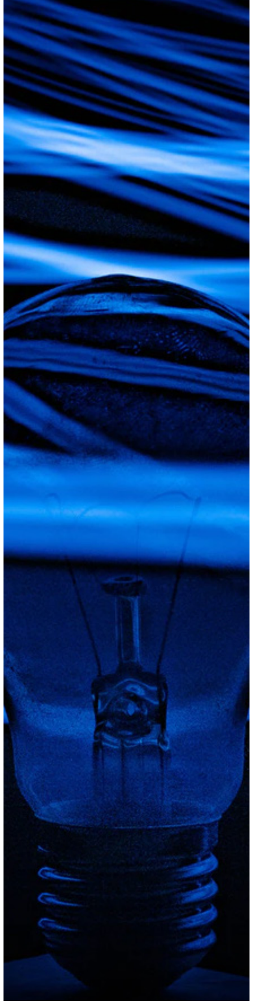
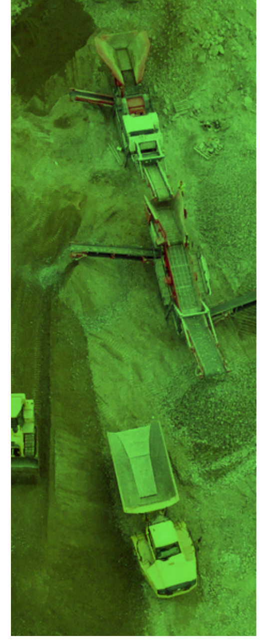




Northern Ontario Circular Economy Symposium

Business, Technology, and Innovation

DE DESIGN + ENVIRONMENT
www.design-environment.com

NORTHERN POLICY INSTITUTE | INSTITUT DES POLITIQUES DU NORD
Giwednong Aakomenjigewin Teg
ᑲ ᐃᑕᔕᐊᓂᐊᐧ ᑭᐁᐧᑎᓇᐤ ᐊᑐᕐᖁᐃᑲᒥ
Institu dPolitik di Nor

SUDBURY INTEGRATED NICKEL OPERATIONS
A GLENCORE COMPANY

Executive Summary

On January 19, 2021 speakers from Canada and abroad came together to speak about current and future opportunities of a circular economy in Northern Ontario. A circular economy refers to a system that reduces waste by reusing material in the creation of new products.

Aaron Henry, who is the Senior Director for Natural Resources & Sustainable Policy at the Canadian Chamber of Commerce, spoke to natural resources opportunities in the context of a circular economy and the market. In his presentation, there were several key considerations that arose:

→ There are several drivers that we need to pay attention to when discussing circular economy: scarcity, biodiversity loss prevention, structural changes such as trade policy and finally, other jurisdictions are pursuing circularity and we need to ensure Canada has a market share as well.

→ There is opportunity for Canada to leverage the commodity boom on minerals as they are used in electronics and other clean technologies.

→ Multiple circular economy solutions exist in the mining sector such as bacterial oxidization which captures cobalt in pyrite-rich tailings. At the moment, cobalt exchanges hands for about $23,000 per tonne in US dollars, and so being able to apply that technology effectively is a significant advantage.

→ Circular economy examples also exist in the forestry sector such as pulp and paper mills capturing leftover wood fibre and using that to sell to the brick industry or utilizing leftover cellulose fibres to create a multipurpose product that can have applications across numerous industries.

→ There are several policy drivers that we need to consider: expanding the definition of clean to include technologies that create greater circularity in the reuse of products and materials to ensure that they're eligible for the same financing and tax deductions that are currently available to clean technologies in other sectors; exploring cases where circular projects can pass the test of additionality and reduce emissions, and those should be written into Canada's offset protocols as they come out; and, a need to consider building more frameworks that allow for the recovery of our resource products to ensure that those products can be reused. There might be some room here to consider subsidies put in place for the recovery of materials per tonne.

