dynaCERT and Cipher Neutron Catapult into the Hydrogen Economy Establishing an International R&D Facility in the Greater Toronto Metropolitan Area

written by Raj Shah | February 22, 2023

February 22, 2023 (Source) – *dynaCERT* Inc. (TSX: DYA) (OTCQX: DYFSF) (FRA: DMJ) ("*dynaCERT*" or the "Company") is pleased to announce that is has concluded a Collaboration Agreement with Cipher Neutron Inc. ("CN" or "Cipher Neutron") to further jointly develop, produce and market state-of-the-art Hydrogen technology, including AEM Electrolyser technology, that is designed to produce Green Hydrogen for world-wide large infrastructure projects, and Reversible Fuel Cell technology applied to emergency preparedness and efficient storage of Hydrogen as a long-term source of power.

Cipher Neutron is a rapidly growing disruptive technology company focused on Electrolysers for Green Hydrogen production and Reversible Fuel Cells for power generation and energy storage solutions. Cipher Neutron combines a global group of collaborating scientists that team up with engineers, technology developers, experts in hydrogen technology, investment bankers and people that have worked in hydrogen and power generation for decades. Cipher Neutron's innovative products, such as Electrolysers and Reversible Fuel Cells under development, have unique advantages over other Hydrogen production, power generation and energy storage solutions currently available in

the global market.

Collaboration Agreement

In collaboration with *dynaCERT*, CN plans to expand the development of *dynaCERT's* previously announced Anion Exchange Membrane (AEM) Electrolysers with a goal to expand *dynaCERT's* collaborative Research & Development and to accomplish the following:

1. A 5-Kilowatt AEM Electrolyser that can meet the commercial specifications of potential clients internationally;
2. A 50-Kilowatt AEM Electrolyser that can meet the commercial specifications of potential clients internationally;
3. A 250-Kilowatt AEM Electrolyser that can meet the commercial specifications of potential clients internationally;
4. A line of Reversible Fuel Cells to meet the growing variety of customer's emerging needs internationally; and,
5. A Production Facility meeting the suitability requirements to offer these products to international clients in a timely and reliable manner and on a cost competitive basis.

AEM Advantages

AEM is considered as a superior hybrid solution combining the benefits of both PEM electrolysers and Alkaline electrolysers. The major issue with PEM technology is the high cost owing to the use of precious metals such as Platinum and Iridium as catalysts. AEM does not require such precious metals making it more sustainable and cost effective than PEM electrolysers. The major drawback in Alkaline electrolysis is its low current density and highly corrosive alkaline solution used as the

electrolyte. The AEM technology offers higher current density using significantly reduced amounts of corrosive electrolytes compared with alkaline electrolysers.

Green Hydrogen Cost Reductions

Green Hydrogen is defined as hydrogen that is produced from water electrolysis using clean electric power (i.e. electric power from hydro, solar, nuclear & wind), resulting in a zero GHG footprint. Grey Hydrogen, by comparison may often have a significant GHG footprint, as such hydrogen is produced by the steam methane reforming process.

One of the major hurdles of Green Hydrogen is its high production cost. CN and *dynaCERT* technology is designed to address this major industry problem. A typical commercially available electrolyser consumes more than 51 kilowatt-hours ("kWh") of energy to produce one (1) kilogram of Hydrogen or 77% efficiency (based on High Heating Value calculations of H2 Gas). Cipher Neutron's and *dynaCERT's* jointly developed 5 Kilowatt AEM Electrolyser slashes the energy consumption down to 48 kWh, thereby achieving 82% efficiency.

Our highly efficient AEM Electrolyser can produce more Hydrogen per kWh than typical commercially available electrolysers and enables Green Hydrogen at affordable prices. For example, if clean electric power were available to a customer at USD 4 cents per kWh, the Green Hydrogen production cost of our 5 Kilowatt AEM Electrolyser would be under USD $2.00 per kilogram of Green Hydrogen Gas.

The R&D goals of CN and *dynaCERT* are to eventually design and produce commercially larger systems capable of producing Green Hydrogen Gas at more competitive prices, in order to excel at the ever increasing competitive Green Hydrogen pricing marketplace and stay at the forefront and cutting edge of the

Hydrogen technology.

