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The implications of the discovery of a world class resource of phosphate in Europe

By

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Ladies and Gentlemen, Dear Secretary General,

thank you for giving me the honour to speak at this highly esteemed audience.

When we founded Norge Mining in 2018, I was fully aware of the EU's list of Critical Raw Materials and the green energy transition – the two major themes that target minerals we own. But I had no idea how quickly the context of our project would develop. And I had no Idea how much the term "critical raw materias" would live up to its name very soon.

The past three years have seen a pandemic, supply chain chaos, escalating climate change and Putin's invasion of Ukraine.

Currently, Europe relies on imports for these materials, which brings supply chain vulnerability and geopolitical risk. As a result, the EU wants to increase in the European production and processing of such materials.

It should be noted that currently, Europe consumes about a **quarter of the world's raw materials but produces only about three percent.** This statistic will come as no surprise because developed countries don't like mining in their own back yard, for reasons including cost, environmental impact, land use etc. **This attitude for the sake of supply chain security, needs to change.**

Remember also that the green energy transition, **to deliver a carbon neutral economy, is critical- raw-material-intensive.** The global shift from fossil fuels to renewable energy can only be achieved through the mining of metals & minerals, **playing the key role** in green energy production and storage.

So far, we have completed more than 72'000 m of drilling and, in summary, the exploration work has been tremendously successful in that we have discovered at least **and published** two world-class resources of phosphate, vanadium and titanium making up just about 10%-13% of our entire **potential.**

I would like to underline that the approach we have taken to the project - **and this is of utmost importance to us** - is to embrace the highest standards of environmental and other behaviours. Alignment with international sustainability programmes, **ESG & SDG compliancy** and disclosure guidance, are central to our strategy for becoming a responsible mining and processing business.

The EU's argument for increasing the production of raw materials in Europe has never been stronger nor the need more urgent.

Phosphate, vanadium and titanium are all on the EU list of Critical Raw Materials, these are materials that have been identified by Europe as of strategic importance.

The EU list of Critical Raw Materials was launched in 2008 as a priority action of the EU raw materials initiative. Phosphate was added to the list in 2014 and has remained on the list ever since. It is included because of its **key role in the agriculture industry,** in the production of fertilizers and **for the food security of this planet.**

The global phosphate fertilizer market size was valued at more than $61 billion in 2021 and it is forecast to be valued at around $176 billion in 2040.

Almost all, around 95%, of phosphate produced is used in fertilizer so phosphate is *absolutely central to the security of food supply.*

But Phosphate also is increasingly important in the green energy transition, owing to its use in a type of battery, called a lithium **iron** phosphate or LFP battery. These LFP batteries are used in electric vehicles,

including in the Tesla 3 models, in smaller VW vehicles or for public transportation vehicles, but also for static energy storage. I'll talk a bit more about LFP batteries later on.

But first, let's look at where phosphate is currently produced and the impact on geopolitics linked to Phosphate.

China is the world's biggest producer, followed by Morocco, the US and Russia. These are the top four producing countries, and geopolitics abounds. Other producers include Jordan, Saudi Arabia, Egypt, Tunisia and Syria, and further afield in Brazil and Vietnam.

But now the war in Ukraine has weaponised natural resources, particularly energy, **but also phosphate.** And the conflict also has weaponised grain supply by trying to take control of Ukraine's sea ports, which further threatens food security which will effect on a broader scale social and political stability over a wide area.

Morocco is believed to host one of the world's largest reserves of phosphate. There are also important reserves in the Western Sahara. But mineral-rich Western Sahara suffers from sporadic political instability that may make supply uncertain. A vital ingredient in fertiliser, North-African phosphate has been instrumental in feeding the world. But, as we've seen with the war in Ukraine, conflict can put a sudden and detrimental stop to supply chains - that the world depends on.

Also Algeria and Tunisia are said to have significant untapped potential phosphate reserves. That said while China engages in Algeria's Phosphate resources for billions of Dollars while in the same time China cutting down on exports of Phosphate in October 2021.

EU has historically imported most of its phosphate from Russia and MENA countries **though** the invasion of Ukraine has created an urgent requirement to prevent dependency on Russia.

