New Data from Fumed Silica Reactor Commissioning Shows Additional Significant Drop in Both Energy Use and Carbon Footprint

- **Up to 92.0% less energy is required to produce fumed silica in one step compared to conventional industry processes**
- **Up to 99.9% less CO_2 emissions associated with the production process compared to conventional industry processes.**

Montreal, Canada, August 15th, 2024 — HPQ Silicon Inc. ("HPQ" or the "Company") (TSX-V: HPQ, OTCQB: HPQFF, FRA: O08), a technology company specializing in the green engineering of silica and silicon-based materials is pleased to share new data from recent updated process modelization work. This work was accomplished by technology supplier PyroGenesis Canada Inc. (TSX: PYR, OTCQX: PYRGF, FRA: 8PY) ("PyroGenesis") during the ongoing commissioning of HPQ Silica Polvere Inc. ("HSPI") [1] Fumed Silica Reactor ("FSR") pilot plant.

The new data highlights the commercial and environmental impact advantages of the HSPI Fumed Silica project compared to conventional industry processes.

Reducing Energy Use and Carbon Footprint in Fumed Silica Production

Since the project's inception in July 2021, our working models have consistently been based on the estimate that producing 1 kg of fumed silica at commercial scale using the FSR would require between 10 and 15 kWh [2] of energy experimentally compared to 4-5 kWh theoretically based on the thermal model developed by PyroGenesis. This assumption has been the foundation of our internal technical and economic study, published on January 10th, 2024, which demonstrated the strong commercial potential of the FSR, as well as the update released on June 5th, 2024.

As part of the current commissioning work, data collected from updates to the thermal model now indicate that the energy required to produce 1 kg of fumed silica at commercial scale of at least 1,000 TPY has been reduced to a range of 8 to 12 kWh [3]. This represents an additional 20% reduction in the energy requirements for the FSR project which is due to an optimized thermal efficiency of the process.

The updated model indicates that HSPI FSR technology requires 92% less energy when compared to conventional processes, which typically consume between 100 and 120 kWh per kg of fumed silica produced [4].

The additional 20% reduction in energy requirements significantly enhances the environmental benefits of the FSR project. Since energy consumption and its associated greenhouse gas (GHG) emissions account for approximately 99% of the carbon footprint of FSR technology, this reduction is crucial. When factoring in the updated model data and considering that energy production in Quebec generates 1.7 grams of CO_2 equivalent per kWh, the HPSI FSR technology should now emit only 0.0136 kg of CO_2 per kg of fumed silica produced [5].

This represents a potential reduction of up to 99.9% in the carbon footprint compared to conventional fumed silica production processes, which typically produce between 8 to 17 kg of CO_2 per kg of fumed silica produced. [4]

"In mature industries like fumed silica production, improvements are typically incremental and modest in scale," said Bernard Tourillon, President & CEO of HPQ Silicon and HPQ Silicon Polvere. "However, with the introduction of our FSR technology, we are poised to disrupt the market by enhancing efficiency and reducing costs, potentially altering the competitive landscape for fumed silica manufacturing."

Understanding the significant CO_2 Reduction Potential of HSPI FSR in Key Markets

With an annual consumption of approximately 24,000 tonnes of fumed silica in Canada [6], adopting the HSPI FSR process could result in significant reduction in CO_2 emissions of approximately 191,500 to 379,000 tonnes per year [7]. Similarly, in European countries, where 92,000 tonnes are consumed yearly [6], this process could cut emissions by approximately 734,000 to 1,453,600 tonnes annually [8].

This is equivalent to removing between approximately 45,477 to 345,817 cars from the road annually [9].

Updated Table Highlighting HSPI Disruptive Advantages

	FUMED SILICA MANUFACTURING							
	CONVENTIONAL PROCESSESS		HSPI FUMED SILICA REACTOR		HSPI FUMED SILICA REACTOR		DISRUPTIVE ADVANTAGES VS CONVENTIONAL PROCESSESS	
	August 2024		January 2024		August 2024 update		As of August 2024	
RANGE	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH
Energy Consumption Range (kWh / Kg of Fumed Silica)	100 [4]	120 [4]	10 [2]	15 [2]	8 [3]	12 [3]	90% Less	92% Less
GHG Impact (Kg CO2 eq / Kg of Fumed Silica)	8 [4]	17 [4]	1.00 [10]	2.50 [11]	0.0136 [5]	0.0204 [12]	99.8% Less	99.9% Less
Canadian Carbon Taxes (CAD$80 per tonne released [13])	$ 640	$ 1,360	$ 80	$ 200	$ 1.09	$ 96	$ 638 Less	$ 1,264 Less
European Carbon Taxes (90€ per tonne released [14]	€ 720	€ 1,530	€ 90	€ 225	€ 1.22	€ 108	€ 718 Less	€ 1,422 Less
HCl Production (Kg / Kg Fumed Silica)	2.4 [15]		NIL		NIL		NO HCl GAZ	
EBITDA MARGINS	20% [16]		61%	65%	75%	91%	3.74 to 4.55 BETTER [17]	

"The transformative potential of our FSR technology, with its ability to dramatically reduce energy consumption and emissions, is strong," added Mr. Tourillon. "However, we believe that its impact will be more truly recognized once the pilot plant starts producing fumed silica materials, setting a new standard for sustainability in the industry."

