Quebec's Northern Dynamo

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TAMED AND HARNESSED, the rivers of northern Quebec are being put to work in the most monumental hydropower project ever undertaken in North America. As visitors from Montreal look on, spillover from a giant new reservoir cascades down a man-made canyon at LG 2, largest of three colossal dams along La Grande River. Not blessed with the oil and gas of Canada's western provinces, Quebec has turned to its vast subarctic wilderness for a source of clean, renewable energy. Billions of dollars and armies of workers are involved. New industries and jobs and electricity sales to neighboring provinces and the United States are expected payoffs.

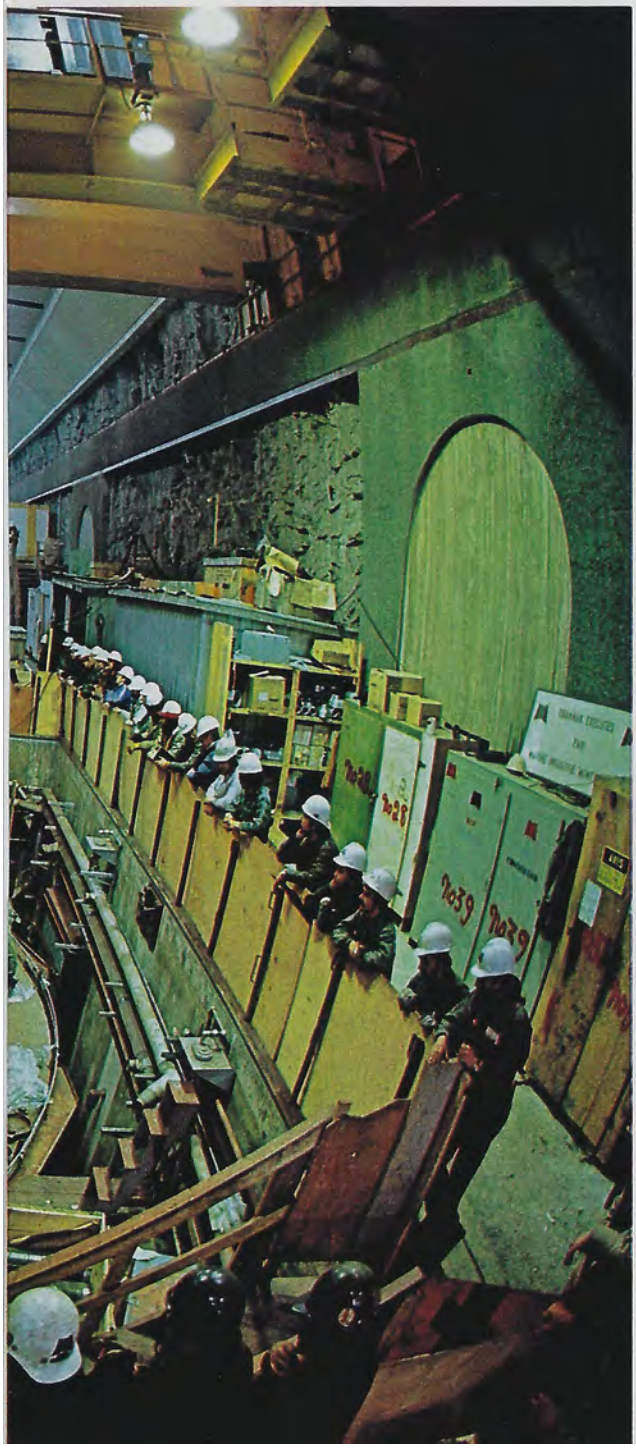
ELECTRIFYING MOMENT for all concerned, a 600-ton rotor is eased into its generator at the world's largest underground powerhouse, blasted out of solid rock at LG 2. The huge electromagnet will spin at 133 rpm, turned from below by turbine blades catching the surge of water that has fallen 180 meters (590 feet) through intake tunnels from the reservoir above.

