Senate Committee on Energy and Natural Resources

Hearing

to Examine the Near-Term Outlook for Energy and Commodities Markets

366 Dirksen Senate Office Building

10:00 a.m.
January 19, 2016

Written Testimony of

Daniel McGroarty
Principal,
Carmot Strategic Group Inc.

My thanks to the Committee Chair, Senator Murkowski, and to Ranking Member Senator Cantwell for the opportunity to appear here this morning. My name is Daniel McGroarty. I am principal of Carmot Strategic Group, an issues-management firm based here in Washington, D.C. Strategic resource issues are a core element in my practice.

As is disclosed in my biographical material, my advisory companies include Texas Rare Earth Resources, Graphite One, American Manganese, Denham Capital Management and Rio Tinto – companies that are working to develop new sources of metals ranging from copper and graphite to manganese and rare earths – plus co-production of other metals and minerals key to new technology applications in markets where we want to see America rebuild its economic strength. I also run the American Resources Policy Network, a virtual think tank that encompasses all aspects of domestic non-fuel resource production – and I consult to the Institute for Defense Analyses (IDA), which supports the Departments of Defense and Homeland Security, the Joint Chiefs' Joint Staff and the Intelligence Community on issues related to strategic materials and resource security. I want to underline, however, that the views I express today are my own.

The Committee asks a single question as the entry-point into today's hearing, and that is where I will start. The near-term outlook for the commodity markets – and, for related reasons I will explain, for the alternative energy markets – can be summed up in a single word: bleak.

As the Committee has heard this morning, oil and gas prices are in sharp decline, and each day's headlines seem to bring stories of new lows. The same is generally true for hard-rock commodity prices. Look at prices for five key industrial minerals – aluminum, copper, lead, nickel and zinc. In the past 5 years, aluminum is down 36%, lead 35%, zinc is down 40%, copper 55% and nickel 64%.

Of course, it's not as if commodities cycles are novel – they happen. Growth rates slow, supply exceeds demand, prices fall, producers idle their mines, postpone new projects and abandon exploration. Then, the economy works through the surplus production, demand returns, supply tightens – prices rise – and so does the incentive for investment in new exploration and development. It's a familiar cycle – Econ 101.

The market is self-corrective, and in the long-run, that is true.

It is also true, as Keynes put it, that "in the long-run we are all dead."

I can't answer the question – "how long is the long-run?" -- until commodities prices recover. What I think may be of interest to this Committee is what risks we run -- now and in the near-term -- while we wait for that long-run to arrive.

And the risks are real – with implications for the strength of the American economic recovery, for the revival of U.S. manufacturing might, and for the hoped-for dominance of U.S. ingenuity and enterprise in the advanced technology applications that we know are shaping the world of the 21s Century.

Put simply, in the case of critical metals and minerals, the U.S. is deeply dependent – and growing more so. The US Geological Survey has just released a very useful historical snapshot. 30 years ago, the U.S. was 100% foreign-dependent for 11 metals and minerals. Today, the U.S. is 100% dependent on foreign supply for 19 metals and minerals, and more than 50% dependent for 47 minerals in all – nearly half of the naturally-occurring elements on the Periodic Table.

There are national security implications to this dependency as well. In the most recent National Defense Stockpile Requirements Report delivered to the House and Senate Armed Services Committees, of the 12 materials with identified shortfalls that

the Pentagon report recommends for stockpiling, China is a significant supplier of all 12.

In the real world, much of our access to key minerals is as by-products or co-products of the industrial minerals. Take the five I mentioned earlier – aluminum, copper, lead, nickel and zinc. Taken together, those 5 "unlock" our access to an additional 25 elements on the Periodic Table. Nearly all of them are used in today's advanced technology applications.

We used to call them "minor metals." But we are in the midst of a materials science revolution – and access to the minor metals is taking on major implications.

Unfortunately, in many cases, U.S. dependency is severe -- and even complete.

Take the materials we need for clean energy. Graphite is key to EV batteries and energy storage. The U.S. produces zero natural graphite – we are 100% import dependent.

Indium is needed for flat-screen TVs and solar photovoltaic panels. Most indium is derived from zinc mining – the U.S. is 81% import-dependent for the zinc we use, and we produce zero indium.

Thin-film solar panels are made of C-I-G-S materials – those letters stand for Copper, Indium, Gallium and Selenium. We have a 600,000 metric ton copper gap at present – demand exceeding supply. Selenium is recovered from copper processing.

Gallium comes from aluminum processing – we are 99% import-dependent – and we are closing American aluminum smelters at a record pace.

The list is long. We need rhenium for a high-strength alloy in the jet turbines on the F-35 and other fighter aircraft. Rhenium is dependent on copper processing – and we are 83% import-dependent. Congress has directed the Defense Department to purchase electrolytic manganese, used in key super-alloys, for the stockpile – the U.S. produces zero manganese. We need rare earths in too many applications to list: Wind turbines, lasers for medical and national security applications, smart phones and smart bombs. We produce zero rare earths – and we are once again 100% dependent on China.

In terms of beginning the work to reverse our resource dependency, Senator Murkowski's American Mineral Security Act is a strong step in the right direction. As I understand today's hearing, we're not evaluating policy and programs. But there are

executive branch efforts that merit mentioning: Work at the Defense Logistics Agency to recast the defense stockpile in ways that suit our new world of materials science… The Critical Materials Institute under the aegis of Department of Energy…

And then there is the White House's Materials Genome Initiative – which aims at supporting "U.S. institutions in the effort to discover, manufacture, and deploy advanced materials twice as fast, at a fraction of the cost." That's a laudable goal – but it's going to prove difficult for American innovators to be twice as fast when America's mine permitting process is twice as slow as in other mining nations.

We can also do more to encourage recycling of rare metals – reclamation from scrap laptops and cellphones – so-called urban mining – and also from fly ash and mining waste piles of all types where techniques employed 50 and 100 years ago left behind metals and minerals no one needed then, but which are critical now. This is win-win – for the economy and the environment: Our aim should be to recover valuable metals – even as we remediate old mine wastes.

And we should continue efforts to find substitutes to rare metals – but we must do so mindful of the fact that some of today's scarce minerals and metals are themselves substitutes for scarce metals from earlier decades. Our dependency is so severe that we must also realize that the search for substitutes may simply swap our dependency on one scarce metal for another metal, equally or even more scarce. For instance, there are known substitutes for rhenium, where our import dependency is 83%, in some catalyst applications – but those substitutes include gallium (99% dependency), germanium (95%), or indium and vanadium (both 100%).

This is why, when it comes to remedying U.S. resource dependency, I'm a subscriber to the "all of the above" school – let's recycle, reclaim and seek substitutes, but let's also recognize there is no way out of our dependency without added production.

Going back to commodity cycles -- pricing will come back. Remember the long-run. But if the U.S. allows the trend-line towards decreased exploration spending and increased time to complete permitting to continue – production of key metals and minerals is going to take place elsewhere. And the manufacturing we want to see right here in America – will be pulled to where the metals are.

I don't think there's another nation in the world that can match American ingenuity. We can pioneer the ideas behind wind and solar and so much else – but where will the materials that make these new energy sources real – where will they come from?

How we answer that question will determine to a large extent whether the U.S. can regain its manufacturing might… Whether America will lead the alternative energy revolution… And whether the U.S. will have the metals and minerals we need to provide the modern military technology we depend on.

I thank the Committee for this opportunity to speak today, and I look forward to your questions.

# # #