



PyroGenesis Announces Milestone Reached for Fumed Silica Reactor Project

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Pilot Plant Construction Commences with Anticipated Q2 2024 Commissioning

MONTREAL, Feb. 06, 2024 (GLOBE NEWSWIRE) -- PyroGenesis Canada Inc. (<http://pyrogenesis.com>) (TSX: PYR) (OTCQX: PYRGF) (FRA: 8PY), a high-tech company (the "Company" or "PyroGenesis") that designs, develops, manufactures and commercializes advanced plasma processes and sustainable solutions which are geared to reduce greenhouse gases (GHG) and address environmental pollutants, is pleased to announce that, further to HPQ Silicon Inc's ("HPQ" or the "Client") press release dated today, and the Company's own [news releases dated November 9, 2023](#) and [January 11, 2024](#), the next milestone for pilot plant development has been reached.

The Fumed Silica Reactor (FSR) technology project is being conducted in conjunction with HPQ Silica Polvere Inc. ("HPQ Polvere"), a wholly owned subsidiary of HPQ. With the engineering design having concluded, major fabrication ending, and all additional peripheral materials having been ordered, the 50 tonnes per year (TPY) FSR pilot plant is now entering the construction phase.

The FSR pilot plant will be constructed within a dedicated space inside PyroGenesis' facilities, with a custom-designed infrastructure that meets the pilot plant's unique ventilation, safety, and access requirements. A 4,000 sq ft facility with a 30-foot height allowance has been allocated to house the pilot plant, which itself has an approximate layout footprint of 50ft by 30ft.

Fumed silica is a moisture-absorbing white microstructure powder with high surface area and low bulk density. Used most often as a thickening agent, anti-caking agent, and stabilizer to improve the texture and consistency of products, the commercial applications of fumed silica can be found in many industries across thousands of product lines, including – but not limited to – personal care, powdered food, pharmaceuticals, agriculture (food & feed), adhesives, paints, sealants, construction, batteries and automotive.

The FSR converts quartz into fumed silica (also known as Pyrogenic Silica) in a single and eco-friendly step while eliminating the use of harmful chemicals generated by conventional methods.^[2] The FSR, if successful, could provide a groundbreaking contribution to the repatriation of silica production to North America.

The FSR pilot plant is being developed by PyroGenesis with a 50 tonne per year output capacity. In addition, [recent results](#) (refer to the Company's news release dated January 11, 2024) from an internal economic and technical study, which was carried out at the request of a third-party who requested confidentiality, confirmed the viability of, and advantages from, the eventual scale up to a 1,000 tonne per year commercial configuration. These advantages included potential EBIDTA margins three times higher than the industry average of 20%, and a capital investment 93% less than that required for building a conventional fumed silica plant.^[1]

"This development milestone initiates the construction phase of what we believe to be a truly innovative approach to producing one of industry's most in-demand materials", said Mr. P. Peter Pascali, CEO and President of PyroGenesis. "Conventional fumed silica processes, which rely on silicon metal (Si) as raw material, not only have a significant carbon footprint of around 9.5 tonnes of CO₂ equivalent per tonne of fumed silica, but also present complex process challenges which include, but are not limited to, using hazardous materials.^[2] The technology developed by PyroGenesis for HPQ Polvere is designed to offer significant economic and environmental advantages over conventional manufacturers – improving profitability, but also reducing the environmental footprint and reducing the harmful chemicals associated with traditional fumed silica production."

The fumed silica market, valued at US\$1.3 billion in 2022, is expected to grow at a CAGR of 5% to reach US\$2.1 billion by 2032. Fumed silica sales accounted for almost 23% of the global specialty silica market at the end of 2021. ^[3]

In the FSR project, PyroGenesis is the exclusive supplier of a technology capable of using quartz (SiO₂) as a raw material to produce commercial-grade fumed silica, in a single step. As part of the terms on the FSR project with HPQ, PyroGenesis benefits from a royalty payment representing 10% of the Client's eventual sales, with set minimums. This royalty stream, can, at any time, be converted by PyroGenesis into a 50% ownership in HPQ's remaining equity stake in HPQ Polvere.

PyroGenesis' involvement in developing fumed silica from quartz is part of PyroGenesis' [three-tiered solution ecosystem](#) that aligns with economic drivers that are key to global heavy industry. High-purity silicon is part of PyroGenesis' Commodity Security & Optimization tier, where the recovery of viable metals and the optimization of production to increase output helps to maximize raw materials and improve the availability of critical minerals. Silicon has been [identified as a critical mineral by many](#) governments worldwide.

REFERENCE SOURCES

[1] Traditional Fumed Silica manufacturing involves a complex three-step process. Step 1: Conversion of Quartz to Silicon Metal (Si), with an average Capex of around US\$9.38 per kilogram of annual capacity ([for reference, the PCC Bakki Silicon Plant in Iceland cost US\\$300 million for an annual capacity of 32,000 tonnes](#)). Step 2: Conversion of Si to Silicon Tetrachloride (SiCl₄), with an average Capex of approximately US\$125.00 per kilogram of annual capacity (e.g., [Wacker Chemie AG Polysilicon's US production plant cost US\\$2.5 billion for an annual capacity of 20,000 tonnes](#)). Step 3: Burning Silicon Tetrachloride (SiCl₄) with Hydrogen and Oxygen to produce Fumed Silica (SiO₂), incurring an average Capex of around US\$11.54 per kilogram of annual capacity ([Wacker Chemie AG's US Fumed Silica plant cost US\\$150 million for an annual capacity of 20,000 tonnes](#)). The combined Capex for these three steps averages at US\$145.92 per kilogram of annual capacity. According to a rough order of magnitude study by PyroGenesis, our one-step process for making Fumed Silica is estimated to have an average Capex per kilogram of annual capacity between US\$9.00 and US\$10.00, which is approximately 93% less than traditional processes.