REFERENCE SOURCES

[1] A wholly owned subsidiary of HPQ Silicon Inc. when technology supplier PyroGenesis announced its intention to exercise its option to acquire a 50% stake in HSPI in May 2024.

[2] Preliminary energy consumption estimate made by PyroGenesis Canada Inc. (January 2024)

[3] Updated energy consumption estimate made by PyroGenesis Canada Inc. (August 2024)

[4] Frischknecht, Rolf, et al. "Life cycle inventories and life cycle assessment of photovoltaic systems." International Energy Agency (IEA) PVPS Task 12 (2020).

[5] The 0.0136 Kg eq of CO2 per Kg of Fumed Silica was calculated using Government of Canada data that indicate that in Quebec on average 1.7 g of CO2 are generated eq per KWh. and multiplying that number by 8. https://www.canada.ca/en/environment-climate-change/services/climate-change/pricing-pollution-how-it-will-work/output-based-pricing-system/federal-greenhouse-gas-offset-system/emission-factors-reference-values.html.

[6] Sales data per regions from MarketsandMarkets 2017 "fumed silica market – global forecast to 2022".

[7] The 191,500 number is derived by X 24,000 @ (8-0.0136) while the number 379,000 is derived by X 24,000 @ (17-1.2).

[8] The 734,000 number is derived by X 92,000 @ (8-0.0136) while the number 1,453,600 is derived by X 92,000 @ (17-1.2).

[9] USA EPA Greenhouse Gas Equivalencies Calculator

[10] The 1 Kg eq of CO2 per Kg of Fumed Silica was calculated using Government of Canada data that indicate that in Canada on average 100 g of CO_2 are generated eq per KWh., and multiplying that number by 10

[11] The 2.5 Kg eq of CO2 per Kg of Fumed Silica was calculated using Government of Canada data that indicate that in the rest of Canada, 150 g of CO2 are generated eq per KWh., and multiplying that number by 15

[12] The 0.0204 Kg eq of CO2 per Kg of Fumed Silica was calculated using Government of Canada data that indicate that in Quebec on average 1.7 g of CO2 are generated eq per KWh., and multiplying that number by 12. https://www.canada.ca/en/environment-climate-change/services/climate-change/pricing-pollution-how-it-will-work/output-based-pricing-system/federal-greenhouse-gas-offset-system/emission-factors-reference-values.html

[13] Government of Canada

[14] The Wall Street Journal article, April 18, 2023, "World's First Carbon Import Tax Approved by EU Lawmakers"

[15] Cai, H., Wang, X., Kelly, J. C., & Wang, M. (2021). Building Life-Cycle Analysis with the GREET Building Module: Methodology, Data, and Case Studies (No. ANL/ESD-21/13). Argonne National Lab. (ANL), Argonne, IL (USA).

[16] Average EBITDA margins of 20% are derived from two sources, with Link #1 leading to Source #1 and Link #2 leading to Source #2 (Specialty Additives division).

[17] Management has calculated the EBITDA margins for the Fumed Silica Reactor (FSR) based on data derived from third party sources and publicly available information. These figures will be updated upon completion of the pilot testing phase. The 16% range in HSPI EBITDA margins considers estimated selling prices of the material produced and estimated costs (worst case and best case) associated with producing a Kg of Fumed Silica with the FSR

Cautionary Statements

HSPI management plans to update and further validate the energy and carbon footprint projections as more data is collected during the ongoing pilot plant phase.

About HPQ

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 Silica Polvere Inc being developed for HSPI by PyroGenesis.
2) Becoming a producer of silicon-based anode materials for battery applications with the assistance of NOVACIUM SAS.
3) HPQ SILICON affiliate NOVACIUM SAS is developing a low carbon, chemical base on demand and high-pressure autonomous hydrogen production system.
4) Becoming a zero CO_2 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.

For more information, please visit HPQ Silicon web site.

About PyroGenesis Canada Inc.

PyroGenesis Canada Inc., a high-tech company, is a 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 three 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 R&D and 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

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