This topic and overall discussion of a circular economy is relevant to those living and working in Northern Ontario. The four identified drivers that will play into circular economy, are all factors that impact the wellbeing of Northerners. For example, overconsumption leads to scarcity, which in turn creates higher prices for resources. These higher prices are felt by individuals and small business owners. A circular economy, or the integration of one, has many benefits for people and their communities – not only environmental ones but economic as well.

Aaron Henry, Senior Director for Natural Resources & Sustainable Policy

Aaron Henry is the Senior Director of Natural Resources and Sustainable Growth at the Canadian Chamber of Commerce. He has worked with Canada's leading resource companies to develop public policy on key issues related resource development and climate policy. Aaron has led the Canadian Chamber's work on advancing the circular economy and positioning the importance of our resource sector in Canada's economic recovery. Aaron holds a doctorate in political economy and sociology and maintains a position as an adjunct research professor at Carleton University. – Aaron Henry, Sr. Director of Natural Resources and Sustainable Growth.

Purpose

This commentary was transcribed from a presentation Aaron Henry gave on January 19, 2021, at the online Northern Ontario Circular Economy Symposium event. The editor has adapted some of the text for the sake of structure and narrative. The presentation is viewable on ParlAmerica's YouTube channel.

The event aimed to explore current and future opportunities of a circular economy in Northern Ontario, which refers to a system that "aims to gradually decouple growth from the consumption of finite resources" (Ellen MacArthur Foundation n.d.) — in other words, reducing waste by reusing material in the creation of new products. By doing so, we can create more self-sustaining communities, produce more jobs, become our own supply chain, and reap benefits across Ontario's northern regions.

" In the end, the term 'circularity' may just be one way to make us aware that we need a more encompassing, integrated and restorative sustainability path that includes people as much as technology and nature. "

- Michiel Schwarz, A Sustainist Lexicon

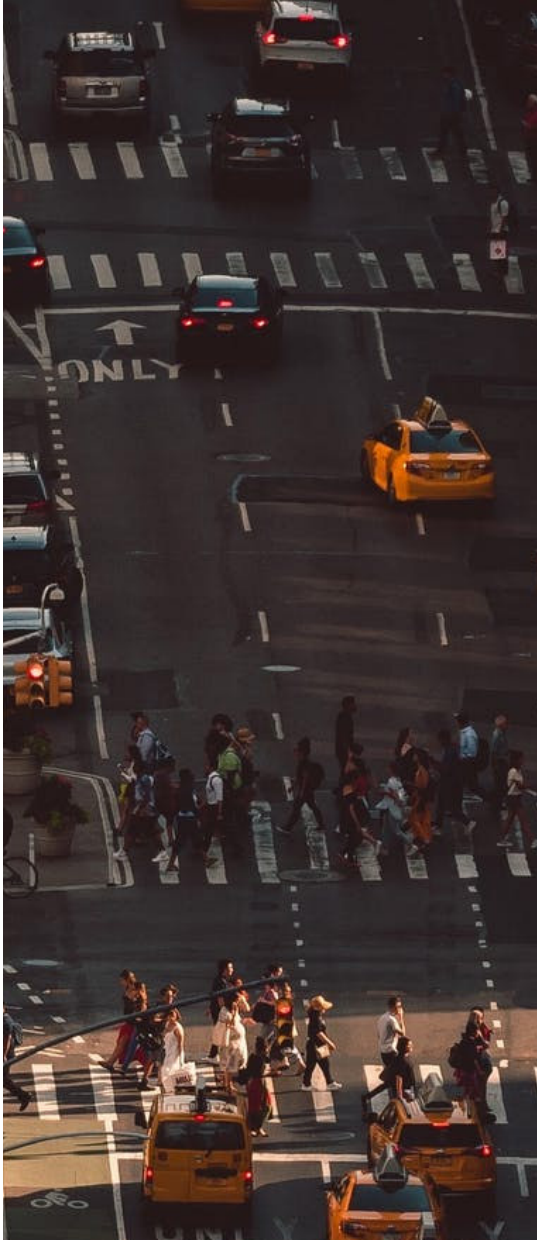
Natural Resources & Sustainable Policy

When we look at this as an opportunity and see where the circular economy is coming from as a set of policies and a set of practices, there are four main overarching drivers that I think are really important to be attentive to.

