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Cipher Neutron

Cipher Neutron - Developing Iridium-Free AEM Electrolysers and Leading the Way in Making Green Hydrogen Accessible and Competitive



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CEOCFO: *Mr. Randhawa, what is the idea behind Cipher Neutron?*

Mr. Randhawa: The idea behind Cipher Neutron is to drive the global transition to a sustainable, green hydrogen economy. Our focus is on developing cutting-edge Anion Exchange Membrane (AEM) electrolyser technology that makes the production of green hydrogen more efficient, affordable, and scalable. By achieving high efficiency and eliminating the use of scarce and expensive materials like iridium, we aim to solve key challenges in the hydrogen industry, making clean hydrogen accessible to a broader range of industries.

Cipher Neutron's vision is to be a leader in the next generation of hydrogen production technology, addressing the demand for clean energy solutions across various sectors such as transportation, heavy industry, and energy storage. Our innovative approach helps companies reduce their carbon footprint by replacing grey hydrogen (produced from fossil fuels) with green hydrogen, which can drastically cut CO2 emissions. Ultimately, Cipher Neutron is not just about building electrolysers; it's about enabling a future where hydrogen plays a central role.

CEOCFO: *What is different about your approach to accomplish clean hydrogen?*

Mr. Randhawa: When a new concept emerges, it's natural for scientists worldwide to pursue it, leading to what I consider healthy competition. At Cipher Neutron, we've been at the forefront for many years and are proud to be the first North American company to commercialize AEM (Anion Exchange Membrane) electrolysers.

Our electrolysers are designed with sustainability in mind, avoiding harmful chemicals and using no iridium—a precious and scarce metal commonly found in traditional electrolysers like PEM (Proton Exchange Membrane) systems. PEM electrolysers often rely on PFAS (Per- and polyfluoroalkyl substances) chemicals and iridium, which present environmental and cost concerns.

Cipher Neutron's approach focuses on developing AEM electrolyzers that are iridium-free, resulting in lower capital costs while delivering a highly efficient system. This allows us to produce more hydrogen from the same amount of electricity, significantly reducing the cost of hydrogen production. Our key advantages for customers include lower CapEx, lower OpEx, a sustainable product, and a longer operational lifetime.

CEO CFO: *Do your customers or potential customers understand immediately the value or are they skeptical of what you can accomplish with the AEM Electrolyser?*

Mr. Randhawa: Yes, they absolutely recognize the value. While there may be some natural caution when adopting new technology, including AEM electrolyzers, we view this as an opportunity. Customers come to us, and we successfully address their questions and concerns through pilot projects, which consistently demonstrate the superior benefits of our solution over traditional, carbon-intensive hydrogen production methods. Our technology enables customers to generate green hydrogen on-site, tailored precisely to their needs. By starting with pilot projects, we can clearly showcase the advantages, making it easy to transition and scale up to larger implementations.

CEO CFO: *Would you tell us how and where graphene comes into play?*

Mr. Randhawa: The graphene system represents a different product line that we will be launching in the coming years. Essentially, it's a hydrogen battery. We have two main products: the AEM electrolyser and reversible fuel cells, which function like a hydrogen battery. Our approach involves producing hydrogen using our system and then storing the generated hydrogen in graphene. This innovative storage method allows for efficient energy retention and utilization.

Graphene serves as a storage medium because it has the ability to absorb hydrogen produced by our reversible fuel cells. This allows us to store the hydrogen for future use in generating electricity. The process involves producing hydrogen, storing it within the graphene, and then utilizing the graphene, now infused with hydrogen, to create electricity. This is where graphene plays a crucial role in our energy storage and utilization strategy.

"Cipher Neutron is leading the way in making green hydrogen accessible and competitive, with plans to scale up to 1 Gigawatts of electrolyser production capacity annually, driving down costs and accelerating the global shift to clean energy" Gurjant Randhawa

CEO CFO: *Would you give us an example of a project that you are working on currently and what were some of the steps in getting it going?*

Mr. Randhawa: We're currently collaborating on an exciting project with a local company called Fuel Positive, which produces green ammonia. In this partnership, we're providing electrolyzers because the green ammonia production process requires both nitrogen and hydrogen. Our role is to supply the hydrogen, while they handle nitrogen production. The system they have developed is quite advanced, converting hydrogen and nitrogen on-site, directly on the farmer's land, into ammonia. This ammonia can then be applied to fields as fertilizer, making the process highly efficient and sustainable.

