

With recent moves in the USA towards supporting key critical mining projects, will NioCorp Developments make the list?

Critical metals scandium, titanium, and niobium are all doing well as global demand for metals remains robust in 2021. In May 2018, the U.S Interior Department moved to include niobium, scandium, and titanium onto its list of critical minerals. These three critical metals have targeted applications in clean energy, aerospace/commercial aviation, defense, and automotive. Generally speaking, they are used to lighten and strengthen alloys. For example, scandium is a key lightweighting metal used in aluminum alloys as well as in fuel cells. Niobium is used to strengthen stainless steel. Titanium is very well known for its strength-to-weight ratio, as it is as strong as steel but weighs about half as much.

As we move to a world of electric vehicles (EVs), lightweighting is a key component to improve performance and range. For example, \$9 of niobium added to a mid-sized car reduces weight by 100kg, increasing fuel efficiency by 5%. \$1-1.5 million of scandium in a single airliner offers >\$9 million of net present value in fuel savings. (source)

Niobium and scandium uses

Niobium and Scandium are Key Enablers of Sustainability



Today we take a look at a USA based junior miner that has all three of these valuable critical elements.

NioCorp Developments Ltd (TSX: NB | OTCQX: NIOBF) (“NioCorp”) is developing North America’s only niobium, scandium, titanium, rare earths elements project, located near Elk Creek, Nebraska, USA. The Elk Creek Superalloy Materials Project is the highest grade niobium project in North America, as well as the largest prospective producer of scandium in the world. The Project is a large underground hard-rock deposit containing an estimated 250,000 tons of niobium pentoxide, 2,300 tons of scandium, and 891,000 tons of titanium dioxide. There are also some rare earths, as discussed later.

Some reasons why NioCorp’s Elk Creek Superalloy Materials Project is unique:

- A pure-play critical minerals and rare earths element company.
- All of NioCorp’s planned products have been designated as “critical minerals” by the U.S. government.
- Tier one project location in Nebraska, USA.
- The Project enjoys strong community, as well as state and local government support.

- Strong focus on sustainability and ESG principles.
- Large resource with a 36-year long mine life.
- Feasibility Study – Post-tax NPV of US\$1.7 billion, post-tax IRR of 21.7%, initial CapEx US\$1 billion.
- Much of the planned production in the first 10 years is pre-sold.
- 100% of the Project's projected FeNb production in the first 10 years is under sales contract or Letter of Intent, and 12% of its projected scandium is under sales contract.
- All permits needed to start construction have been secured.
- The NioCorp Board and management team have more than 200 years of collective experience in minerals development.

All that is left to do is for NioCorp to raise the project funding. Given the recent moves in the USA towards supporting key critical mining projects, it is hoped that soon NioCorp can be a beneficiary.