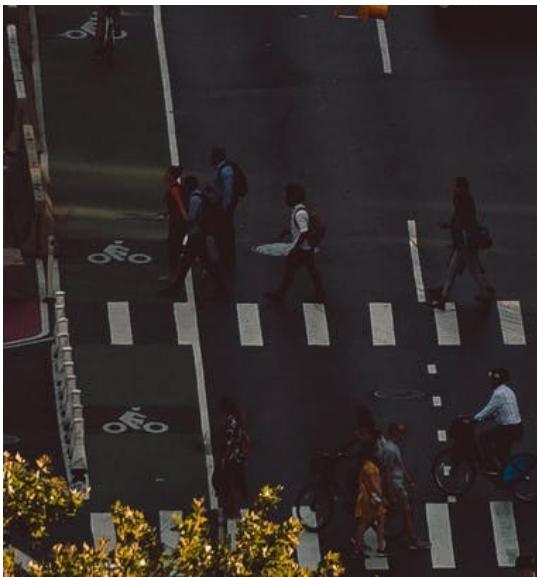
One is scarcity. The reality is that, at present, the level of consumption by our global population exceeds 400 per cent of Earth's current carrying capacity. By 2030, 2040, there will be another two billion people potentially within the middle class globally, seeking similar levels of consumption and that's a significant challenge. It presents strains on all our resources: our natural resources, our water, our space, our land. In addition, if this type of scarcity in resources is not attended to and pushed to get the most out of our resources and products to make them as recyclable and reusable as possible, we're looking at a total of $25 trillion in extra costs by 2050, and those costs will be borne by everybody. In short, it comes down to scarcity and consumption and therefore increases in resource prices.

The flip side is that, increasingly, we are seeing the need to prevent further losses of biodiversity, finding ways to maximize the use of our non-renewable natural resources. And, of course, having a fine balance between continual growth of population and land-use changes and the challenges that come from living in cities and the broader ability to maintain natural geographies as key carbon sinks. In addition, it's also very important to be attentive to structural changes. We're seeing changes in the ways in which countries relate to each other in trade policy, and so we may see a continued period of significant reshoring of production, changes in supply chains. For instance, we see a continuation of America First policies. There's a need for Canada and other nations to find their own ways to be more self-reliant, and there's a number of ways to do that. One way is to ensure that we are utilizing the resources we have as effectively as possible.

Finally, Canada finds itself in a position where other jurisdictions are pursuing greater circularity. As you start to see climate policy expand, you will see similar mirroring in climate trade policy. So, having a circular economy is going to be a key part of doing business with those nations and ensuring market share for Canadian producers here.



" The level of consumption by our global population exceeds 400 per cent of Earth's current carrying capacity "



With that said, that's a mixture of what the drivers might be. We need to be cognizant that this potential to pursue a circular economy is a considerable opportunity for Canada's business community. And, of course, that comes down to creating a circular economy for plastics. There's a real opportunity here for the resource sector. I think a key issue right now is that we see good federal leadership in terms of acknowledging the issues around plastics and making that into a policy priority. I do think, though, that we also need to be very aware that the circular economy is not just plastics — that there are actually significant opportunities for Canada's resource sector that would come from pursuing greater circularity.

In terms of Northern Ontario, where there are significant natural resources and established industries, it comes to mind that we should be thinking about policies in the areas of both forestry and pulp and paper and mining. As I go through this discussion, I'm going to briefly outline some of those opportunities that other jurisdictions are taking to achieve greater circularity in the resource sector, and then finish with some high-level potential policy steps that could be taken that would supplement the incentives to move in that direction for businesses.