On a larger scale, CN and *dynaCERT's* 1 Megawatt AEM Electrolyser will be designed to achieve the production of 498 kilograms of Hydrogen Gas per 24 hour day as compared to 470 kilograms of the current lesser efficient electrolysers commercially available today. This 28 kilogram difference in daily production of Hydrogen Gas equates to powering 36 compact Fuel Cell cars travelling up to 100 kilometers without producing any CO2 emissions. This travel distance would otherwise represent over half a tonne per day of CO2 emitted into the atmosphere from typical gas powered Internal Combustion Engine cars assuming a fuel economy of 7 Litres/100 kilometre.

Capital Cost Reduction of Green Hydrogen Electrolysers

Research and Development teams of *dynaCERT* and CN have focussed on cost efficiency and mitigating material costs. Operational efficiency and the core material costs go hand in hand with design engineering. Our 5 Kilowatt AEM Electrolyser is highly efficient and has achieved a higher current density of 2 amps/cm2 as compared to 0.07 amps/cm2 in a traditional alkaline electrolyser. Each cell in our 5 Kilowatt AEM electrolyser produces 28 times more Hydrogen Gas than a traditional alkaline cell of equivalent size. This cost reduction in raw materials, the elimination of the use of Platinum group metals as catalysts, coupled with our unique design, allows the AEM 250 kilowatt stacksplanned by *dynaCERT* and CN to be priced below USD $950/kilowatt, believed to be a most compelling proposition to users of electrolyser technology.

Current Global Market

CN and *dynaCERT* have pioneered a five (5) Kilowatt AEM stack (a key technological subcomponent of an electrolyser) and plan to take their breakthrough transformative work to the next level

with a trailblazing fifty (50) Kilowatt Electrolyser. This cutting-edge development is set to meet the current targets of the global hydrogen market, with the visionary scientists of the two companies going even further by planning to develop a futuristic two hundred and fifty (250) Kilowatt Electrolyser to meet and bid for future large infrastructure projects. The 5 Kilowatt AEM Electrolyser is planned to be market ready by Q4 2023 making it the largest capacity single-stack AEM Electrolyser commercially available today.

Hydrogen use today is dominated by industry, namely: oil refining, ammonia production, methanol production and steel production. In today's hydrogen production, steam methane reforming accounts for more than 95 percent of the worldwide production of hydrogen also known as grey hydrogen. Steam reformers use heat, pressure, and catalysts to produce hydrogen gas from fossil fuels such as natural gas. This process generates about ten kilograms of carbon dioxide (CO2) per kilogram of hydrogen produced. As per the International Energy Agency, current production of grey hydrogen, mainly used in the chemical and petrochemical sectors, is responsible for more than 900,000,000 tonnes of CO2 emissions per year. As a result, switching those industry sectors to low-emission hydrogen use is a priority.

Growth of Green Hydrogen Market

Green Hydrogen is the only hydrogen type fully compatible with net-zero emission targets and sustainable, climate-safe energy use. Green Hydrogen produced by AEM Electrolysers of *dynaCERT* and CN, has the potential to emerge as a vital clean energy carrier. The global Green Hydrogen market size is valued by Grand View Research at USD 3.2 Billion in 2021 and is expected to expand at a compound annual growth rate or CAGR of 39.5% from 2022 to 2030.

Reversible Fuel Cell Technology

Cipher Neutron’s remarkable work in developing the world’s first patent pending Reversible Fuel Cell using Graphene Slurry to store hydrogen in a non-compressed form is set to modernize the industry. Cipher Neutron’s dynamic and versatile Reversible Fuel Cells can be used both as an Electrolyser in it’s E-Mode (Hydrogen generation mode) and as a Fuel cell in it’s FC-Mode (Power Generation mode). Cipher Neutron plans to be the first company to commercialize Reversible Fuel Cells for residential and industrial use.

Reversible Fuel Cells

Cipher Neutron’s unique all-in-one Reversible Fuel Cell technology is designed to replace the need for two separate systems i.e. an Electrolyser system and a Fuel Cell system, thereby offering significantly less expensive solutions to clients that require both fuel cells and electrolysers.

The growing demand for reliable emergency preparedness devices in the world has created an international need for an economically viable source of backup electricity during periods of surging prices and times of natural disasters, war and suffering. Cipher Neutron’s Reversible Fuel Cell technology can provide carbon free power storage in the form of hydrogen and supply of electric power on demand at attractive prices.

