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Sustainable uranium mining: Grappling with the new realities

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Nuclear power is hot. Advocates of nuclear energy promote its low carbon cost as the way to reconcile surging global energy needs with the challenges of climate change. But something often gets lost in the discussion of the environmental superiority of nuclear energy over fossil fuels: questions about the sustainability of uranium mines.

According to the World Nuclear Organization's March 2008 statistics, China is constructing six nuclear reactors and has 86 more on the drawing board. In order to fuel these plants, China needs 1,396 tonnes of uranium this year, which is only slightly lower than Canada's requirements of 1,665 tonnes. India wants to more than double the number of its reactors and needs 978 tonnes of uranium to operate its existing 17 reactors. France will be using 10,527 tonnes of uranium in 2008 in its 59 nuclear reactors. Cameco Corporation, which accounts for 20% of world uranium production, estimates an increase in net generating capacity of about 21% by 2016.

Meanwhile, Dr. Gavin Mudd of the Institute for Sustainable Water Resources at Monash University in Victoria, Australia, argues that a significant amount of the GHG emissions for nuclear power comes from uranium mining and milling. And that only limited information on emissions has been reported by mining companies.

Mudd's 2007 paper, "Sustainability Aspects of Uranium Mining: Towards Accurate Accounting," published in a recent issue of Environmental Science and Technology, was, he says, the first analysis of environmental sustainability in modern uranium mines. "There has never been an analysis that I have found that has used actual, reported data for different uranium mines," says Mudd. "It's always been assumed that the energy costs coming from the mining side are pretty low, relative to those coming from say the production of nuclear power. Also, people didn't realize that the data was available. Now that companies are releasing sustainability reports, a lot of that data is in there."

Western Mining Corporation, (now BHP) was the first to issue sustainability reports in Australia in 1995 for its copper and uranium mining operations. "They were ahead of the whole mining industry globally on this," says Mudd, who has written extensively on the subject. Rio Tinto, which with BHP operates 90% of Australia's uranium mines, followed suit in 1997. Mudd credits Rio Tinto for providing site-specific environmental data, such as the effects of ore grade on energy costs, which he says should be the standard for all companies worldwide. (Rio Tinto did not respond to requests for an interview).

BHP provides only a company-wide report. Mudd says, given the company's massive divisions, that's a real problem. "Before Rio Tinto, in the late 90s, a lot of reporting was mostly words from a lot of companies. It is really only since 2000 that most companies have started to put numbers to things" he says. "However, those numbers need to cover all aspects of operations. Some gold companies will give you the amount of cyanide they use,

but they don't give you the amount of CO2 they release. And other companies will give you CO2 figures but not water. When you want to try and really understand sustainability analyses from a strategic point of view about the direction that the industry needs to go in, you can't just use one figure for a whole company," says Mudd.

Some of the major environmental sustainability issues in Australian uranium mines are found in the expanded operations that have replaced small underground mines, Mudd says. "Now we are dealing with big, open-cast mines with a lot of waste rock and tailings to manage so the environmental costs are going up as grades go down." The large amount of trucking to process ore on-site is a significant producer of direct CO2 emissions, he says.

Australia has large remaining uranium resources, which in itself poses challenges. "If you extrapolate forward 50 years, the mining companies will say they are going to continue increasing production. We need to know how much energy and therefore CO2 emissions that will produce. If we look at the directions we are trying to achieve with climate change where we want 60% or 70% cuts in GHG emissions by 2050, we have to triple production on a lower grade resource which we know means a higher CO2 cost per tonne of uranium and yet we still have to cut greenhouse emissions by 70%," says Mudd.

As far as underground uranium mining goes, depth is expected to emerge as a big issue. "We know from South Africa the amount of energy they have to use to go down sometimes two or three kilometers for their gold mines," says Mudd. At the same time he concedes that with the higher grade ore generally found in underground mining, the payback is also higher.

Cameco Corporation operates nine mines in Northern Saskatchewan, the US and Kazakhstan. Its sustainability measures cover communities, the environment and employee health and safety, says Gord Struthers, a company spokesman. "Having regulators looking over your shoulder," is a major driver on performance, he says. "Obviously, because we are dealing with uranium, we are subject to far closer regulatory scrutiny than other mining companies. Our goal is to get in front of regulatory compliance so that Cameco is actually defining the best practices," he says.

For example, the company is looking for new technology and systems to exceed the required targets for water treatment at its milling operations. One way in which the company reduces its environmental footprint is by transporting ore by road from the McArthur River and Cigar Lake mines to its milling sites rather than building new facilities and using more land. The company uses the ISO 14001 certification standard for environmental management, which involves a "plan-to-do" checklist approach to rectifying risks to the environment. Independent auditors carry out rigorous, annual site visits to ensure environmental management is effective, says Struthers.

On the social sustainability front, Cameco has successfully worked with the primarily First Nations communities around their Northern Saskatchewan operations, says Struthers. Residents make up more than half of the workforce and the company helps local people develop their own businesses. In 2007, 71% of services contracted by Cameco were

provided by businesses owned by northern residents.

Gaining social license in this way---community trust and support for uranium mining operations---is a growing aspect of sustainability. Joseph Ringwald, Vice-President of Sustainable Development at Tournigan Energy Ltd, a Vancouver-based exploration company developing two uranium properties in Eastern Slovakia, says it's critical to operate in the uranium sector with integrity and responsibility to the local community and shareholders.

Ringwald, who as Vice-President of the Canadian Institute of Mining, was instrumental in making sustainability a major theme of two recent, national conferences, says sustainability is being raised at conferences and workshops more and more, but the industry is just beginning to understand that social license is the number one issue facing the global mining sector. "The major companies know this and there is a plethora of juniors who are beginning to understand this," he says. Still, operating sustainably has definitely become the new way of attracting investors and doing business. "Many investors are looking for companies that have good social performance and these are typically the majors. We need to learn from the majors that have fully engaged social license teams. Because they are so big, they can afford to hire sociologists, anthropologists and so on---in many cases before they send in exploration teams," says Ringwald.

Cameco's Struthers agrees. "We are aware that sustainability is becoming an increasingly important factor in investment decisions that affect our business. You really have to walk the talk in this business."
However, the cost of sustainability social licensing programs is a significant issue for the junior mining sector. It takes funding which is far more affordable for the major companies.

And despite the cost challenges for junior companies, Ringwald contends that when major companies come calling for acquisitions they are not only looking for technically strong projects, but also for the social licensing aspects that junior companies have developed with their affected communities. Many junior companies are only now beginning to realize this, he says. He also points out that some North and South American companies did not earn their social license to operate and "those projects are all gone now with the loss of hundreds of millions if not billions of dollars from the markets."

The global demand for uranium presents companies with a powerful opportunity---to substantially improve their sustainability practices to attract investors, employees and community support for their operations. Business is changing in the ore patch.

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