As many of you have probably heard, there is an increased awareness around critical minerals and metals. There is a recognition that Canada needs to have its own critical mineral metal plan, and the business community definitely wants to acknowledge the steps taken by this government in having the foresight to pursue a strategy like that. However, I think an additional component of that strategy is really thinking about what Canada can do to get the most out of its metals. So, looking forward, there is simply going to be a continued commodity boom when it comes to minerals and metals, and that's going to come from the growing imprint of electronics throughout society as well the fact that many of these metals are critical to clean technologies that are becoming increasingly driven and embedded in the recovery and green stimulus plans of other nations. So, there's certainly an opportunity there, and right off the top there's a list of probably 46 of these, but you know the well-known ones are cobalt, copper, lithium, nickel, indium, as well as a whole series of other rare earth metals.

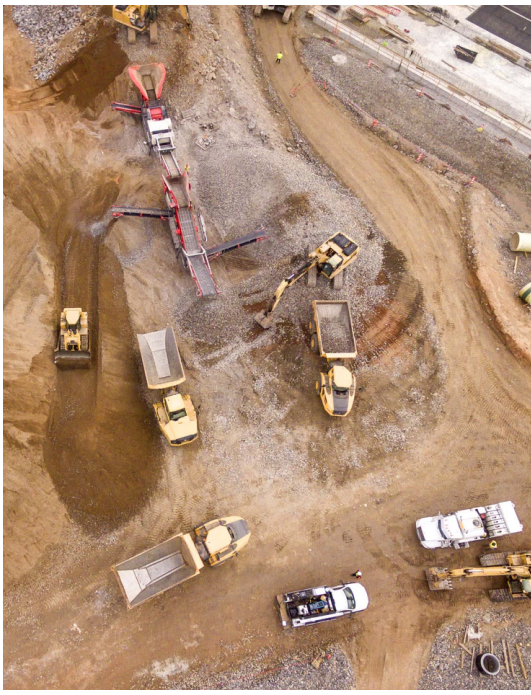
" There is a recognition that Canada needs to have its own critical mineral metal plan "

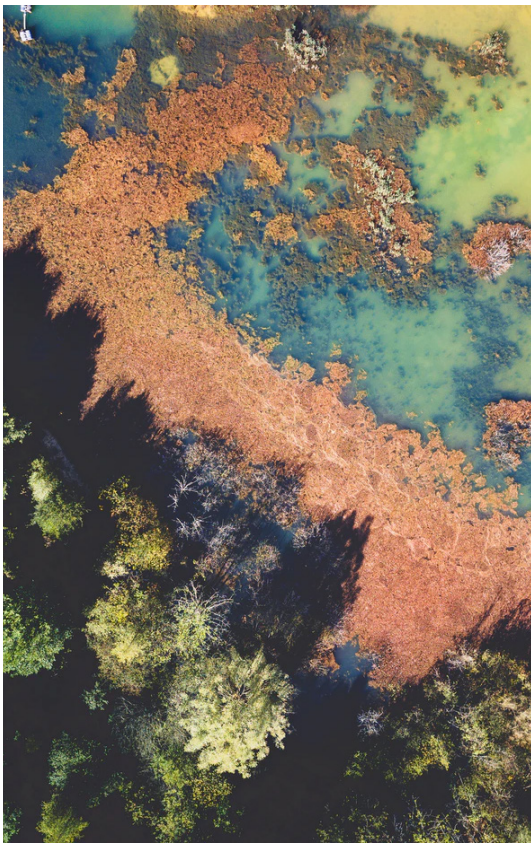
The reality is that we need to think both about ways in which Canada can access those markets and about whether there are some ways in which we can start to utilize the resources, and the mines that we already have to start to fill that demand. The other side of that, going back to the question about reshoring and scarcity, is that, if Canada is able to find ways to be more circular and actually start to extract greater value from our minerals and metals and utilize the waste of tailings more effectively, this might also help Canada position itself as a necessary hedge on rare earth metal supplies, on which currently China has a virtual monopoly, which, of course, is a long-term concern and creates an additional supply chain pressure.

