

# **World leader in the production of permanent magnetic powders, Neo Performance Materials continues to innovate and lead the pack**

Neo Performance Materials Inc. (TSX: NEO) continues to impress the market, despite previous Q3-2020 results which reflected the impact of slower economic activities due to the impact of the global coronavirus pandemic. Notably, the company has continued the quarterly dividend of CAD\$0.10 per share as customer demand is returning and slowly growing. Although it is too early to call an end to the impact of the pandemic, it appears business is starting to return to pre-pandemic levels.

Notably, the company announced on December 4, 2020 that a group of selling shareholders had entered into a secondary bought deal financing for the sale and purchase of 3.9 million shares at CAD\$12.10 per share for gross proceeds of CAD\$47.6 million. As this was a secondary offering from existing shareholders, the company will not receive any of the proceeds. However, at September 30, 2020, the company had cash, cash equivalents plus restricted cash of US\$78.6 million and positive working capital of US\$173 million (including \$115 million of inventories), giving the company a strong balance sheet. Moreover, it is a definite sign of the strength of the company's business plan and the interest in the capital markets for Neo.

Neo manufactures the building blocks of many modern technologies that enhance efficiency and sustainability. Neo's

advanced industrial materials, magnetic powders and magnets, specialty chemicals, metals and alloys are critical to the performance of many everyday products and emerging technologies. The company operates as a global advanced materials manufacturer with 11 manufacturing facilities in countries including Canada, China, Estonia, Germany, South Korea, the US and Thailand. Neo also has two dedicated research and development centres in Singapore and the United Kingdom.



#### REE Separation

- Sillamäe, Estonia
- Zibo, China
- Jiangyin, China

#### REE Metal Production

- Rayong, Thailand\*
- Jiangxi Province, China\*

#### REE Alloy + Magnetic Powders

- Korat, Thailand
- Tianjin, China

#### REE Magnets

- Tianjin, China
- Chuzhou, China

#### REE Environmental Catalyst Materials

- Sillamäe, Estonia
- Zibo, China

#### LED / Electronic specialties

- Hyeongok, South Korea
- Quapaw, Oklahoma, US

#### Rare Metals Refining / Recycling

- Sillamäe, Estonia
- Sagard, Germany
- Peterborough, Ontario, CAN

The company has approximately 1,800 employees worldwide who are “all passionate about making advanced industrial materials”. The company is customer-focused and operates in three business segments where Neo management sees robust, long-term growth driven by multiple global macro trends, such as vehicle electrification, industrial automation, consumer electronics, energy efficient lighting, air and water pollution control and super alloys. Neo identifies growth markets driven by global macro trends such as these and produces highly engineered industrial materials that are critical to the performance of applications in those markets. The company engineers materials that are reducing the human carbon footprint.

Neo, through its Magnequench business unit, is the world leader in the production of permanent magnetic powders used in bonded and hot-deformed, fully dense neodymium-iron-boron (“NdFeB” or “neo”) magnets. So much so that, despite the global pandemic, in August 2020 the company announced that it intends to significantly expand its capacity to produce compression molded neo magnets and assemblies, used in the automotive, electronics, home appliance and other industries. Particularly important is that modern vehicles use more than 140 small electric motors, many of which have neo magnets. Electric and hybrid electric vehicles use even more small electric motors and larger traction motors, all of which preferentially use Neo magnets.

Lastly, it is important to note that Neo has developed dual supply chains inside and outside China for rare earths separation and rare earths advanced materials. The company also owns the only rare earths separation facility in Europe.

With an almost half billion dollar (Canadian) market capitalization and world/industry leading manufacturing and technology centers, Neo is leading the way in an industry that is continuing to evolve and grow. The company is innovative and management has the expertise and knowledge and the potential to continue to innovate and lead the pack.

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**Jack Lifton on the real  
challenge of China  
Incorporated on the global**

# supply of rare earths

China's recent re-enactment of its export "prohibition" list illustrates the differences between the impact of the West's "financial globalization" and of China's approach to globalization under "Socialism with Chinese Characteristics" on the individual nations' security of supply of critical materials (rare earths) as enabled by what are the two principal competing economic systems in today's world, "free market" capitalism and state-controlled capitalism (also known as Socialism with Chinese characteristics).

It's easy to say that China's recent revisions to and the republication of the law that makes the export of named technologies from China either subject to governmental approval or simply illegal, is retaliation for the American (Trump[?]) (and now also the Japanese and EU) administrations' technology import and use bans applied recently to Chinese cybertechnology, but for the Rare Earths these restrictions have been in place for more than a decade, and their updating and reaffirmation in Chinese law tells a much more nuanced and worrisome story.