In 2021 Russia and Ukraine together accounted for almost a third of the world's wheat and grain's needs. The deliveries went mainly to the Middle East and Africa, which now face a sharp increase in the number of undernourished people. Following the outright aggression of this war, the flow of wheat and grain was not only disrupted ***but completely stopped.***

Russian Blockage of Ukrainian sea ports not only stopped overnight wheat and grain exports but also had a severe effect on the cost of food as importers seek to find alternatives. As an example: only Egypt, Turkey and Bangladesh alone with a combined population of about 350 million people, bought more than half of Russia's wheat. Egypt is the world's biggest importer of wheat to feed its population of over 100 million. In the crop year of 2021-22, Turkey was the largest buyer of Russian wheat.

On general Arab states, poor in agriculture, import about 80% of their grain and wheat from Ukraine and Russia.

What isn't receiving enough attention is **what stranded Ukrainian grain means for the world's poorest and most vulnerable.** The price of wheat in Africa is up by 45%, reports the African Development Bank.

In an UN security council debate earlier this year it was stated that "Failure to open those ports… will be a declaration of war on global food security… And it will result in famine and destabilization and mass migration around the whole world." More than 275 million people worldwide "are on the brink of starvation". It stated that there are "44 million in 38 countries at the 'emergency' phase of food insecurity…one step away from a declaration of famine." People in South Sudan, Yemen, Afghanistan, and elsewhere were at "serious risk" according to the UN agency.

Or in other words, the war in the Ukraine has created many victims—in Ukraine for sure - **but it may also thousands of miles away.**

But thanks to the joint efforts of this **very institution** a deal aimed at resuming Ukrainian grain exports blocked by Russia, was brokered with raising prospects for an end to a standoff that had exposed millions to the risk of starvation.

This example demonstrates, that raising food prices and supply disruptions are an explosive combination that can lead to a domino of social unrest and political instabilities in many countries. But that must not be the case!

There couldn't be any better time now to develop the phosphate industry in a stable environment, in the heart of Europe – in Norway. It will create security of supply in Europe and beyond, thereby contributing to food security and positively reflect also thousand miles away. It would create an export industry, which had provenance as its hallmark. It would also have longevity, as Norway's resources would last potentially for several hundred years.

But there is not only Phosphate in fertilizers.

In addition to security of food supply, phosphate from Norway could be a major enabler of the green energy transition through the LFP batteries I mentioned earlier. It creates the opportunity for Europe to have its own, vertically integrated battery industry.

A dangerous dependency on Oil and Gas will accelerate the green transition and automatically call for mobile and stationary battery storage capacity.

Until about a year ago, LFP, as one of the early types of lithium battery, seemed to have little chance of challenging the dominant battery chemistries, which use nickel and cobalt. But technological advances in China, focused on enhancing the energy density of LFP batteries, has turned **LFP into a highly competitive technology with key advantages in terms of cost, safety, longevity and sustainability.**

Rapidly growing demand for batteries amid constrained supply of raw materials means that raw material costs are expected to increase substantially during the coming years. **This gives a clear cost advantage to LFP technology because these batteries do not require nickel or cobalt**, both of which are expected ***to at least double in price by 2030.*** In addition, LFP does not have the social and environmental concerns associated with the mining of nickel and cobalt.

Projected demand for phosphate **only** within the transport and energy storage sectors is expected, cumulatively, to reach more than **14 million tons globally** from 2021 to 2040.

In Europe, research forecasts that the cumulative demand for phosphate would reach to almost 1.7 million tons in the decade 2031-2040.

With faster decarbonisation by world economies and greater prevalence of LFP technology, these forecasts could underestimate potential phosphate demand. Irrespective of the exact level of future demand, the vast resources of phosphate in Norway could underpin the emergence of a European LFP battery industry.

There is no doubt that Norway - close to home, free of conflict and a friendly neighbour - has the resources to become a superpower in phosphate. The aim but also the potential is there to deliver stability and security to the worlds food supply, from Phosphate with Provenance or CRMs for Democracies !

Thank you !