DHT ENERGY CORP
DISRUPTIVE HYDROGEN TECHNOLOGIES

# Green Hydrogen

## $12 Trillion, Once in a Lifetime Market Opportunity

Goldman Sachs 2020

"It is my belief that the next 1,000 unicorns – companies that have a market valuation over a billion dollars – won't be a search engine, won't be a media company, they'll be businesses developing green hydrogen, green agriculture, green steel and green cement"

**Larry Fink, Chairman and CEO 2022**

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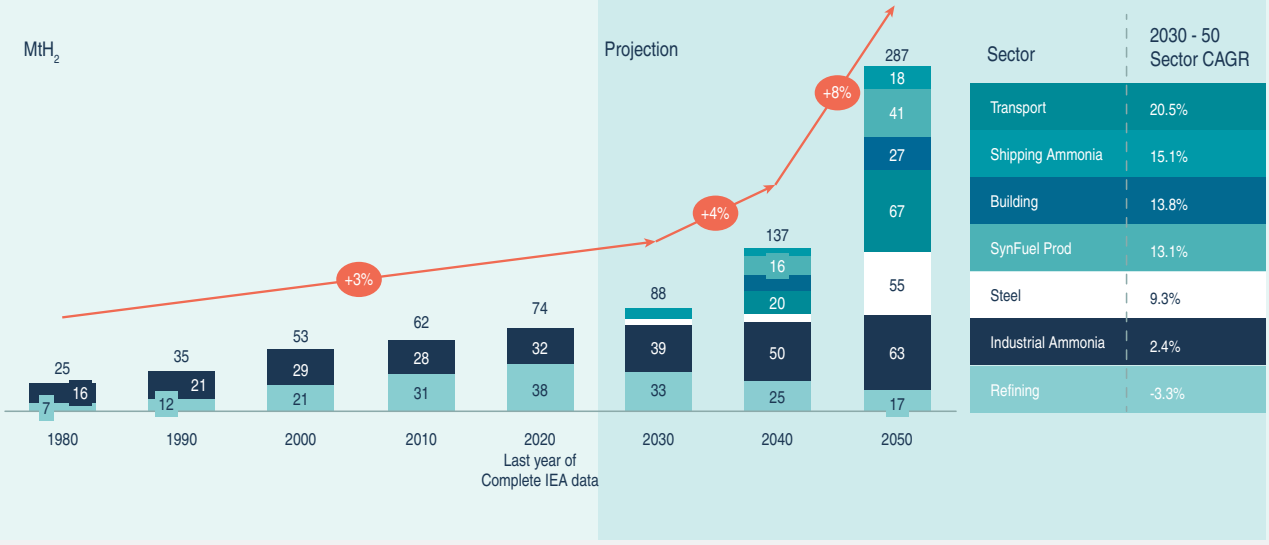
# Motivation

Climate change is already causing devastating effects on millions of people globally. And, the worst is yet to come as sea level rise impacts both wealthy people in coastal areas around the world, like Miami, and poor people in low-lying countries, such as Bangladesh. New sources of clean, carbon-free energy are greatly needed. They can both reduce the effects of global warming and help power its unavoidable effects, such as inland migration. Hydrogen produced by wind, solar and nuclear energy is one of the most attractive sources of clean energy. Large investments are now going into the production, storage, transportation, and use of hydrogen in Europe, Japan, the U.S., and many other areas. The hydrogen market is forecasted to exceed 12 trillion dollars by 2050.

Hydrogen is already produced in massive quantities as a feedstock in many chemical processes. However, most of that hydrogen is made now by burning fossil fuels, so it contributes to the global warming problem. Those old uses, and the new uses of hydrogen as an energy storage medium and fuel, urgently require clean low cost means of producing the hydrogen. Electrolysis of water to generate hydrogen is very attractive process because it can be done locally for hydrogen vehicles and other distributed uses. However, electrolysis is now expensive.