Emerging off-grid solar and wind power projects use electrolysers for hydrogen production used to store energy and for later use in Fuel Cells to supply uninterrupted power to their intended loads. These Hydrogen projects typically include expensive and costly energy sources, electrolysers, hydrogen compressors, hydrogen storage tanks and fuel cells. Our Reversible Fuel Cell technology reduces such costs significantly.

The combined benefits of these two proprietary technologies, and the elimination of componants, allows for significant reductions in project investment capital and operating and maintenance costs in applications where *dynaCERT* and CN expect to emerge as strong bidders for large global infrastructure projects, chemical and steel production, and off-grid remote projects, in the next decade.

In a bid to target off-grid communities, including but not limited to cottages, remote villages, and islands, CN plans to launch in the market by Q1 2025 its 5 Kilowatt and 10 Kilowatt Reversible Fuel Cells.

Graphene Technology for Safe & Efficient Energy Storage

Furthermore, our labs have demonstrated that using Graphene Slurry for Hydrogen storage eliminates the requirement for Hydrogen compressors and, accordingly, CN's research team has applied for a patent relating to this breakthrough technology.

Cipher Neutron's polymer acid electrolyte-based Reversible Fuel Cell with Graphene Slurry has the similar energy density as Lithium-ion batteries. This non-toxic energy storage method combines a lower carbon footprint, affordable recycling options and unparalleled safety, especially for residential and commercial applications.

Significant Investment by *dynaCERT*

Under the Collaboration Agreement, *dynaCERT* plans to invest in CN up to $17,500,000 upon the exercise of common share options at various prices granted by CN to *dynaCERT* (the "CN options"). *dynaCERT* may exercise such options at various expiry dates up to July 31, 2025, which may give *dynaCERT* up to a 50% ownership of CN based on current CN shares outstanding on an undiluted basis.

The proceeds of this investment is expected to be used by CN, in collaboration with *dynaCERT,* to develop a state-of-the-art International Hydrogen Research & Development facility in the Greater Toronto Metropolitan area, which will enable the development of AEM 250 Kilowatt Electrolysers while ensuring *dynaCERT* and CN retain their role in the Hydrogen Economy. As well, part of the proceeds shall be used to establish the necessary Production and Quality Control facilities for the company's line of Reversible Fuel Cell models, and AEM Electrolyser models.

In order to quickly advance *dynaCERT*'s and CN's penetration in the Hydrogen Economy and the AEM Electrolyser industry, *dynaCERT* has committed to exercise certain of its CN options in amounts ranging up to 50% of the net proceeds of any equity financing by *dynaCERT* up to a maximum of $5,000,000 at favourable seed capital exercise prices of CN equity to *dynaCERT*. When *dynaCERT* exercises such options, *dynaCERT* may then own 25% of CN on an undiluted basis.

In conjunction with executives at Cipher Neutron and *dynaCERT*, Galaxy Placements Inc. has, at no cost to *dynaCERT* nor CN, acted as corporate strategy advisor in certain of the structuring of the hydrogen business collaborations between these two international leaders in hydrogen generation. To accelerate the fulfillment of Cipher Neutron's and *dynaCERT's* global business, further future private financings by Cipher Neutron may provide institutions with an opportunity to gain large potential upside exposure to international hydrogen infrastructure projects.

Gurjant Randhawa, M.Eng., P.Eng., President and CEO of Cipher Neutron, stated, "Cipher Neutron and *dynaCERT* share ambitions for transforming and accelerating the energy transition. Our portfolio of technologies can help place both companies at the forefront of tackling climate change with practical and

implementable solutions. We are enthusiastic to be supported by *dynaCERT* in its ambitions for a more sustainable future. There is enormous global demand for Green Hydrogen and clean energy, and engineering solutions such as those pioneered by Cipher Neutron and *dynaCERT* collaborating together are vital to increasing world options to reduce Greenhouse Gases. We look forward to working with *dynaCERT* on a variety of AEM Electrolyser and Green Hydrogen projects in Canada and around the globe, the many plans that will help to enable industries and the world to move beyond the detrimental effects of fossil fuels."