[2] 2012 – Executive summary: "[SILICON-CHEMISTRY CARBON BALANCE, AN ASSESSMENT OF GREENHOUSE GAS EMISSIONS AND REDUCTIONS](#)", Covering the Production, Use and End-of-Life of Silicones, Siloxanes and Silane Products in Europe, North America, and Japan.

[Pages 20 to 21] (Commissioned by Global Silicones Council, Centre Européen des Silicones, Silicones Environmental, Health and Safety Council of North America Silicone Industry Association of Japan).

[3] <https://www.factmr.com/report/2301/fumed-silica-market>

About PyroGenesis Canada Inc.

PyroGenesis Canada Inc., a high-tech company, is a proud leader in the design, development, manufacture and commercialization of advanced plasma processes and sustainable solutions which reduce greenhouse gases (GHG) and are economically attractive alternatives to conventional “dirty” processes. PyroGenesis has created proprietary, patented and advanced plasma technologies that are being vetted and adopted by multiple multibillion dollar industry leaders in four massive markets: iron ore pelletization, aluminum, waste management, and additive manufacturing. With a team of experienced engineers, scientists and technicians working out of its Montreal office, and its 3,800 m² and 2,940 m² manufacturing facilities, PyroGenesis maintains its competitive advantage by remaining at the forefront of technology development and commercialization. The operations are ISO 9001:2015 and AS9100D certified, having been ISO certified since 1997. For more information, please visit: www.pyrogenesis.com.

About HPQ Silicon

[HPQ Silicon Inc. \(TSX-V: HPQ\)](#) is a Quebec-based TSX Venture Exchange Tier 1 Industrial Issuer.

HPQ is developing, with the support of world-class technology partners [PyroGenesis Canada Inc.](#) and [NOVACIUM SAS](#), new green processes crucial to make the critical materials needed to reach net zero emissions.

HPQ activities are centred around the following four (4) pillars:

1. Becoming a green low-cost (Capex and Opex) manufacturer of Fumed Silica using the **FUMED SILICA REACTOR**, a proprietary technology owned by HPQ being developed for HPQ by PyroGenesis.
2. Becoming a zero CO₂ low-cost (Capex and Opex) producer of High Purity Silicon (2N+ to 4N) using our **PUREVAP™ “Quartz Reduction Reactors” (QRR)**, a proprietary technology owned by HPQ being developed for HPQ by PyroGenesis.
3. Becoming a producer of silicon-based anode materials for battery applications with the assistance of NOVACIUM SAS.
4. HPQ SILICON affiliate NOVACIUM SAS is developing a low carbon, chemical base on demand and high-pressure autonomous hydrogen production system.

For more information, please visit [HPQ Silicon web site](#).

Cautionary and Forward-Looking Statements

This press release contains “forward-looking information” and “forward-looking statements” (collectively, “forward-looking statements”) within the meaning of applicable securities laws. In some cases, but not necessarily in all cases, forward-looking statements can be identified by the use of forward-looking terminology such as “plans”, “targets”, “expects” or “does not expect”, “is expected”, “an opportunity exists”, “is positioned”, “estimates”, “intends”, “assumes”, “anticipates” or “does not anticipate” or “believes”, or variations of such words and phrases or state that certain actions, events or results “may”, “could”, “would”, “might”, “will” or “will be taken”, “occur” or “be achieved”. In addition, any statements that refer to expectations, projections or other characterizations of future events or circumstances contain forward-looking statements. Forward-looking statements are not historical facts, nor guarantees or assurances of future performance but instead represent management’s current beliefs, expectations, estimates and projections regarding future events and operating performance.

Forward-looking statements are necessarily based on a number of opinions, assumptions and estimates that, while considered reasonable by the Company as of the date of this release, are subject to inherent uncertainties, risks and changes in circumstances that may differ materially from those contemplated by the forward-looking statements. Important factors that could cause actual results to differ, possibly materially, from those indicated by the forward-looking statements include, but are not limited to, the risk factors identified under “Risk Factors” in the Company’s latest annual information form, and in other periodic filings that the Company has made and may make in the future with the securities commissions or similar regulatory authorities, all of which are available under the Company’s profile on SEDAR+ at www.sedarplus.ca, or at www.sec.gov. These factors are not intended to represent a complete list of the factors that could affect the Company. However, such risk factors should be considered carefully. There can be no assurance that such estimates and assumptions will prove to be correct. You should not place undue reliance on forward-looking statements, which speak only as of the date of this release. The Company undertakes no obligation to publicly update or revise any forward-looking statement, except as required by applicable securities laws.

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