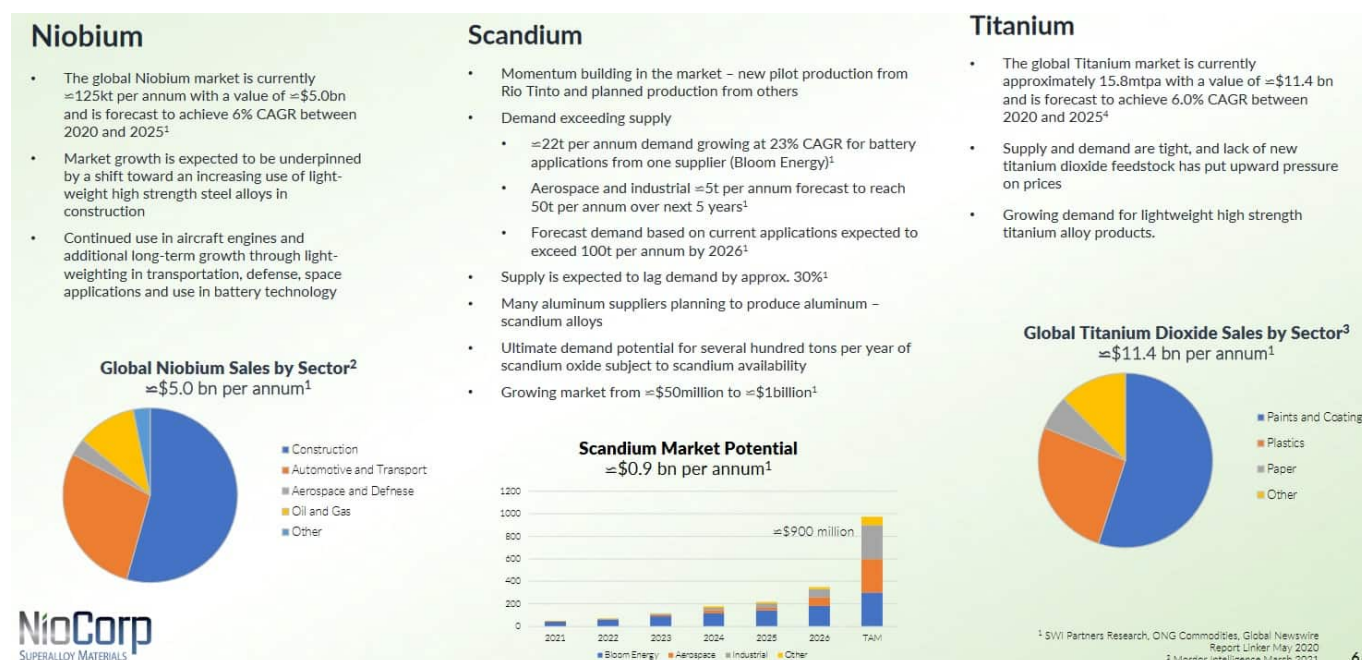
NioCorp recently raised C\$6.2 million, extended their land at Elk Creek, and works on recovering rare earths

Regarding the C\$6.2 million raise, NioCorp stated: "Proceeds of the private placement will be used for continued advancement of the Company's Elk Creek Superalloy Materials Project, including ongoing detailed engineering efforts, conducting technical assessments of potentially adding rare earth products to the planned product offering, and for working capital and general corporate purposes."

NioCorp now owns the surface land on which the Elk Creek Project's mine infrastructure and support operations will be located. Ownership of the land also gives NioCorp ownership of the mineral rights to more than 90% of the Project's Mineral Resource and Mineral Reserve. The purchase price was approximately \$6.2 million.

In other recent news, NioCorp is working on enhancing their metallurgical processes to potentially also recover rare earth oxides. NoCorp stated: “The Company is currently evaluating next steps in its overall metallurgical test work program, which will focus on optimizing and streamlining the existing processing flowsheet as well as establishing process routes for the potential recovery of rare earth products. The rare earth products that are of most interest to the Company at present are Neodymium-Praseodymium (“NdPr”) oxide, Terbium oxide and Dysprosium oxide.”

The niobium, scandium, and titanium markets summary



Source: NioCorp company presentation

Closing remarks

NioCorp is now an advanced stage critical metals developer, located in Nebraska USA. Their Elk Creek Superalloy Materials Project contains economically viable niobium, scandium, titanium, and potentially some rare earths.

A strong Feasibility Study has been produced, all permits to construction are in place, and the project now awaits funding. As a sign of support for the project, Nebraska Governor Pete

Ricketts nominated the Project as a “National High-Priority Infrastructure” Project to the White House.

NioCorp Developments trades on a market cap of C\$333 million (US\$269 million) and is well worth following.

Aluminum-scandium master alloys, changing the way the world flies.

Scandium has until now only been a niche metal with demand in high end products such as the aerospace industry and sports equipment (bicycle frames, fishing rods, golf iron shafts, tennis rackets and baseball bats). It has great potential as an alloy because it has almost as low a density as aluminum with a much higher melting point. Scandium, when added to aluminum, creates a strong lightweight alloy with excellent resistance to corrosion and good weldability. Aluminum-scandium alloy can be 10-100% stronger than conventional aluminum alloys and has been used in Russian MIG fighter planes. A new analysis shows that scandium-contained aluminum alloys can save airline operators approximately \$9 million in net present value for a single B737 -sized jetliner, assuming scandium oxide pricing at \$3,500/kg.

NioCorp Developments Ltd. (TSX: NB | OTCQX: NIOBF) is developing North America’s only niobium, scandium, titanium project. Located near Elk Creek, Nebraska, the Elk Creek Project is the highest grade niobium project in North America, as well as the largest prospective producer of scandium in the world. NioCorp is sitting on 250,000 tons of niobium pentoxide, 2,300 tons of scandium, and 891,000 tons of

titanium dioxide, and is heading towards being the only producer of its kind in the USA.

