

Straight Talk



MARCH 2022

Global energy security and the growing demand for critical minerals

With Jeff Kucharski and Heather Exner-Pirot

This publication is based on the transcript of a recent *Pod Bless Canada* discussion between Aaron Wudrick, Director of MLI's Domestic Policy Program, and Senior Fellow Jeff Kucharski and Senior Policy Analyst Heather Exner-Pirot. Kucharski and Exner-Pirot spoke to MLI about the current global situation facing energy security and what role Canada can play in this critical area.



Jeff Kucharski is a strategic thinker, policy entrepreneur and academic. He is currently a Senior Fellow at MLI and an Adjunct Professor at Royal Roads University in Victoria, BC. Before retiring from the public service in 2012, he was an Assistant Deputy Minister in the Alberta Department of Energy.



Heather Exner-Pirot has 15 years of experience in Indigenous and northern economic development, governance, health, and post-secondary education. She is currently a Senior Policy Analyst and Research Coordinator of the Indigenous Policy Program at MLI.

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Today, we are very pleased to be joined by energy experts Jeff Kucharski and Heather Exner-Pirot from MLI.

One of the reasons we have you here today is because you have co-authored a forthcoming MLI paper, *Reimagining Canada's Role in Global Energy Security: Practical Considerations for a Low Carbon Transition*. Heather, you also have another paper coming out soon titled, *Preparing for the Upswing: The Growing Demand for Critical Minerals and Canada's Roles and Responsibilities*. Let us begin by talking about energy security. The obvious question for you, Jeff, is that a lot of people don't think about energy in terms of security. Can you explain why is it important that we do so?

Jeff Kucharski:

Energy is essential to a modern economy. Without energy, there's no way to provide energy services like power and heat to homes and businesses, or to manufacturing plants. So energy is necessary to a properly functioning economy. But it's not just that we need energy; we need reliable, good quality energy. What I mean by that is that the energy must be there when we need it, in the right amount, and in the right form.

And energy, particularly electricity, must be high-quality because modern, high-tech manufacturing and research hospitals, for example, all require electricity to be delivered within tight tolerances of frequency, range, and voltage. Since reliable, high-quality energy is so essential to an economy, it's necessary to secure it so that energy supplies can be delivered without interruption; it's important to the national security of a country. That's why energy security is such an important concept. Energy security is, therefore, about ensuring stable, affordable, and sustainable supplies of energy.

Now, there are many sources for the energy we use. They can be divided in different ways, such as between renewable and non-renewable, and so on. There are also alternative energy sources like nuclear that have characteristics of both. Some energy sources are relatively scarce, and their production is concentrated in certain countries and regions, say, the Middle East, for example. Others, like wind and solar, can be generated in a wider range of locations but are also geographically specific.

In some ways, oil is the commodity that has traditionally been extremely important to energy security because it's the foundation for so many products like gasoline, jet fuel, and lubricants;

it's also the basis of petrochemicals. For about 150 years, energy security was all about ensuring access to oil. Wars were fought over access to oil in the Middle East, for example, but also in the Indo-Pacific and even in the Second World War.

These days, the concept of energy security has been broadened to include many other energy sources, including other types of hydrocarbons, like natural gas, but also renewables and very recently critical minerals as well. I'll be publishing a paper with MLI on this topic soon.

MLI It sounds as though there are actually two aspects to energy security. One is the geographic aspect. And then one is about the type of energy itself and its reliability. Is that a fair encapsulation of the situation?

Jeff Kucharski

Yes. Oil and gas, hydrocarbons in general, are specific to only certain regions of the world, which confer some geopolitical benefits on those countries. They can use it for good or for ill. But it makes it very important for countries that are highly dependent on imports of oil and gas, let's say, to have secure sources of energy. That's why energy security is so important to countries like Japan, South Korea, and others in the Indo-Pacific – right now, they rely almost totally on imports from the Middle East, which is itself a rather unstable place. It has seen a lot of wars and instability over the years.

Energy security is, therefore, about ensuring stable, affordable, and sustainable supplies of energy.

MLI Heather, your upcoming paper notes that there's a consensus about the need to reduce carbon emissions. But often the details of that transition are just sort of glossed over. Your paper touches on some of the practical considerations for that process. Could you expand on some of them?