## Global Demand for Hydrogen by Sector




Note: 'Other' category not separated into different industries until projection years

Source: IEA Global Demand for Pure Hydrogen 1975 - 2018, IEA Global hydrogen demand by sector in the Sustainable Developemnt Scenario, 2019 - 2070

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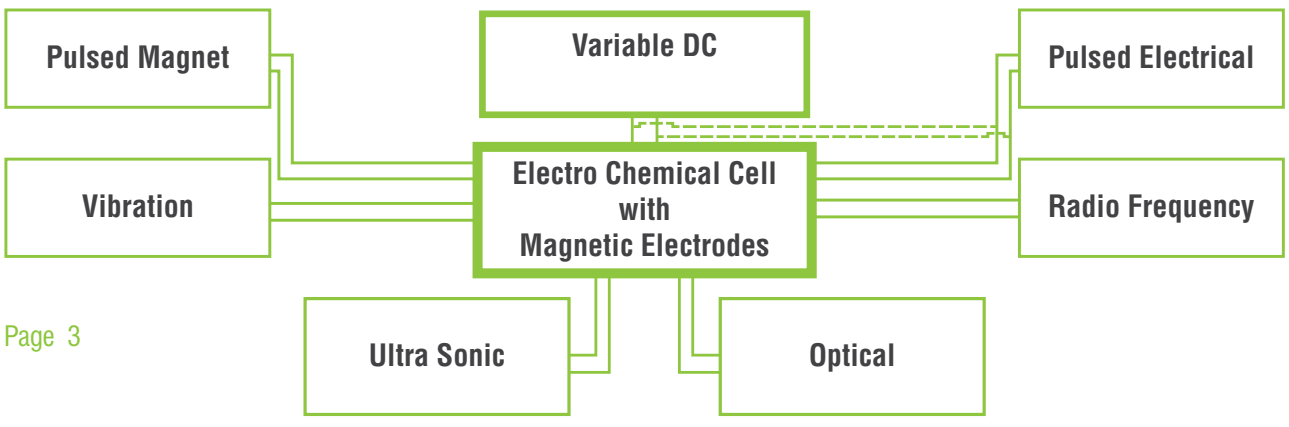
# The Technology

DHT exists to lower the energy consumption of an electrolyzer and therefore improve the economics of green hydrogen production, therefore increasing the number use cases for hydrogen. Disruptive Hydrogen Technologies ("DHT") Energy Corp is a Canadian Federal Corporation conducting confidential and proprietary research and development dedicated to the improvement of Alkaline and AEM electrolyzers, through the use of an excitations-based proprietary stimulus package. Its intellectual property is described in PCT patent application #CA2024050076 filed on January 22, 2024. The IP is being protected in 157 countries concurrently. The application is titled "Electrochemical Systems with Magnetic Electrodes and Additional Excitations and Methods Relating Thereto." **105 claims are made in the patent**. DHT is privately held and led by Canadian Troy E. MacDonald as CEO. Mr. MacDonald is a renewable energy project specialist, and co-owner of a Swiss Multinational Company (WPP Energy) which is a distributor of renewable energy technology. Mr. MacDonald is Chairman and CEO of an American Public Company providing renewable project advisory services. (HyFi Corp). The foundation of the R&D is a system conceived and documented by George Washington University Physicist, Dr. David J. Nagel, the Chief Science Advisor for DHT Energy. He has over six decades of experience in inventing complex research experiments and executing programs to prove their worth.

The DHT system involves multiple components and excitations which, used in various ways, lower the energy consumption used in electrolytic hydrogen production, and therefore reduces the cost of electrolytic hydrogen production. The DHT system is a stimulus package which introduces 6 different "excitations" to stimulate the chemistry of water to significantly reduce the amount of electrical energy needed to split water into hydrogen and oxygen. The DHT stimulus package gets integrated directly into industry-leading electrolyzers.

One major feature of the DHT Energy system is the use of magnetic electrodes for both their beneficial effects on reducing electrolysis energy and as substrates for magnetic catalysts. The system also includes capabilities for both pulsed electric and magnetic fields. Further, it has means for mechanical vibrations to remove bubbles more quickly from electrodes, which will improve electrolysis efficiency. The DHT Energy system includes subsystems for sonic and ultrasonic excitations, and the use of optical and radio-frequency signals to improve electrolysis.



# Collaboration With ICIQ

ICIQ is a large and very strong research organization with extraordinary capabilities for the design, production, and operation of advanced experimental chemical systems. Scientists in ICIQ have published the results of thorough studies of magnetic catalysts, and their effects on electrolysis efficiency, in top journals. www.cen.acs.org

The DHT Energy project at ICIQ includes the exercise of the various excitations noted above at a wide variety of frequencies and intensities, in many combinations, in order to find the lowest cost means to produce hydrogen. The project is distinguished by thorough accounting of all relevant old and new energies. It is led by Dr. José Ramón Galán-Mascarós, who has decades of experience in the conduct and management of advanced research projects. He is assisted by Dr. Felipe A. Garcés-Pineda, who has strong experience with magnetic catalysts and electrolysis.