In a joint project with IBC Advanced Alloys, NioCorp announced in October the successful production of an aluminum-scandium master alloy. NioCorp and IBC intend to utilize the master alloy from this program to further the companies' ongoing efforts to develop specialty scandium containing alloys and/or prototype products for potential commercial use. This agreement is to investigate and develop applications for scandium-containing materials for a range of downstream markets.

Mark A. Smith, CEO and Executive Chair of NioCorp and Chairman of the Board of IBC, said: "This is almost certainly the first aluminum-scandium master alloy made in the United States in some years. We look forward to the possibilities presented by the establishment of a domestic U.S. production capacity for aluminum-scandium master alloys that utilize scandium mined and purified in the U.S."

NioCorp is developing the Elk Creek Critical Minerals Mine and processing facility in southeast Nebraska, which is expected to produce more than 100 tonnes per year of scandium oxide when fully operational. As shown below the project has an impressive after-tax NPV8% of \$1.7 billion, with after-tax IRR of 21.7%.

[Back to Index](#)**\$2.3B**

Pre-Tax NPV

24.3%

Pre-Tax IRR

\$1.7B

After-Tax NPV

21.7%

After-Tax IRR

\$389MAveraged EBITDA over
operational life**69.5%**Averaged EBITDA margin
over operational life**\$17.6B**

Gross ROM Revenue

\$12BOperating margin
over operational life**\$1B**Total Net
Up-Front CAPEX**32 Yrs.**

Mine Life

3.4 Yrs.Payback period from
production start

Elk Creek Feasibility Study highlights

NioCorp has also signed a commercial sales agreement with Traxys North America LLC. Under the agreement, Traxys is obligated to purchase 12 tonnes per year of scandium trioxide for the first 10 years of the project's production. Traxys can purchase more than 12 tonnes per year and can extend the 10-year term by mutual agreement. This annual amount represents approximately 10% of NioCorp's planned annual production of scandium. According to estimates by the U.S. Geological Survey, 12 tonnes per year is approximately equivalent to all current global sales of scandium for 2018. Traxys will focus its scandium sales and marketing efforts to customers in the aerospace and sporting goods sectors, and it retains the exclusive right to sell NioCorp scandium to those sectors.

CEO Mark Smith continued: "We are very pleased with the size, term, and potential value of this contract. We look forward to working with the leadership at Traxys to build and grow markets for a variety of scandium materials."

In May 2018, the Interior Department (US) moved to include niobium, scandium, and titanium on its list of critical

minerals. NioCorp is very well placed to be a US leader in the above mentioned critical minerals.

All three of NioCorp's products have targeted applications in clean energy, aerospace/commercial aviation, defense, automotive, with independent estimates of the latent demand for scandium being placed at several hundred tonnes per year in the aerospace sector alone. The Traxys contract now means scandium sales are largely taken care of. Added to this NioCorp has 75% of their primary product (ferroniobium) already under contract over the first 10 years of production.

Given the above off-take and sales contracts NioCorp is looking attractive for finding a project funding partner, especially given they already secured an in-principle eligibility from the German Government loan guarantee program.

Niocorp publishes encouraging results for the United States' only primary niobium deposit

✘ NioCorp Developments Ltd. ("Niocorp", TSXV: NB | OTCQX: NIOBF) announced the final assay results from the third phase of its drilling program at Elk Creek, Nebraska. Elk Creek is rich in barium, rare earth element mineralization and especially high grade concentrations of niobium (formerly known as columbium), a rare metal that is the focus of the project. On January 19, Niocorp published the final results from the third and final phase III of the 2014 drilling program at its Elk Creek project in Nebraska, in preparation

for the release of its feasibility study toward the spring of this year. Niocorp is pleased with the high-grade assay results, which add to the already successful drilling campaign of 2014. The recent results concern drillholes NEC14-020, NEC14-021, NEC14-022 and NEC14-023, showing that niobium mineralization continues both within the defined resource zone and at depth.