We need to be mindful that there are all these opportunities in terms of the mining sector, but also recognize that continual expansion of that sector is incredibly costly. We need to think through the fact that we do have to continue to open new mines and seek that development, but for many producers doing so can cost hundreds of millions of dollars, excluding exploration costs. They are also subject to increased regulatory challenges, which can make it difficult to attract the needed investment for a lot of these operations. And so, while we need to make sure that we are able to address upstream demand to get more minerals and metals, there is a circular economy solution here as well. This really involves thinking through how we can both utilize the tailings of existing operations more effectively, but also — and this I think is really quite critical — rehabilitate abandoned mines in terms of actually going through mines that are no longer operational and the tailings that are still there and find critical minerals and metals. Australia has been very successful with doing this in its own mines. For instance, it has been using technologies essentially to manage mines that once produced tin, silver, copper, and zinc, and basically extract key metals for electric vehicles as well as for other electronics.

Another thing that's become an example of this is the trial methods of what is called bacterial oxidization — essentially, to capture cobalt in pyrite-rich tailings. At the moment, cobalt exchanges hands for about $23,000 per tonne in US dollars, and so being able to apply that technology effectively is a significant advantage. It allows for what otherwise is a latent waste product to be captured and sold through supply chains, and it also contributes to the management of those waste tailings to come off operations.

We're also seeing increased filtration technologies being utilized to source some of the minerals that are critical for lithium batteries. Other jurisdictions are starting to utilize those, and there's a real nice combination between getting the most out of current assets and assets that may be open in the future. We'll also doing our best to recognize that there is still value to be found and resources to be fully utilized for mines that may be dormant or no longer active.





At the same time, there's a significant opportunity in the forestry sector. In reality, the forestry sector has been engaged in circular practices now for decades. This has been a result of pulp and paper mills being incredibly innovative since the 1980s to grapple with changing global markets. So, there has been an awful lot of effort and thought into reusing leftover wood fibres very successfully. Just as an example, many pulp and paper mills have been basically capturing leftover wood fibre and using that to sell to the brick industry. That allows those industries to minimize their waste, to find ways to capture additional value, to the point that, right now, of the fibres that are used in brick production, 30 percent is actually supplied by the pulp and paper industry. It's a really good example of finding ways in which you can develop these sorts of supply chain relationships that take the output or the waste output of one process and make it the input into another.

On that point, there have been efforts by this government to invest. I believe it's $28.5 million in Domtar in Sudbury to allow that pulp and paper mill operation there to continue to develop new circular economy solutions, find paper-based solutions and alternatives to plastics, as well as to scale a technology that's been in the wings for years now — namely, cellulose nanocrystals. The use of cellulose nanocrystals is one of the key ways you can utilize leftover cellulose fibres to create a multipurpose product that can have applications across numerous industries.

The same kind of opportunity has started to arise in a partnership between Rio Tinto, Geocycle, and Lafarge construction to find ways to take aluminum smeltings and use them as an input into the cement industry, which, again, is a key way to capture waste. Another way to help the cement industry, which is emissions intensive, is to cut emissions through by incorporating an alternative approach.

With all that said, those are opportunities not only for the resource sector that I think we can continue to build upon and play with, but also opportunities that speak directly to changing workforces for the resource sector. I think that we do see the resource sector itself as a key employer. It creates great jobs, and it's a really important sector to continue to grow and develop, but it is not immune to the forces of the fourth industrial revolution. We're seeing more remote work being integrated into resource projects and more automation. In some ways, if you can start to integrate circular solutions in ways that currently aren't being realized, you're not only creating more adjacent industries for that sector, but also helping to grow upstream work, because there's more value coming up from those upstream operations.