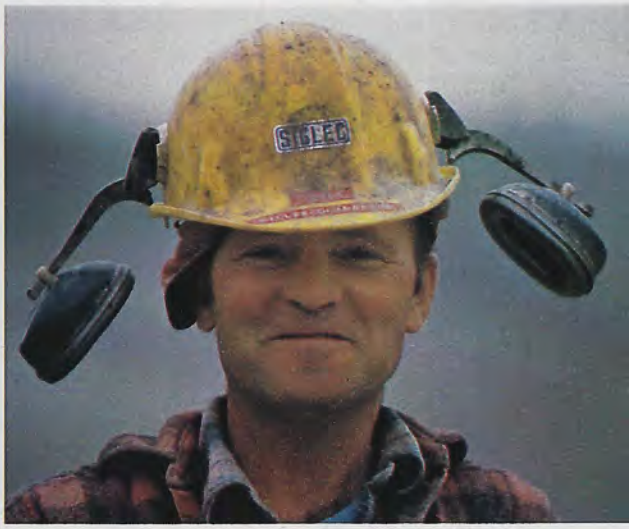
Inaugurated in 1979, when four of its 16 generators were activated, the 483-meter-long powerhouse has a capacity of 5,300 megawatts—power enough for four million people. By the turn of the century, 63 turbines in nine powerhouses will produce 13,700 megawatts from La Grande Complex—itself but the beginning of a long-term plan to exploit Quebec's water wealth.

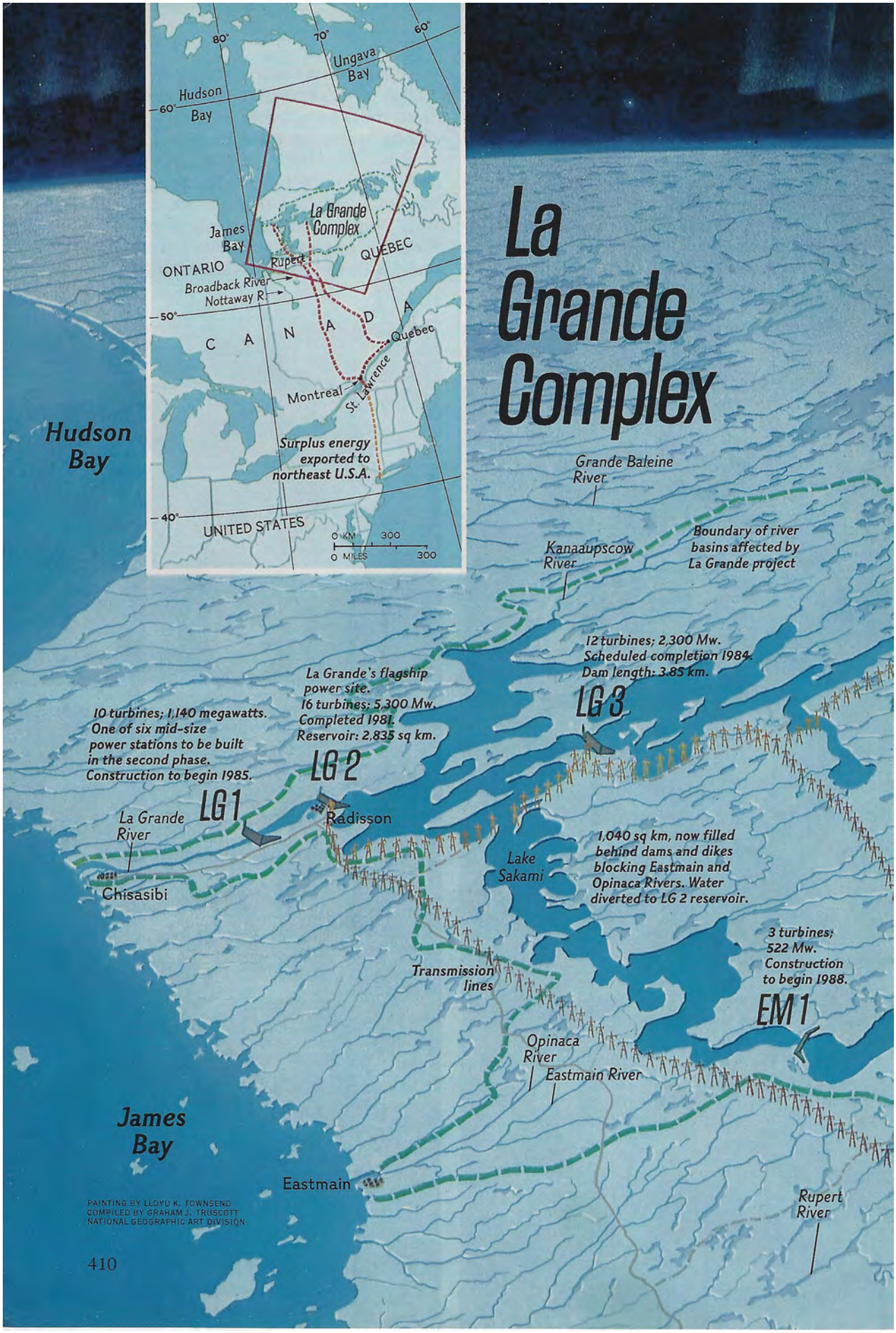
During the short days of the northern winter, when temperatures as low as minus 40°