Heather Exner-Pirot

In the past, I did some security studies. And one of the lines famous in the military is that amateurs talk strategy and professionals talk logistics. I think we've been talking about strategy for a long time

on climate and energy. But we really have not been talking about the logistics nearly enough, certainly not at the political level. I think that there is consensus, or at least a strong public and political will to do something about climate change. But we're very far from figuring out the logistics of it.

Eighty percent of global primary energy comes from fossil fuels. Think about that for a moment. It has taken 150 years to build up this system – the refining, the transportation, the production, and everything that is part of our energy system. To think that we want to transition quickly off of all that we've built (we've never had a billion people who didn't rely on fossil fuels), well, it's a very daunting task. I don't think any serious person thinks that it can be done quickly because there aren't many better sources of energy than oil and gas. They are uniquely transportable; uniquely dense. And even though they are geographically concentrated, like Jeff says, they're relatively competitive.

In comparison, when you're talking about the critical minerals that we touched on, or moving to renewables (wind and solar) and nuclear, those kinds of mines are actually much more geographically concentrated, and will be even more competitive. There'll be a few countries that have monopolies over these things. So moving to nuclear, or moving to wind and solar, there's a tremendous cost involved. Further, we don't currently have the raw materials to make this transition; we don't currently have the financing to do it; the various systems are not in place. Neither do we have the capacity, the labour, or the know-how to build nuclear at scale in a lot of places, for example. So it is fine to say, "oh, we shall move to wind and solar," but a thousand things have to happen before it can be a reality. People need to appreciate the logistics of what needs to happen in the next 20 to 30 years.

MLI Implicit in your message is that while it's all fine and well to say we need to make this shift to renewables, it's actually really hard to do. And it may take a lot longer than some people are hoping for.

Heather Exner-Pirot

Unfortunately, it isn't happening yet because we haven't figured out the logistics. Cheap energy is so crucial to economies, to societal well-being, to health, to education, to everything, that we're probably going to have a new peak for oil demand in the next year or two. Some people hoped that COVID-19 might have been the peak, and it's obviously not. It looks like oil demand is set to rise for at least another decade before it plateaus; it's not set to drop anytime soon.

A big part of the reason for that is that we have 7.5 billion people in the world today, and we're going to have 9 billion people at some point. A lot of those people are moving from extreme poverty to a higher level of income, which is fantastic. But people in middle incomes use more energy. That's part of what getting out of poverty is. It means you use more energy per capita. Oil and gas demand, even if it dropped per capita, would still rise overall because there's going to be another 1-2 billion people in the near-term to worry about.

Another example where I think people had hoped that we had reached the high point of demand was coal use between 2013 and 2014. And now we don't have enough. We've cut the supply of oil; we've cut the supply of liquified natural gas (LNG). LNG plants are very expensive; natural gas is very expensive. The International Energy Agency (IEA) thinks we'll hit a record use of coal for power production next year.

Clearly, there's still a high and growing demand for energy and we don't have replacements for fossil fuels yet.

MLI Jeff, in terms of meeting this growing demand, how is Canada positioned to do this, whether from fossil fuel sources or for new renewable energy sources? Do we have policies that are going to ensure we can take advantage of that growing demand?

Jeff Kucharski

Canada's in a unique position. First, our energy security is not really a major policy concern in Canada because we have an abundance of it from all different kinds of sources. So, for example, over 60 percent of all the electricity generated in Canada comes from hydro. And we also have nuclear. And we also have hydrocarbons. (We're gradually phasing out coal in the electricity sector.)

In fact, we have a surplus of all these sources, which right now we export primarily to the United States. Potentially in the future our exports will grow as pipelines get built to the West Coast. And then we'll have the opportunity to export oil and natural gas to countries that are highly dependent on imports of those commodities. Canada is in a really unique position.

We can generate a lot of very clean, low-emission electricity in this country already with carbon capture, utilization and storage (CCUS) technology gradually being implemented. Even hot hydrocarbon use can be extended because we can sequester those emissions underground. And we can also produce other energy commodities like ammonia, for example, which countries

like Japan and others will be needing so that they can produce hydrogen from it in the future.