Looking carefully at those of China's export restrictions that are focused on rare earth "processing" technology, they show that China does not want any of its companies, state-owned or "private", to give any assistance to foreign entities to develop any aspect, at all, of a total rare earth supply chain.

I have been told that China originally acquired rare earth separation (by solvent extraction) technology from the first Molycorp in the early 1980s when that company was seeking to lower its costs by exporting the rare earth separation technology it had developed in the 1960s and 70s to China where bastnaesite, the same mineral as was being mined at Mountain Pass by Molycorp, was being recovered in large

quantity as a byproduct of iron ore mining in Baotou, Inner Mongolia. I believe that Molycorp also then began sending some ore or ore concentrates from California to China at that time for separation in China. I have been told that the "blueprint" for a rare earth separation plant supplied by Molycorp was stolen and illegally "sold" into alleged operatives from China in the first Chinese "rare earth processing rush" in the 1980s during which dozens of dedicated solvent extraction systems for rare earths were built outside of Molycorp's control.

Deng Xiaoping, the real founder of modern China's economic system famously said during this period of rapid growth for China's rare earth "processing" industry that **rare earths were to China what oil was to the middle east**. Besides encouraging the development of a rare earth industry and to support it, this pronouncement also encouraged the creation in Chinese universities of departments of "separation science" in departments of chemistry and chemical engineering. Today, in 2020, thousands of Chinese chemists and chemical engineers specialize in rare earth "processing." The State Key Laboratory for Separation Science at Peking U., alone, has four locations with more than 400 researchers, more than 150 of whom hold PhDs! It is estimated that several thousand Chinese researchers are dedicated today to the field of rare earth studies in China.

All of the raging commentary about Chinese intellectual property theft from the West, America in particular, has masked the fact that regarding rare earth processing downstream of ore concentration China has an existing and growing advantage technologically over all of the West. While it is certainly true that we do not know the true costs of mining and refining rare earths in China, because China doesn't seem to capitalize health and safety concerns that are both significant and also highly regulated in the USA and almost all other Western countries, we must also concede the advantage of extensive experience to China in the effective

production of rare earth metals, alloys, and magnets. The current method of choice, for example, for the production of rare earth metals, the electrolytic reduction of molten salts, has never even been practiced commercially in the USA.

The unfortunate truth is that the US and the West needs technological help. Particularly in scale-up, from China's large reservoir of downstream (of mining) rare earth processing knowledge and experience if, and only if, the goal is global competition with China for the 150,000 mta rare earth permanent magnet markets. If the goal is regional or national self sufficiency and security of supply then governments will have to either subsidize or get much smarter, with regard to economics and the selection of companies that have the necessary skill sets, about (re) establishing total domestic supply chains for critical materials and, especially, the components manufactured from them.

The American federal bureaucracy is an assembly of the industrially inexperienced but well credentialed (not necessarily well educated!) who first and foremost speak with each other, and, when and if they must reach outside of their group, go only to academics for advice on policy.

Implementation of policy is simply not considered, and the excuse for that is it would look like overstepping their authority, favoritism, or worst of all, a mistake might be made that would reflect badly on the bureaucrat.

China's mandarin bureaucrats are chosen primarily for their experience and skills as well as their education and (Chinese Communist) Party connections. The China "State Council" sets the nation's industrial policies. The bureaucrats implement those policies. Those bureaucrats, speaking with the authority of the State Council and President, have a great influence on the lending policies of the People's Bank of China.

The current Chinese “President” has decreed (not recommended) that by 2025 China will be independent of the rest of the world in 10 key high technologies. Several of these technologies are critically dependent upon rare earth enabled components, especially rare earth permanent magnets.

China is today cleaning up its rare earths industry to meet global standards of health and safety. This has necessitated a sharp restriction on rare earth mining within China. China is today, in 2020, on a track to import nearly 40% of its needs for rare earth bearing ores for ALL of the rare earths.

In fact, heavy rare earth production from so-called ionic clays has essentially halted within China. Yet, notwithstanding the rare earth mining pollution “problem” the implementation of China 2025 is advancing rapidly.

**What does this mean for Western rare earths mining, refining, metal and alloy making, and rare earths enabled products’ manufacturing? It means that China, Incorporated, is your competitor at every stage of the total supply chain. It means more importantly that as China’s consumer economy grows and as long as China requires outside raw materials the rest of the world will be completely subjugated to Chinese pricing and export policy.**

Neither the US (or any other allied) defense establishment can take the risk of having its rare earth permanent magnet and alloy supply cut off or curtailed by the Chinese government. Even more dependent upon China today, in permanent magnet volume alone, are the global OEM automotive and consumer appliance industries.

