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a by-product, a fissionable material suitable for use as fuel in the projected fast breeder reactors now under development.

Mackenzie, looking 20 years ahead, says New Zealand may find it advisable to move into the very sophisticated techniques of fuel processing to recover this by-product fuel and use it in the fast type of reactor now under test at Dounreay in the United Kingdom.

A program requiring nuclear electricity generation within 10 years, starting with practically no nuclear experience, is a major project which began with the initial training of two engineers in Australia last year.

This year three New Zealand electricity department engineers and a health department scientist are going to the Atomic Energy Authority in Britain for 18 months. Two Ministry of Works engineers are already with the Authority. *William A. Scholes*

FROM SWEDEN

Satirical physicist turns librettist

The well-known Swedish plasma physicist Hannes Alfvén has entered a new field—as opera librettist.

It all started, Alfvén says, when his grandson, Gabriel, aged five, wanted a new story. So Prof. Alfvén invented a story about a computer.

The story got a bit out of hand for Gabriel, and ended instead as a satire, published pseudonymously, entitled "The Case of the Great Computer" in which human beings were rationalized out of existence.

The opera will receive its premier performance at the Royal Swedish Opera in 1969. Music will be by Swedish composer Karl-Birger Blomdahl—with electronic elaborations by several of Alfvén's scientific colleagues.

Environment engineers

Sweden is training its first group of 16 environmental engineers—specialists who will deal professionally with such problems as water and air pollution—thanks to an economic recession that has plagued the country since 1965.

Three hundred out-of-work engineers applied for the 12-month re-training course planned by the National Education Board. The first 16 selected will study such subjects as community planning, business economics and the medical and legal aspects of environmental engineering. *H. J. Barnes*

FROM MEXICO

Fishmeal revolution

Fishmeal plants light enough to be mounted on small shrimp boats have been developed with promise that they can change Mexico from an importer to an exporter of the commodity.

The republic now imports some \$8.8 million worth of fishmeal fodder and fertilizer a year, while its shrimp and fish fleets throw away huge amounts of fish suitable for the process.

The plant is produced in three basic models for output of 1, 5 and 24 tons daily. The highest capacity plant weighs 1.8 tons and is 9.84 feet long by 16.40 wide. A similar capacity United States plant weighs approximately 32 tons, measures approximately 30 by 60 feet, and is virtually ruled out for use aboard fishing vessels.

The one-ton plant weighs about 750 pounds and can readily be mounted on smaller shrimp and fishing boats.

According to engineer Carlos Diez de Sollano, his fishmeal plant takes about six seconds to produce protein-rich meal from the moment raw fish are fed into it. Protein content of fishmeal produced by the Mexican plant runs 71.26 percent, as compared with 60 percent for Peruvian fishmeal.

"No special installation is required," Diez de Sollano said, "the plant is adapted to work off the ship's engine." Competitive foreign plants require installation of several additional motors, adding weight and complicating use.

Thirty of the plants have already been exported to Ecuador, and U.S. and Japanese fishermen have shown interest.

So far, in Mexico, six ships have been outfitted with the plants, and it is hoped that through official banks, especially the National Bank for Cooperative Development, captains of fishing boats, and firms owning fishing fleets, could install plants on all their craft.

Prices for units range from \$11,200 for the one-ton model and \$17,760 for the 5-ton to \$31,360 for the 24-ton plant.

If all ships of more than 11 tons would install the plant, Mexico's fishmeal production would rise to 32,800 tons compared with the 7,100 tons produced in 1965 (latest year for which statistic are available).

Production could go much higher if smaller boats also installed plants. In shrimping operations several pounds of noncommercial fish are netted with each pound of shrimp. Until now, the fish have been wasted. But fishmeal plants can convert them into a useful product. *Emil Zubryn*

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