of cost savings. The price of electricity seems bound to rise in real terms over the next two decades—with or without nuclear power—as higher-cost energy resources are developed, as safety and environmental standards are implemented, and as transmission and transportation networks are constructed. But nuclear power should still retain some measure of cost advantage over coal-generated power—although the precise margin is highly uncertain—and should assuredly remain less expensive than oil-fired electricity.

In the event the Initiative had passed, the utilities would have had to add several combustion turbine units at their existing oil-fired plants

to make up for the loss of nuclear power during the next several years. Since these units burn costly distillate fuel oil and are relatively inefficient, they would push up generating costs significantly. New oil and coal-fired plants subsequently brought on stream to replace nuclear plants also would represent higher-cost sources.

The price at which an electric generating plant can sell electricity depends primarily upon its costs of capital, fuel, and operation and maintenance. Capital costs—the costs of building and financing plants and transmission lines—have risen dramatically over the past half-decade for all types of power generating facilities, due not only to the high rate of inflation but also to environmental and safety requirements. Despite this increase, most analysts estimate that capital costs/kwh of electricity for a California nuclear plant are still only about 5 to 10 percent higher than those for a comparable coal-fired plant located outside the state, although they may be as much as 100 percent greater than for a California-based oil-fired facility.

Fuel costs present other considerations. The costs of all types of fuel have risen sharply, particularly since the Arab oil embargo. But most studies have shown that nuclear fuel cycle costs are still only about one-third the costs of coal and only one-sixth those of oil. Overall, due to these lower fuel costs, nuclear power appears to be somewhat less expensive than coal-

fired electricity and far less costly than oil-fired power.

Another crucial consideration is whether nuclear power's comparative advantage will prevail some 10 to 20 years into the future, when plants currently planned or already under construction are completed. Here again, estimates vary widely, depending upon the assumptions made regarding the relative rates of inflation in various cost factors. In terms of capital costs, which comprise the bulk of the total cost of nuclear power and thus will be the deciding factor in determining its future overall competitive position, coal's comparative advantage might dwindle as its environmental costs catch up with those of nuclear.

Despite the economic factors favoring nuclear power, and despite the removal of the threat of a complete shutdown of such operations, California's utilities still face an uphill battle in carrying out their nuclear plans. They must satisfy the Energy Commission's requirements regarding the availability of satisfactory technologies for the long-term storage and reprocessing of radioactive wastes, and they must also face difficult problems relating to siting, environmental requirements and water and fuel availability. These factors all add to the immense financing requirements of nuclear installations. Nonetheless, the costs of all the possible alternatives—especially coal and oil—may be even greater.

**Yvonne Levy**