Another project we're involved in is with a mining company in Chile called Molymet. We are supplying them with AEM electrolyzers, which they will use to produce hydrogen for the reduction process of Ammonium Perrhenate (APR) to create rhenium metal products. Currently, they rely on carbon-intensive hydrogen, but with our clean and green hydrogen, they will significantly reduce their carbon footprint.

We're also collaborating with Simon Fraser University (SFU) in Canada to build a clean hydrogen hub. As part of this initiative, we are providing two electrolyzers: one for commercial applications and the other for research and development at the university. We have many other unique projects underway, each tailored to meet specific requirements and goals.

CEO CFO: *Are there certain parts of the world that are paying more attention or is it everywhere?*

Mr. Randhawa: Interest is widespread, but some countries are taking it more seriously than others. Europe, especially Germany, is leading the way in advancing green hydrogen initiatives. The US and Canada are also committed players in this space. While some countries have more aggressive goals and targets, China is currently the fastest-growing nation in terms of green energy production. Overall, there is a global shift, with every country starting to recognize the importance of clean energy.

CEOCFO: *You mentioned that people are turning to you now? Are you able to take on all the projects that come your way and can you ramp up as there is more interest or are there some considerations such as money, location or personnel that come into play?*

Mr. Randhawa: Yes, we have over 100 potential customers in discussion, and we receive new project inquiries almost daily. We currently have a manufacturing facility in Toronto, but we recognize that we need to expand to meet the growing demand. We are planning additional fundraising to boost our production capacity. Additionally, we work closely with governments worldwide, as there is significant support for green energy initiatives. While we are doing everything we can at the moment, our expansion efforts will help us better meet our customers' needs and deliver on the increasing demand.

CEOCFO: *What have you learned and what has changed in your approach as you work on more projects and you see how to tweak them and make them better?*

Mr. Randhawa: I believe learning is a lifelong process. In the hydrogen industry, I've seen significant growth over the last four years, with more people gaining an understanding of hydrogen's potential. Each project teaches us something new, and the last three years have shown that people are now more knowledgeable about hydrogen and the available technologies.

It's important to note that hydrogen's applications extend far beyond vehicles. The hydrogen used in transportation or fuel cells makes up less than 1% of global usage; most of the demand today comes from industries like ammonia production, oil and gas, and others. We work closely with customers, providing training sessions to guide them on how to operate our electrolyzers effectively.

CEOCFO: *What type of maintenance is involved?*

Mr. Randhawa: Maintenance typically involves tasks like changing filters and ensuring there are no abrupt shutdowns or power interruptions. While the system can be as complex as needed, the main responsibilities for the end user include checking filters, monitoring water quality, and ensuring there are no issues with the municipal water supply. We conduct regular follow-ups with the end users to ensure that someone is on-site to oversee operations and that everything runs smoothly.

CEOCFO: *What challenges do you see for Cipher Neutron over the next year and how do you expect it to be different a year or two from today?*

Mr. Randhawa: The challenges are not just for Cipher Neutron but for the entire green hydrogen industry. Companies are striving to outperform each other, but our greatest competition comes from carbon-intensive hydrogen, which is currently more widely used. However, we are making significant strides in reducing the Levelized Cost of Hydrogen (LCOH) for our green hydrogen. Cipher Neutron's technology is highly competitive, and we are closing the gap with traditional grey hydrogen, making green hydrogen increasingly affordable.

Market acceptance is a key factor, and we're optimistic about the growing global momentum for clean energy. Continuous government support, such as affordable electricity for end users and tax incentives, will be instrumental in accelerating the adoption of green hydrogen. We are committed to improving our electrolyser efficiency to ensure we can offer a compelling alternative to grey hydrogen.

Looking ahead, we plan to significantly expand our production capacity. We aim to scale up to 600 megawatts in the next few years, with the goal of reaching an annual capacity of 1Gigawatts. As we increase our production volumes, we expect to drive down costs further, enabling real growth in the green hydrogen market. That's where Cipher Neutron is headed in the near future—leading the way in making green hydrogen accessible and competitive.

The logo for Cipher Neutron, featuring the company name in white sans-serif font on a red rectangular background.

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