

Canada's problem, like that of many industrial countries, is how much to spend on the large research facilities that are becoming more and more a hallmark of modern science.

The most common solution, beyond the kind of cooperative effort exemplified by the European research group CERN, is to invest in projects which complement the installations of the neighboring industrial giants, but don't overlap. Canada's projected Intense Neutron Generator, which was recently abandoned, was such a plan: nothing in the United States can produce the flow of test particles that the ING would have generated.

Another gap-filling project, the first North American center for long-range research in hydroelectric power production and distribution problems, independent of manufacturers, is now under construction near Montreal. The first stage is due for completion in the fall.

No such facility has hitherto been available this side of the Atlantic. Privately and publicly owned producers have been spending millions in fees to European centers to test new facilities of untried design.

Hydro-Quebec, one of the largest state-owned producers and distributors of water power outside the Soviet Union, took a hard look at the constant economic drain and inconvenience of working with European testers. Dr. Lionel Boulet of Laval University in Quebec did a feasibility study; it was his plan for the \$35 million Hydro-Quebec Institute of Research that was finally adopted.

Meantime, a cooperative plan for a similar center was mooted for the Seattle area. But response from producers in the United States asked to subscribe capital was slow, partly because the site would be high above sea level and would pose transport problems for heavy units to be tested. The U.S. scheme seems to have been dropped, with industries planning to use the Hydro-Quebec facilities.

The one-square-mile site of the center is 18 miles southeast of Montreal, close to Hydro's 735,000-volt Boucherville substation, enabling researchers to use the short-circuit capability of an extremely powerful electric network.

The general research laboratory building, with offices, library and auditorium as well as labs, will be completed this year. The high-voltage laboratory is planned to be ready by the

summer of 1970 and the high-power laboratory will be finished early in 1971.

By that time, says Dr. Boulet, the staff will number some 250 scientists and technicians.

Hydro-Quebec now has a generating capacity of more than 8.3 million kilowatts. One of its achievements was development of the 735,000-volt transmission system, the world's first.

It has been decided that the new institute's research effort will be concentrated in those areas where existing North American research is weakest, or where its facilities will be superior to those of other laboratories.

In the field of power generation, the institute will study fuel cells in an attempt to develop economic units capable of generating power for remote locations. In the distant parts of Quebec where electricity is at present generated by diesel-electric sets, it costs about 10 times as much to provide electrical service as the sales of electricity yield in return.

The center will stay out of nuclear fission reactor studies, but will keep in touch with developments in fusion research against the day when fusion reactors become practical.

One of the projects the center will undertake is the testing of high-power transmission lines. Hydro-Quebec, which developed the 735,000-volt line, spent \$1.5 million to test one recent version, according to Dr. Boulet. The use of cryogenics to cool transmission lines to superconducting temperatures is a possibility that will receive special attention.

Another development to be sought by the institute will be miniaturization of devices that monitor power levels on individual lines, to prevent short circuits. At the Boucherville station there are 24 of these units; the present ones are 20 feet high and 3 feet wide and cost \$25,000 each. Dr. Boulet says the researchers hope to reduce the sensors, which detect the magnetic field put out by the flow of current through the lines, to the size of a cigarette lighter and a cost of \$1,000.

To speed up the operation of the institute once the doors open, some members of the research team, now numbering 40, have been sent to Europe for special training in electrical research laboratories in France, Britain and Italy. Training in France has been aided by cooperative agreements between the French and Quebec Governments.

#### LETTER FROM MONTREAL



# High powered research

Canada's new hydropower center will be the only one in North America

by Fred Poland