If we continue to have policies that promote the export of those energy commodities, we'll be okay. Yes, there's some question about whether the Canadian government is truly committed to ensuring that all the barriers are removed from the export of our hydrocarbon resources. But as it stands today, the TransMountain Pipeline is on schedule to be completed in the next year. We have one, and possibly three, LNG export terminals that will be complete in the next two to five years. And we already have a new propane export capacity built at Ridley Island Terminal on the west coast near Prince Rupert.

We're getting to the point where we're going to be able to move these commodities offshore, which will open up trade and expand our relationships with countries, particularly in the Indo-Pacific. I think if we continue to have policies that support the production and export of our energy resources, we'll be fine.

MLI

Heather, are you in agreement that policies we have right now are things we can take advantage of? Are there obstacles that we need to get out of the way? Nuclear is often not a big part of the energy transition conversation. Do you think it needs to be a more prominent part of the conversation when we're talking about energy transitions?

Heather Exner-Pirot

On the oil and gas side, a lot of people know Canada is a major exporter of oil, and to a lesser degree they know that we are also a major exporter of natural gas – almost primarily to the United States. But we also have the third largest reserves in the world. And the other nations that have larger reserves are not democracies.

We're still going to need oil and gas 40 to 50 years from now, whether it's for burning (hopefully much less of it), or whether it's for other materials – petrochemicals, carbon fiber, other things. As we address in our upcoming paper, with oil sands there's often a criticism that it's an expensive source of energy, and that we should shut it down. But it has one huge advantage that we're starting to see. Canadian oil and gas have almost never been as profitable as they are now. The oil sands have huge upfront capital costs, but very low depletion rates. As we reduce financing and investment and capital into oil and gas, the oil sands will still be chugging along; they're already quite profitable. And Canada is poised to take advantage of that.

There have not been any new oil sands mines developed in quite a while. One policy in particular that affects the development of new oil sands mines is the emissions cap. The current minister of climate change and environment wants to impose an emissions cap on the sector. In one sense that's very good. We do want an emissions cap and a lot of the production is lowering its emissions intensity. But if we want to increase LNG (LNG is seen as a cleaner burning fuel that could replace coal in Asia) – and if you're a pragmatic environmentalists it is a very good idea – how can you develop LNG on top of the oil sands if we have an emissions cap? The policies are not 100 percent thought-through on global needs, which needs production to be kept at least steady, if not increased. Oil is about to hit US\$130 a barrel. There's not enough supply coming on; there is a deficit in investment in oil and gas. There's nowhere for the price of oil to go but up in the medium term. Maybe at some point, some of our allies are going to wonder why Canada isn't doing more.

To get to your point about nuclear. I'm from Saskatchewan; it's kind of our pride. Northern Saskatchewan has the best deposits of uranium in the world. The richest deposits are being mined by Cameco and Orano there. So there's a real incentive for Canada to take the lead in expanding nuclear. I think the tide is turning and that people are seeing that if we do want a zero-carbon future, nuclear has to be part of that. China is going full-bore on developing nuclear – they are becoming very good at it – the costs of nuclear are going down in China. If we in the West could get good at developing nuclear plants again, the costs of could go down here, too. And there's a role for Cameco and Orano to provide that critical strategic source of uranium. There's also a need to develop technology for small modular reactors, which I'm sure we'll be talking more about; they are a slightly more accessible, more dynamic way to bring nuclear power to different places.

MLI Jeff, I want to pivot back to something that Heather just mentioned about security. We talked about the opportunities for Canada. What do you see as emerging security risks for Canada and for our allies going forward in terms of energy security?

Jeff Kucharski

Let me begin by building a bit on some of the things that Heather said. I would draw your attention to what's going on right now in Ukraine and Russia, with Russia's invasion of Ukraine. Given the situation of ramped up economic sanctions, there's going to be a huge energy crisis in Europe. The US is now busy planning and thinking about how they can meet that demand and fill the gap

should Russian oil and gas exports be removed from the equation. Unfortunately Canada is in no position to be a player because we just don't have the export capacity in our country to help the energy security crisis that's looming. It's certainly a risk.

