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On utilities: "Utilities see 'steady state' as death," and rightly so. Declining fuel supplies combine with an increased reliance on natural energies in Odum's model to phase out the role of utilities—contrary to the rapid growth econometricians are now predicting. The life-and-death issues prevailing in the utility industry—rate design and financing, for example—lose their meaning in Odum's steady state economy. Utilities should "plan on maintaining plant" for the transition period, Odum thinks, but "there should be no new additions."

Where do we go from here? Although he admits that net energy research is in its infancy and that an all-out steady-state campaign is premature, Odum thinks "the secret is to see (the crisis) coming and try things." As a starting point he proposes a "big pilot project" based on "intermediate energy agriculture": more land, more diversified labor, less machinery and chemicals. Project participants would engage in a kind of modern-day sharecropping, living in lower-energy housing in a rural setting. Government policy would encourage a gradual shift of the population "back to the farm," leaving remaining city-dwellers to "turn their lawns into gardens." Putting the lower-quality "free" energy of nature to work may result in a higher quality of life, Odum concludes. ■

DRASTIC STEPS TO SAVE CANADIAN TAR SANDS—THREE GOVERNMENTS KICK IN MONEY

As expected, the federal and provincial governments in Canada have bailed out the financially-strapped Athabasca oil sands plant of Syncrude Canada Ltd. The federal government in Ottawa ended by taking a 15 percent interest in the \$2 billion project, roughly an investment of \$300 million. Federal Treasury Board President Jean Chretien told *Weekly Energy Report* that Ottawa would probably continue in the project (up to about \$330 million) even if project costs drive Ottawa's share higher. Alberta has taken a 10 percent interest—worth about \$200 million—and is lending Syncrude another \$200 million in convertible debentures. (Alberta already has an unexercised option to buy a 20 percent share of Syncrude's project.) Alberta is also planning to spend about \$600 million to build the pipeline system to carry the 125,000 b/d of synthetic crude to market. The province of Ontario has taken a five percent interest in the project. Ontario's share is worth about \$100 million.

All told, the three levels of government could end up with as much as a 60 percent interest in the Syncrude plant. As a result of the negotiations, the three private partners in the project—Imperial Oil, Gulf and Cities Service—were left with about a \$1.4 billion investment to cover on their own. Imperial's share jumps from 30 percent to 31.25 percent, Gulf gets an extra 6.75 percent above its original 10 percent commitment and Cities Service drops—from the original 30 percent to 22 percent as a result of the deal to save Syncrude.

Following the move by the governments, other oil sands developers already say they want concessions similar to those offered Syncrude. These include a guarantee that output from the plant will sell at world prices. (Shell Canada Ltd. refused to join Syncrude in large part because the Canadian government refused to guarantee a minimum selling price for the synthetic crude in the \$12-\$13 per barrel range.) But energy minister Donald Macdonald told *Weekly Energy Report* that later arrivals on the oil sands scene should not expect the same favorable treatment as a pioneer like Syncrude. ■

BRITISH SCIENTISTS DISMISS 'HOT PARTICLE' THEORY

The hot particle theory—developed by Arthur Tamplin and Thomas Cochran at the Natural Resources Defense Council in the U.S.—has been dismissed as nonsense by an independent committee of medical experts in Britain. Plutonium workers are adequately protected by existing international radiation standards—although the committee proposes some minor amendments. There is no evidence, says the group's report, "that irradiation by 'hot particles' in the lung is markedly more hazardous than the same activity uniformly distributed or that the currently recommended standards for inhalation of plutonium are seriously in error."

Britain's Medical Research Council, its premier medical research agency, had asked its Committee on Protection against Ionizing Radiations to summarize present knowledge about the potential hazards to man of plutonium and its compounds. The committee of 13 doctors and scientists was asked to examine particularly the allegation that plutonium possessed unique properties that introduced entirely new risks of cancer. The report finds that plutonium's toxicity is not unique. There are other radio-elements of comparable or even greater toxicity, it says. But plutonium—particularly Pu-239—deserves special attention "since large quantities are now processed by the nuclear power industry and since these quantities will increase as the industry develops."

Thus far there has been "no cancer in man which can be confidently attributed to plutonium." That this is so, the report says, is due in large measure to the attention given to systems of radiological protection "and the caution with which safety standards have been set in the past." Commenting on the theory of Tamplin and Cochran, who claim that current radiation standards are too low by a factor of 115,000 when applied to the so-called 'hot particle' of plutonium lodged deep in a man's lung, the committee decided that their conclusions "cannot be any better founded than the hypothesis on which they are based and that is too tenuous to be worth further discussion here."