The New York Times | http://nyti.ms/2eG93BF

CANADA

Canada's Big Dams Produce Clean Energy, and High Levels of Mercury

By IAN AUSTEN NOV. 10, 2016

OTTAWA — Protests. Hunger strikes. Sit-ins that disrupt construction. At the immense Muskrat Falls hydroelectric dam project in a remote and rugged part of Labrador, the indigenous people who live nearby have been raising louder and louder alarms.

But it is not about the dam itself. The controversy is over what will flow from it.

The protests are focused on a mostly overlooked side effect of hydroelectric projects all over Canada: The reservoirs behind the dams tend to develop high levels of methyl mercury, leading to mercury poisoning among people who eat fish or game caught downstream.

The protesters at the Muskrat Falls dam, which is very far along in construction, finally agreed in late October to allow partial flooding of the reservoir behind it to begin. In return, the province of Newfoundland and Labrador, which owns the utility that is building the dam, promised to take steps to reduce the mercury problems, based on recommendations from an independent advisory group and independent scientists.

But Muskrat Falls will probably be just the first of a series of fights over

mercury in Canada, where dams now supply about three-fifths of the country's electricity.

The researchers whose work first raised the issue of mercury at Muskrat Falls published a new paper on Wednesday, saying that similar problems loom at 22 major dams now proposed or under construction close to indigenous communities in Canada. People living there could develop toxic levels of methyl mercury, a particularly dangerous mercury compound, unless corrective steps are taken, the paper said — steps that could be time consuming and costly.

The findings in the paper, which appeared in Environmental Science and Technology, a journal of the American Chemical Society, may inflame protests already aimed at several proposed dams, including a particularly contentious project in British Columbia known as Site C, which has a projected budget of 9.3 billion Canadian dollars, or $6.9 billion.

"I wouldn't say hydro is bad," said Elsie Sunderland, the lead author of the paper and a professor of public health, environmental science and engineering at Harvard. "But you need to evaluate and look at the pros and cons of any project."

Dr. Sunderland, who has performed several studies related to Muskrat Falls, said officials were told about the mercury problem but were reluctant to grapple with it for political reasons. "We've been working on this for years," she said. "I've done multiple briefings, and they just didn't care."

It has been known for decades that concentrations of methyl mercury rise rapidly in waters impounded behind dams. Research by Dr. Sunderland, a Canada native, and others has shown that the compound builds up in fish and game downstream as well as the people who eat them regularly — which in Canada overwhelmingly means indigenous people.

Mercury buildup caused by dams "is a well-known and well-understood issue," said Jacob Irving, president of the Canadian Hydropower Association, an industry lobby group. But practices to mitigate the problem are also well known, he said, and because of them, "there's never been a recorded public health incident."

Nonetheless, Dr. Sunderland said that research clearly showed that many

aboriginal people in Canada living near electrical dams now have “mercury toxicity.” Her research forecasts that methyl mercury levels will double in people living downstream from Muskrat Falls.

“Chronic exposure to this is detrimental to human health at any level,” she said. “You shouldn’t impose a harm to the local population.”

Chronic exposure to elevated levels of methyl mercury can cause potentially dangerous changes in heart rate, persistent pins-and-needles sensations in the skin, and problems with muscle coordination that can cause those affected to walk with an improper gait, the research paper said. Children who were exposed while in the womb are more likely to develop attention-deficit disorder.

Other studies have documented the effects that followed dam construction. According to a 2006 report on a dam project in far northern Quebec, elevated mercury levels in fish, caused by dams built in the province in the 1970s, forced many Cree people to abandon their fisheries, and with it their traditional diet. Rising rates of diabetes and other ailments have followed.

The problem starts with mercury in the soil. Dr. Sunderland said some occurred naturally and some was deposited by air pollution from, among other things, the burning of coal.

As long as the soil is exposed to air, the mercury does little harm. But when the soil is underwater, it is largely cut off from oxygen, Dr. Sunderland said, allowing certain types of bacteria that convert the mercury into methyl mercury to flourish.

The effect tends to peak about three years after a dam’s reservoir is first flooded, she said, but elevated methyl mercury levels can persist for decades.

Methyl mercury is absorbed more easily by living things than inorganic mercury is. Once in the body, it tends to concentrate there rather than being excreted. It especially tends to accumulate in fish, and in anything or anyone eating the fish, including humans.

Billy Gauthier, an Inuit sculptor who was one of the Muskrat Falls hunger strikers, said his diet depended almost entirely on fish and wildlife from Lake Melville downstream from Muskrat Falls, where Dr. Sunderland has said that

methyl mercury levels will rise unless remedial steps are taken.

When he went to Ottawa last month to press the government of Prime Minister Justin Trudeau to intervene at Muskrat Falls, Mr. Gauthier brought his dickie, the hooded white canvas jacket he and other Inuit men wear to hunt seals with a harpoon at their blowholes in winter ice. Its cuffs are stained by seal blood.

In general, soils that contain more carbon tend to lead to higher levels of methyl mercury in dam water. Based on analysis of soils surrounding the 22 proposed dams near native communities, Dr. Sunderland's group concluded that at half of those projects, methyl mercury levels in the water will be similar to or greater than those they expect at Muskrat Falls if no preventive measures are taken. (At Site C, in British Columbia, the effect will be significantly lower, the study found.)

There is no consensus on how to deal with the methyl mercury created by damming.

Mr. Irving, the president of the utility group, was able to cite only two examples of remediation efforts by industry: warning people downstream to limit or avoid eating fish, and importing fish to communities where the local supply has become contaminated.

The indigenous protesters, who included people from Innu communities as well as Inuit, want much more to be done at Muskrat Falls. They want Nalcor, the government-owned utility building the dam, to dig up and cart away most of the topsoil that would be covered by the 40-mile-long reservoir. In its agreement with the leaders of three indigenous groups affected by the dam, the province of Newfoundland and Labrador left open the possibility of stripping the land in that way.

But the cost of large-scale soil removal would only add to the financial burden imposed by the project, which was promoted by earlier Conservative governments when the province was flush with royalties from offshore oil. Since then, oil prices have collapsed, creating financial problems for the historically poor province of 530,000 people. The estimated cost of Muskrat Falls has almost doubled, to 11.4 billion Canadian dollars, and the price it can expect to get for power exported to

the United States has fallen.

Dr. Sunderland said that it may be sufficient to remove only the soil with the highest carbon content and that increasing oxygen or iron levels in the water may also be effective.

“When you’re talking about an $11 billion project, surely you can come up with some creative solutions,” she said.

Though some of the Muskrat Falls protesters are unhappy with the deal between the government and indigenous leaders, Mr. Gauthier is not among them. Still, he said, the mercury issue is far from settled. “I am optimistic,” he said from his home in North West River. “But that’s not to say my activism is going to slow down. I’ve got to do more work than ever.”

A version of this article appears in print on November 11, 2016, on Page A8 of the New York edition with the headline: Canada’s Clean Energy Might Not Be So Clean.

© 2017 The New York Times Company