There are, in fact, lots of risks on the horizon. As the energy transition unfolds, some energy security concerns are going to fade away to some extent, some will remain, and others will shift significantly. For example, along with a greater reliance on renewables comes a greater need for the critical minerals needed in their manufacture. Canada now has a list of 31 minerals on its critical mineral list. It is busy trying to strengthen supply chains for those minerals; many of them are absolutely essential to the low carbon transition for clean tech – for wind turbines, for example, and for battery technologies. There are risks because critical minerals, like oil, only exist in different concentrations in a few countries and regions. Canada is blessed in that we have an abundance of about 11 critical minerals. But there's going to be an increased risk of disruptions in the supply of critical minerals going forward because some countries – Russia or China, for example – may use their capacity for either mining them or processing them as leverage against other countries.

Given the situation of ramped up economic sanctions, there's going to be a huge energy crisis in Europe.

Meanwhile, an expected increase in the use of nuclear power will mean increased dependence on uranium imports for some countries, and that has potential proliferation risks as nuclear technology becomes more diffused around the world. But it's an attractive source of energy because of its zero carbon emissions.

One of the things that worries me the most when we talk about fossil fuels, is that if investment in upstream fossil fuel production – exploration and production – continues to dwindle, you're going to find that high-cost producers are likely to be forced out of the market. And countries where state-owned national oil and gas companies predominate will become stronger. I'm thinking here particularly of Russia again, and China because national, state-owned oil companies currently control over 65 percent of global

oil reserves and 60 percent of global oil production. As Heather pointed out, Canada is one of the few democratic countries in the world with very large reserves. As such, it's very important that Canada be a player and that we complete these export projects so we can actually provide energy security to our allies and partners and reduce some of the energy security risks in the future.

MLI Heather, you've writing a separate piece that's coming out with us on critical minerals. Can you give us a "Critical Minerals 101" lesson? A lot of folks may have heard the term critical minerals, but they may not know exactly what that means. Can you explain what critical minerals are and what makes them so important?

Heather Exner-Pirot

Certainly. Some governments that say that they're critical. Analysts say that there are 31 minerals that are critical for our economy and for our needs, though the United States has a slightly different list. It's not geology that it makes them critical; it's that they are important to modern life. For example, silver and gold are not on the list because they're not critical to the digital technologies we use or to green energy, even though they're important minerals. Meanwhile, potash (which is not a metal and not used for renewables) is still deemed a critical mineral because it is a component of fertilizer that helps grow the food we need to eat – for industrial agriculture. What makes these minerals critical is that they may have some supply issues, they may be geographically concentrated, and they may be very important for modern life. And we need to make sure that we have a secure supply of them.

Speaking of our allies, we did develop an MOU (memorandum of understanding) with the United States two or three years ago on critical minerals. And again, the United States wanted to make sure that there is a good supply – and a good supply chain – of minerals to support their economy and their modern life and green transition, making sure that Canada is a good player there.

The minerals that we think are probably going to see their demand greatly expanded due to the green or low carbon energy transition are things like copper, nickel, lithium, cobalt, and also some rare earths. I think that if people have heard of anything about these critical minerals, they've heard that rare earths are a security issue because China has such a monopoly on the mining and processing of them.

If we are going to have a green energy transition, the IEA thinks we need to mine between four and five times more product than we do right now. It takes 10 to 15 years in Canada, as it does in

a lot of other places, to get a mine up and running. The world is scrambling for these resources. And in Canada there still isn't a lot of investment in the mining sector. Commodity prices have been quite poor since 2014, which also means that the sector has been starved of investment for almost a decade. And that means that we do not have enough new mines coming online. We do not have new product coming online in a way that would be consistent with a quick transition to net-zero by 2050. That's why this issue is so important.

When people say solar and wind are renewable, well, everything in that windmill, in that turbine, and everything in that solar panel, and everything in the transmission lines that carries their electricity to the consumer is made of non-renewable mining product. We need a lot more mining if we want to have a low carbon energy future.

MLI

Sounds like a great opportunity for Canada. We're very blessed to have the geography that we do. A lot of these opportunities will certainly make us very important to our allies in the coming years.

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323 Chapel Street, Suite 300,
Ottawa, Ontario K1N 7Z2
613-482-8327 • info@macdonaldlaurier.ca



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