Jim Payne, President and CEO of *dynaCERT*, stated, "While maintaining and supporting our current HydraGEN™ technology and network, world-wide, *dynaCERT* is proud to expand our relationship with Cipher Neutron, a highly respected and skilled partner with a proven track record in AEM Electrolysers. This collaboration will help us strengthen our supply chain and underpin our ability to deliver on our growing AEM Electrolyser initiatives. With a partner like Cipher Neutron, *dynaCERT* is also in a very strong position to become a global leader of the Hydrogen Economy, not just with AEM Electrolysers, but also in Green Hydrogen infrastructure projects. For the rapidly developing Hydrogen Economy, this collaboration is a game-changer. By bringing together one of the most highly regarded Green Hydrogen and fuel cell companies in Canada which operates globally, and with *dynaCERT's* technology and manufacturing capabilities, we are designing the potential for future volume and scale for Green Hydrogen that hasn't existed until now in most parts of Canada. This partnership confirms Cipher Neutron's world class position in flow field design and catalyst coated membranes, the key performance-defining components of our AEM Electrolysers and Reversible Fuel Cells."

About Cipher Neutron Inc.

Please see: www.cipherneutron.com

About Galaxy Placements Inc.

Galaxy Placements is a strategy advisor based in Canada operating world-wide focusing on providing to public and private companies lucrative Climate Change Solutions for Institutions. Galaxy Placements brings hundreds of person-years of professional experience and seasoned wisdom in the financial marketplace to Issuers such as *dynaCERT* and Cipher Neutron, and many others including public and private businesses. Galaxy Placements focuses advising issuers in the Critical Minerals Industry, the new Hydrogen Economy, and Clean Energy.

AEM Technology

Anion Exchange Membrane (AEM) electrolysis is the latest advanced technology designed to produce Green Hydrogen. AEM allows negatively charged Hydroxyl ions (OH-) to pass through the membrane and restricts positively charged ions (H+). These restricted protons (H+) combine to make Hydrogen gas on the cathode side and the Hydroxyl ions (OH-) combine at the anode side producing Water and Oxygen gas.

About dynaCERT Inc

dynaCERT Inc. manufactures and distributes Carbon Emission Reduction Technology along with its proprietary HydraLytica™ Telematics, a means of monitoring fuel consumption and calculating GHG emissions savings designed for the tracking of possible future Carbon Credits for use with internal combustion engines. As part of the growing global Hydrogen Economy, our patented technology creates hydrogen and oxygen on-demand through a unique electrolysis system and supplies these gases through the air intake to enhance combustion, which has shown to lower carbon emissions and improve fuel efficiency. Our

technology is designed for use with many types and sizes of diesel engines used in on-road vehicles, reefer trailers, off-road construction, power generation, mining and forestry equipment. Website: www.*dynaCERT*.com.

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Except for statements of historical fact, this news release contains certain "forward-looking information" within the meaning of applicable securities law. Forward-looking information is frequently characterized by words such as "plan", "expect", "project", "intend", "believe", "anticipate", "estimate" and other similar words, or statements that certain events or conditions "may" or "will" occur. In particular, information relating to Cipher Neutron Inc. and Galaxy Placements Inc. cannot be independently verified. Although we believe that the expectations reflected in the forward-looking information are reasonable, there can be no assurance that such expectations will prove to be correct. We cannot guarantee future results, performance of achievements. Consequently, there is no representation that the actual results achieved will be the same, in whole or in part, as those set out in the forward-looking information.

Forward-looking information is based on the opinions and estimates of management at the date the statements are made and are subject to a variety of risks and uncertainties and other factors that could cause actual events or results to differ materially from those anticipated in the forward-looking information. Some of the risks and other factors that could cause the results to differ materially from those expressed in the forward-looking information include, but are not limited to: uncertainty as to whether our strategies and business plans will yield the expected benefits; availability and cost of capital; the ability to identify and develop and achieve commercial

success for new products and technologies; the level of expenditures necessary to maintain and improve the quality of products and services; changes in technology and changes in laws and regulations; the uncertainty of the emerging Hydrogen Economy; including the Hydrogen Economy moving at a pace not anticipated; our ability to secure and maintain strategic relationships and distribution agreements; and the other risk factors disclosed under our profile on SEDAR at www.sedar.com. Readers are cautioned that this list of risk factors should not be construed as exhaustive.

The forward-looking information contained in this news release is expressly qualified by this cautionary statement. We undertake no duty to update any of the forward-looking information to conform such information to actual results or to changes in our expectations except as otherwise required by applicable securities legislation. Readers are cautioned not to place undue reliance on forward-looking information.

Neither the Toronto Stock Exchange nor its Regulation Services Provider (as that term is defined in the policies of the Toronto Stock Exchange) accepts responsibility for the adequacy or accuracy of the release.

On Behalf of the Board
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