DHT owns all intellectual property associated with the project. DHT Technology will come to market in 24 months with the cooperation of a major manufacturer of commercial electrolyzers, such as Nel Hydrogen. This ensures that the advances obtained in the laboratory will be exploited commercially. The scientific advances could be published eventually in top journals. The program is expected to be among the most cited in the world. The resulting reduced energy consumption values and the lower associated cost of hydrogen production should greatly impact practices and profits in the booming hydrogen energy arena.

The opportunities of the DHT-ICIQ project make it unusually interesting and commercially promising.

# Commercial Considerations

There is tremendous commercial interest in DHT Technology, with a 100MW $300m+ project from a client funded in the majority by the EU commission to construct a Hydrogen production facility in Europe. $50m-$60m of the project budget will be revenue for DHT, and with a profit margin expected at 50%. In addition, there are natural gas and coal fired power plants contacting us to convert their boilers to being hydrogen fired. Should the final performance numbers of the DHT system achieve its commercialization goal of at or near, $1 (net) cost per kg of H2 production, then converting thermal electric power plants to hydrogen can become an economically viable reality. This would exponentially expand the global demand for Hydrogen.

Adani, Tata Power, GE Baker Hughes, Siemens, Kawasaki, KEPCO, ATCO and MAN Energy Solutions have all expressed interest in using our technology, licensing – including regional and industry exclusives, and co-commercialization. In addition, there are at least ten hydrogen project developers waiting for this technology to be commercially ready.

We are expecting sales and licensing 2024 revenues of $50m, 2025 revenues of $200m, 2026 revenues of $500m, 2027 revenues of $750m, 2028 revenues of $1B and continued scale up from there.

Based on a valuation of 25m USD, DHT will raise up to $5m USD on an equity or convertible debt basis to support its two-year commercialization program. Private investments of $1m USD or more are being considered currently.

**Innovation, Sciences et Développement économique Canada**
Office de la propriété intellectuelle du Canada

**Innovation, Science and Economic Development Canada**
Canadian Intellectual Property Office

# Reçu du dépôt électronique / Receipt of electronic submission

**Office de la propriété intellectuelle du Canada**
Place du Portage, Phase I
50, rue Victoria
Gatineau (Québec) K1A 0C9
Canada

**Canadian Intellectual Property Office**
Place du Portage, Phase I
50 Victoria Street
Gatineau QC K1A 0C9
Canada

## Office récepteur canadien / Canadian Receiving Office

Votre demande a été transmise avec succès à la direction des brevets.
Your application has been successfully submitted to the Patent Branch.

## Détails de soumission / Submission details

**Numéro de demande internationale / International application number**
CA2024050076

**Nom du paquet des fichiers / Package file name**
A8148153WO

**Titre de l'invention / Invention title**
ELECTROCHEMICAL SYSTEMS WITH MAGNETIC ELECTRODES AND/OR ADDITIONAL EXCITATIONS AND METHODS RELATING THERETO

**Date de réception / Date of receipt**
2024-01-23

**Sommaire de la soumission / Submission digest**
dcef1002002f6fdbc1b44d9968b391b4d4938681

**Demandeur(s) / Applicant(s)**
DHT ENERGY CORP.;

# Reference

---------- Forwarded message ---------
From: **Eskens, Arden** <Arden.Eskens@gowlingwlg.com>
Date: Tue, Jan 23, 2024 at 6:56 PM
Subject: [PCT Application Filed] International Application Number CA2024050076 (Our Ref: A8148153WO) [GWLG-ACTIVE_CA.FID20277456]
To: Coles, Jeffrey <Jeffrey.Coles@gowlingwlg.com>, Troy MacDonald <t.macdonald@hyfi-corp.com>
Cc: David Nagel <david.j.nagel@gmail.com>, Nguyen, Austin <Austin.Nguyen@gowlingwlg.com>, Knight, Taylor <Taylor.Knight@gowlingwlg.com>

Dear Troy,

We confirm that the PCT application has been filed. Please find attached a copy of the application as filed and confirmation receipt for your records. The Application has been assigned international application number CA2024050076.

Our full filing report will follow in due course.

If you have any questions, please do not hesitate to contact us.

Best regards,

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