The drilling campaign have allowed Niocorp to gain insights into the ore body ahead of an updated resource report to be issued, perhaps, as early as the end of January. Some of the most encouraging niobium interceptions were noted at holes NEC14-021 (304 metres @ 0.98% Nb – 88 metres of which @ 1.28% Nb) and at Hole NEC14-020 (351 metres @ 0.71% Nb). Niocorp advised that “due to the angle of the drilling and other factors”, these results have not revealed the full scope of the Niobium resource.

Niocorp had a very productive year in 2014 but was not the first to realize the potential for niobium mining at Elk Creek. In the 1960's, Molycorp (NYSE: MCP) was the first to explore Elk Creek, which has the third largest niobium deposit in the world and the only primary niobium deposit in the United States. This is especially important because all the niobium used in the United States has to be imported; most of it is produced at a mine in Brazil. While it is crucial for the electric car industry, niobium's appeal stretches across most sectors and countries.

In the last weeks of 2014, Niocorp secured an offtake agreement with ThyssenKrupp Metallurgical Products in Germany, one of the largest steel makers in the world. As part of a ten-year purchase contract, ThyssenKrupp shall acquire 3,750 tons of ferro-niobium per year, as much as 50% of Niocorp's total projected production. ThyssenKrupp Metallurgical Products GmbH is both a producer of advanced alloys and one of the leading trading houses for raw materials worldwide. The contract period is expected to begin after the start of

production in 2017. NioCorp has virtually no competitors in the United States and niobium demand is only increasing but most is now produced at a mine in Brazil and the total world market is in the 80,000 to 100,000 ton range.

Niobium is mainly used in the form of Ferro-Niobium to produce HSLA (High Strength, Low Alloy) steel and mostly used in the construction sector, especially in such things as bridges and roads because it adds strength to steel while reducing weight. The automotive sector is the second largest user and any steel bodied car (the vast majority, only a handful are made using aluminium or carbon fiber) made in the world today has niobium in it, because it helps reduce fuel consumption and add safety. Niocorp has filed an NI 43-101 compliant resource report with Indicated resources of 28.2 Million Tonnes @ 0.63% Niobium pentoxide (Nb₂O₅), containing 177 Million Kg's of Nb₂O₅, and an Inferred resource of 132.8 Million Tonnes grading 0.55% Nb₂O₅, containing 733.7 Million Kg's of Nb₂O₅, (at a 0.3% Nb₂O₅ cut-off grade)., to produce lighter, stronger steel for use in automotive, structural and pipeline industries. Niocorp's project enjoys strong local support because the eventual niobium mine could employ a few hundred people and benefit the community at a larger scale.

Niobium is one of fourteen metals or groups of metals that the Council of Europe has identified as critical. The United States National Research Council considers it even more important, listing it as one of the five "most critical" metals. Niobium carries great economic importance, made all the more so by its high level of supply risk. As has been the case for rare earths, niobium is one of the metals needed to produce 'new technology' items. It is needed to develop a wide range of super-alloys, which have applications in aerospace, nuclear energy (associated with zirconium for their resistance to the flow of neutrons) or in powder form to make micro-capacitors. However, niobium's demand continues to derive from 'ferroniobium' thanks to the former metal's ability to improve

steel's mechanical properties. This is because alloys used in steel must add strength and reduce brittleness while also reducing weight and malleability. Just a few grams of niobium added to a ton of steel can help raise the resulting alloy's strength by 40%.

A fractional amount of niobium can add enough strength to steel, that it can help engineers reduce weight of any steel based product by as much as 10%. In automobiles, niobium enhanced steel can contribute to significant fuel consumption reductions. China is the largest consumer of niobium in the world, because of the booming infrastructure in place in the country. Even the most recent earthquakes, with dramatic damage in terms of loss of life, have highlighted the consequences of the use of inferior materials in construction, but China needs to import niobium, because unlike the rare earths, graphite, zinc and iron ore, it cannot produce even a gram of niobium. The Brazilian CBMM (Companhia Brasileira de Metalurgia and Mineração) singlehandedly addresses 85% of global niobium demand. Such is the context in which, Niocorp is developing Elk Creek, the only primary niobium deposit in the United States and it may soon become one of the most important production sites of niobium outside of Brazil. Not surprisingly, Niocorp's shares have grown by over 300% in 2014, going from \$ 0.14 to \$ 0.80. And there is no reason why that race cannot continue moving up.