are not unusual, workers in the LG 2 powerhouse often felt like human moles, arriving and leaving in darkness, seeing the sun only on Sundays. Roughnecks, like this driller at LG 4 (***right***), find that big earnings and low expenses soften the rigors of living in the bush. Long hours with overtime pay make weekly earnings of $800 (Canadian) common. Free food, housing, and recreation enable many to bank their pay.

At each of La Grande River's damsites a spillway controls reservoir level. Huge steps along the LG 2 spillway (***bottom***) slow rampaging water to prevent erosion downstream. For these mighty excavations 127,000 tons of explosives are being used—enough to warrant their on-site manufacture. Nearing completion, phase one of La Grande Complex is both ahead of schedule and within its 15-billion-dollar budget.







La Grande Complex

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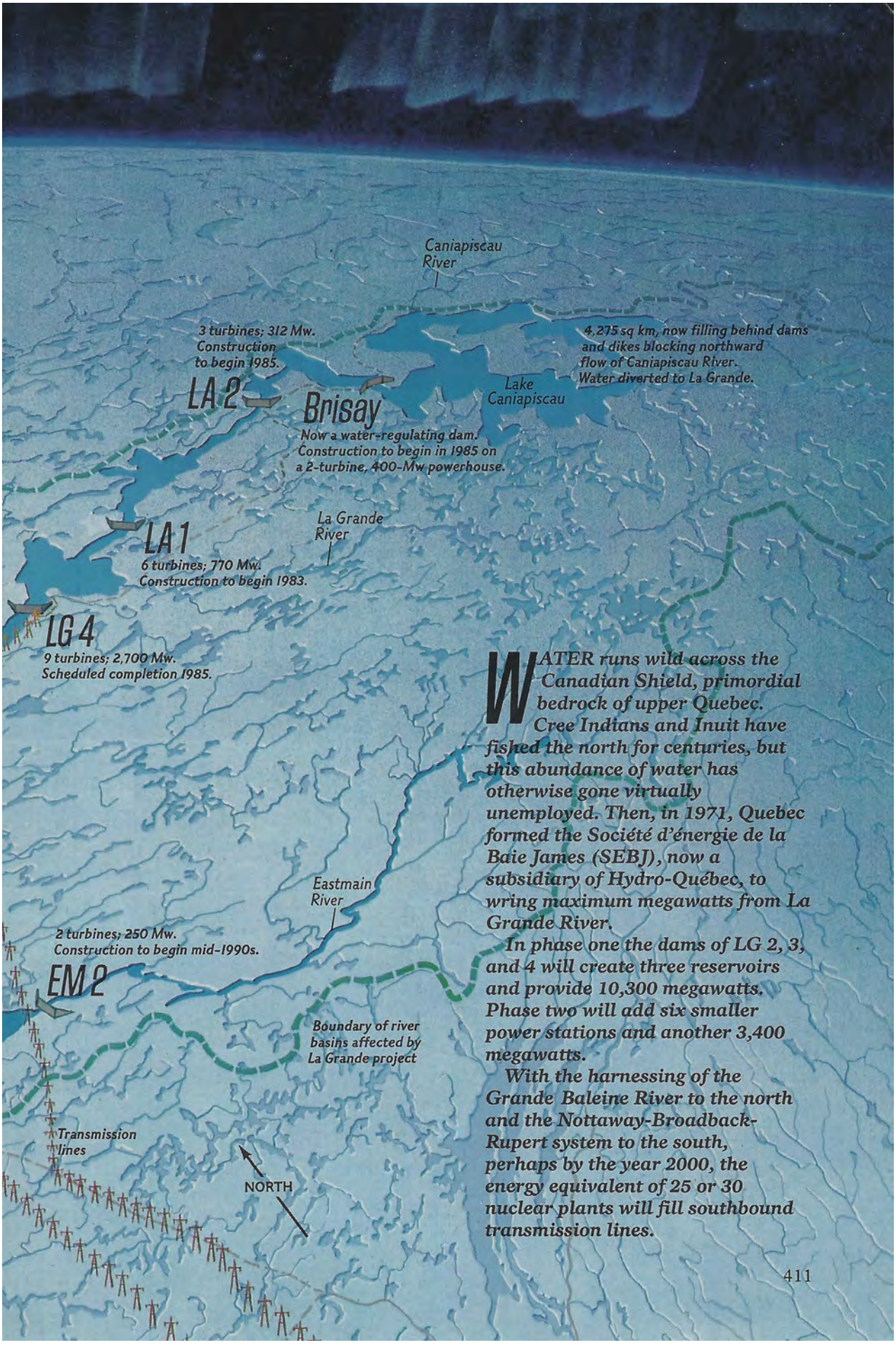
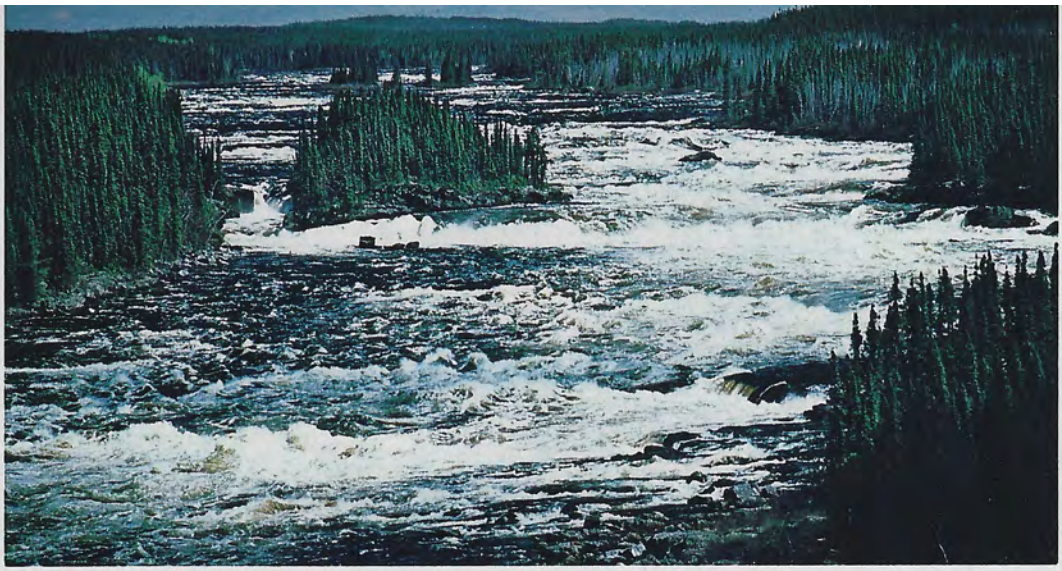


WATER runs wild across the Canadian Shield, primordial bedrock of upper Quebec. Cree Indians and Inuit have fished the north for centuries, but this abundance of water has otherwise gone virtually unemployed. Then, in 1971, Quebec formed the Société d'énergie de la Baie James (SEBJ), now a subsidiary of Hydro-Québec, to wring maximum megawatts from La Grande River.