" The use of cellulose nanocrystals is one of the key ways you can utilize leftover cellulose fibres to create a multipurpose product that can have applications across numerous industries. "

That is a really key point. At the moment the (International Labour Organization) is predicting that there will be 18 million jobs created by 2030 by circular economy solutions. Right now, if you were to look at the waste segment industry, that's probably 1,300 jobs in Ontario alone, but for economies of comparable size to Canada, estimates run up to about half a million jobs.

What are some of the policy drivers that can help us get there? One key step is to expand the definition of clean technologies to include technologies that create greater circularity in the reuse of products and materials to ensure that they're eligible for the same financing and tax deductions that are currently available to clean technologies in other sectors. In addition, there are probably some significant opportunities to explore cases where circular projects can pass the test of additionality and reduce emissions, and those should be written into Canada's offset protocols as they come out, simply because that creates a secondary business model as well as improving the general access to offsets for all heavy and energy-intensive industries.

There's also probably a need to consider building more frameworks that allow for the recovery of our resource products, to ensure that those products can be reused. There might even be some room here to consider, for instance, subsidies put in place for the recovery of materials per tonne. That is an outcome-focused approach; an approach that could be in some ways similar to the ways in which the US has used the recovery of CO2 through carbon sequestration to advance carbon storage technologies. We could do the same thing in terms of having an approach that allows for recovered materials to be eligible for some sort of subsidy from government.

" The International Labour Organization is predicting that there will be 18 million jobs created by 2030 by circular economy solutions "

Work Cited

Ellen MacArthur Foundation. n.d. "The Circular Economy in Detail." Available online at https://www.ellenmacarthurfoundation.org/explore/the-circular-economy-in-detail.

Schwarz, Michiel, Riemer R. Knoop, and Joost Elffers. 2016. A sustainist lexicon: seven entries to recast the future - rethinking design and heritage.

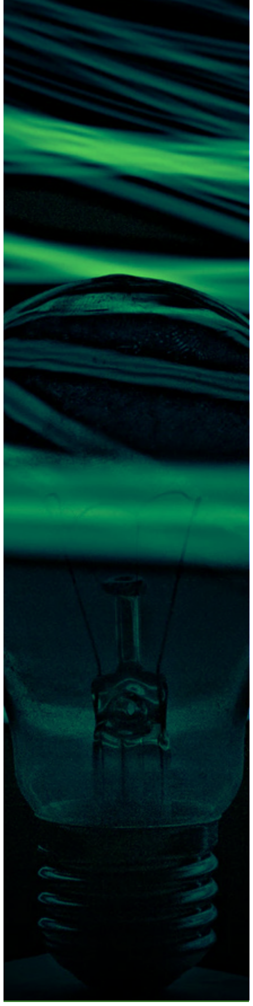
Related Research

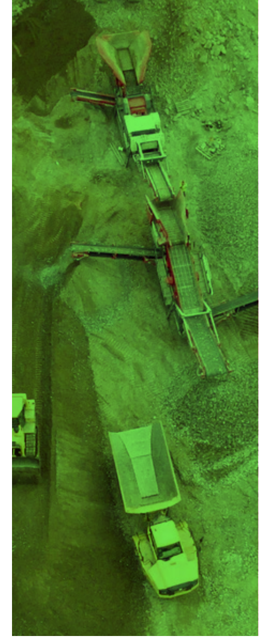
Labour Scenarios for the Future
Ana Belén Sánchez

Health Innovation
Dr. Gary Bota

Water Protection and Sustainability
Dr. John Gunn

Mining Innovation
Peter Xavier





ISBN: 978-1-989343-89-0

www.nordzeronorth.ca

DE DESIGN + ENVIRONMENT
www.design-environment.com

NORTHERN POLICY INSTITUTE | INSTITUT DES POLITIQUES DU NORD
Giwednong Aakomenjigewin Teg
Institu dPolitik di Nor

SUDBURY INTEGRATED NICKEL OPERATIONS
A GLENCORE COMPANY