Investment outside of China in a total rare earths supply chain is a necessity for US defense and the continuation of an independent American manufacturing base for high technology consumer products. It is certainly not wise to put all of your eggs in one basket, but it is also very unwise to plan on just

one company or one technology to solve America's (and the West's) dependency on the Chinese rare earth industry. The solution is to choose only those participating companies that understand the need to manage or have a total rare earth supply chain in view. The poor economics of some of the component operations of the total rare earths supply chain can be solved by legislation (e.g., the Cruz rare earth components tax relief bill) or by the distribution of costs among the supply chain components so that the whole is profitable.

It's time for a serious discussion of the rare earths supply problem. China is not planning to assist the development of competitors in this field.

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## **Jack Lifton talks with Neo Performance's Constantine Karayannopoulos on China's rare earths recovery**

The Technology Metals Show host Jack Lifton talks with Constantine Karayannopoulos, President, CEO & Director of Neo Performance Materials Inc. (TSX: NEO) about the recovery of the Chinese rare earths industry. "The Chinese rare earths industry is recovering but so is the rare earths industry everywhere," Constantine said in an interview. "It looks like the worst is over in China and the rest of the world is showing spurts of demand in specific markets, even in automotive."

Jack and Constantine went on to discuss neodymium and praseodymium (NdPr) prices, the separated praseodymium market,



and how the current market situation is affecting the prices for neodymium and praseodymium. In the interview Constantine also provided an update on Neo's magnetic materials business.

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## **The U.S. Rare Earths Supply Chain Challenge – Part 4**

In an ongoing series on how to solve the U.S. rare earths supply chain challenge, 3 Sr Editors from InvestorIntel and well-known Rare Earths Consultants debate on what are the skills needed to create a rare earths supply chain in North America.

Participants include Tracy Weslosky, InvestorIntel's Sr Editor, Publisher and Rare Earths Consultant; Jack Lifton, InvestorIntel's Sr Editor, Host and Rare Earths Advisor; and Alastair Neill, InvestorIntel's Sr Editor and Rare Earths Expert.

Alastair started by saying that there is no facility in the US to convert rare earth alloys to magnets. Jack continued by saying that "the US Department of Defence doesn't want any

rare earth permanent magnet from China. The only thing they will accept from China is the raw material which the Chinese do not export. They want extraction, separation, metal making and alloy and magnet making done either in the US or in NATO or SEATO ally countries.”

Alastair concluded the discussion by saying, “To achieve this goal it is going to take a couple of different skill sets. It is one set of skills to get something out of the ground and turn it into a separated oxide. That is completely different from metalization and alloy production and then getting into assembly. So you will need three special types of industries that need to be managed. That is where you have to have someone with a vision to be able to bring that type of team together to be able to manage such a diverse set of skills.”

- To access the complete discussion, [click here](#)
- To access Part 1 of this rare earths series, [click here](#)
- To access Part 2 of this rare earths series, [click here](#)
- To access Part 3 of this rare earths series, [click here](#)

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## **The U.S. Rare Earths Supply Chain Challenge – Part 3**

In an ongoing series on how to solve the U.S. rare earths supply chain challenge, 3 Sr Editors from InvestorIntel and well-known Rare Earths Consultants begin the debate on what are the challenges in creating a rare earths supply chain in North America.

Participants include Tracy Weslosky, InvestorIntel’s Sr Editor, Publisher and Rare Earths Consultant; Jack Lifton, InvestorIntel’s Sr Editor, Host and Rare Earths Advisor; and

Alastair Neill, InvestorIntel's Sr Editor and Rare Earths Expert.

Jack starts the debate with: "When you extract rare earths from ore you get a mixture of rare earths and other things that were in the ore that came out in the extract which is usually an acid. The first thing that you have to do is make a pregnant leach solution. What that means is that you put the metal values in the minerals into the solution. Then you separate out those things that are not rare earths or rare earths that you don't really want for example cerium. Now that solution which is normally a hydrochloric acid extract goes into a separation system which in the US has only been a solvent extraction for light rare earths."

Alastair added "There are other companies looking at novel ways to separate rare earths in an environmentally friendly process to tackle this and compete with the Chinese. The benchmark is the Chinese separation cost which is about \$2.50 to \$3 a kilogram."

The experts panel also discussed some of the major problems in the North American rare earths supply chain. The panel discussed that the problem in the North American rare earths space is the absence of rare earth separation facility and metallization capability in North America.

- To access the complete discussion, [click here](#)
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# The U.S. Rare Earths Supply Chain Challenge – Part 2

In an ongoing series on how to solve the U.S. rare earths supply chain challenge, 3 Sr Editors from InvestorIntel and well-known Rare Earths Consultants begin the debate on what is the actual formula to create a supply chain in North America.