In phase one the dams of LG 2, 3, and 4 will create three reservoirs and provide 10,300 megawatts. Phase two will add six smaller power stations and another 3,400 megawatts.

With the harnessing of the Grande Baleine River to the north and the Nottaway-Broadback-Rupert system to the south, perhaps by the year 2000, the energy equivalent of 25 or 30 nuclear plants will fill southbound transmission lines.



LATENT POWER, the reservoir at LG 3 fills behind its new dam (***below***), longest in the complex. The spillway, incorporated into the dam, will be able to release a flow of water equal to that of the St. Lawrence River at Montreal. Normally, however, water will fall through intake tunnels to the powerhouse, nearing completion at the right of the dam.

The crest lengths of phase one's 206 dikes and dams will measure 209 kilometers (130 miles). All are being constructed of natural materials quarried at the sites—some 15 million truckloads, hauled and dumped,

water and sewage development, and erosion caused by spring floods threatened to get worse with new flow patterns of the regulated river. A few residents, like Alice Louttit—here with her grandson (***left***)—have refused to leave, willing to accept the hardships of isolation. With most homes moved to the mainland, Fort George (***below***) resembles a tornado path.

Natives receive hiring priority on the SEBJ project, accounting for about 3 percent of the work force, which peaked at 17,000 in 1978. For the white majority, life at James Bay has meant an uprooted existence in a string of prefabricated towns along the river. For this huge mobilization of men and materials, more than 1,000 kilometers of road and five airports had to be built. Some 1,500 flights a year—most aboard SEBJ's fleet of propjets—shuttle workers south every two months for family visits at company expense. When finished, all three power stations of the complex's first phase will be run by computer by a few hundred personnel at LG 2, with only a few maintenance workers needed at LG 3 and 4. Now that Quebec's north country has been penetrated, however, its abundant mineral wealth may eventually draw permanent populations from the south.

SEBASTIAN BEARSKIN, one of the first born in the new Cree community of Chisasibi, rocks gently to sleep with help from a family friend. Resembling a metropolitan suburb, Chisasibi (***lower right***) boasts a new hospital, a community center, and a modern school. Many high-school students come from far-off Cree villages and live in foster homes during the school year—a situation contributing to discipline problems.

On a bush call, 600 kilometers east of James Bay, Dr. François Lette examines Sam Rabbitskin in the trapper's tent (***below***). An SEBJ work-camp physician, Dr. Lette reached the ailing trapper, on the headwaters of the Caniapiscau River, by helicopter. Sam and a few other Crees had been flown into the remote area to harvest beaver, caribou, moose, and other animals imperiled by the slowly filling reservoir—soon to be Quebec's largest body of water. Company biologists had determined that beaver, the area's most commercially important fur-bearing animals, would have great difficulty in reestablishing new territories. It was decided, therefore, to concentrate trapping efforts in the doomed areas, allowing beaver populations elsewhere to increase. All told, reservoirs of La Grande Complex will expand the area's water surface from the current 15 to about 22 percent.

POWER FOR THE PEOPLE of Quebec began flowing south from James Bay in 1979 along gleaming suspension towers, high above the scrubby black spruce of the lonely taiga. When completed in 1984, some 12,000 towers will carry five high-voltage transmission lines, the longest such system in North America. The lines, each a conduit to serve some 1.5 million people, will pass along corridors approximately 1,000 kilometers long.

Unlike the water that produces it, this electricity cannot be stored. Turbines must be turned on or off according to demand. In Quebec, where electric heat is common, peak usage occurs in winter. In much of the U. S., demand peaks during the summer, when air conditioners are humming. Since power exports to the States enable otherwise idle turbines to turn profits, talks are under way with U. S. utilities for new or increased sales, especially in New England. But the prospect of added industry, attracted by the cheap power, is more important to the Québecois, for whom the 15-billion-dollar James Bay project represents a per capita investment of $2,300.

New large-scale hydro schemes like Quebec's are probably not in the future of the United States, where water and land are now bitterly contested resources. But many nations, rich in untapped waterpower, might learn—indeed are learning—from the James Bay experience. □

Eastman River La Grande Dam Project - Pre and Post photos- National Geographic March 1982