Participants include Tracy Weslosky, InvestorIntel's Sr Editor, Publisher and Rare Earths Consultant; Jack Lifton, InvestorIntel's Sr Editor, Host and Rare Earths Advisor; and Alastair Neill, InvestorIntel's Sr Editor and Rare Earths Expert.

Alastair starts the debate with: "First of all the key is to find a deposit that has a reasonable cost structure and also reasonable content particularly the magnetic four – neodymium, praseodymium, terbium, and dysprosium because those will drive 85-90% of the revenue of any deposit. Then you have to be sure that you can convert that deposit into a concentrate and after that you have to be able to separate it into the oxides. When you talk about magnets you then have to go to the subsequent steps of conversion to metal and then into alloy before you can even get to the magnet manufacturing stage."

Jack added, "The first thing you do is ask the customer what he wants to buy. Then you can go upstream in the supply chain and find out what you need to do."

The experts panel also discussed the exploration and extraction plays in North America. Tracy said that some of the exploration plays in North America include Avalon Advanced Materials Inc. (TSX: AVL | OTCQB: AVLNF), Search Minerals Inc. (TSXV: SMY), Ucore Rare Metals, Imperial Mining Group, etc.

To access the complete discussion, [click here](#)

To access Part 1 of this rare earths series, [click here](#)

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## **Nic Earner on the US Defense Act and our dependence on Chinese rare earths**

“We do have the heavy rare earths, terbium, dysprosium, which others do not apart from Northern Minerals now at their pilot plant. We have a very good mix of the magnet rare earths and the heavy magnet rare earths. Then, of course, we have 40% of revenue coming from zirconium, a lot of uses there, 10% of our revenue coming from hafnium, which is an emerging technology metal. We see people using it in the light generation phone chips. Then we have 20% come from niobium. Certainly we would be one of the largest complexes and revenue generators. That is nearly US\$500 million of revenue a year.” states Nic Earner, Managing Director of Alkane Resources Ltd. (ASX: ALK | OTCQX: ANLKY), in an interview with InvestorIntel Corp. CEO Tracy Weslosky.

**Tracy Weslosky:** Nic we are so delighted to have you. We really want to talk to you and get right into this U.S. Defense Act and how this might affect shareholders for Alkane Resources, as you are clearly the frontrunner for supply for magnet materials worldwide.

**Nic Earner:** Thanks Tracy. We are really hoping that this provides a catalyst to get Western companies, particularly those that want to supply U.S. Defense contracts, moving and motivated to shore up their supply chain. If you look at this act what it is saying is the U.S. will only or wants its contractors to only buy magnets from allied countries so this

excludes buying magnets out of China and Russia. It not must happen immediately today because we all know the capacity for that to actually happen does not exist. It is saying, put your best foot forward, best endeavors. This is where the U.S. government is moving. These companies have to act if they want to make that regulation now or into the future.

**Tracy Weslosky:** We have been talking and discussing sustainability for a number of years so we were delighted to see that the U.S. is putting a good foot forward. Of course, they do not have the supply. Let us talk about your timeline for getting to production. If I understand this correctly, and please do correct me, when you guys are in full production you will have the largest supply chain for magnet and battery materials in the world outside of China. Is that correct?

**Nic Earner:** I would like to think so, but no. Lynas will still be number one in that. If you look at Lynas' neodymium and praseodymium production, with their next program they are moving towards 6,000 tons per annum, which would put them at about 15% to 20% of the magnet market. That is as it stands today not in expanded demand. We in vanadium and praseodymium would be doing 1,200 tons. We do have the heavy rare earths, terbium, dysprosium, which others do not apart from Northern Minerals now at their pilot plant. We have a very good mix of the magnet rare earths and the heavy magnet rare earths. Then, of course, we have 40% of revenue coming from zirconium, a lot of uses there, 10% of our revenue coming from hafnium, which is an emerging technology metal. We see people using it in the light generation phone chips. Then we have 20% come from niobium. Certainly we would be one of the largest complexes and revenue generators. That is nearly US\$500 million of revenue a year. That is a substantial revenue base, but we would be definitely one of the frontrunners absolutely. More importantly we do not have offtake into China or a large Chinese shareholding either, which really means we can tick the U.S. Defense boxes.

**Tracy Weslosky:** I am still certain that most of the investors out there may not be clear on how unique this critical material market is. Now I was reading in your quarterly activities report that your project, your Dubbo Project that we are referencing, could generate \$4.7 billion free cash flow at the 20-year base case...to access the complete interview, [click here](#)

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