



## HPQ PUREVAP™ GEN3 QRR DELIVERS EVEN HIGHER PURITY LEVELS IN A SINGLE STEP

**MONTREAL, Canada, August 9<sup>th</sup>, 2023** — [HPQ Silicon Inc.](#) (“HPQ” or the “Company”) ([TSX-V: HPQ](#)) ([OTCQB: HPQFF](#)) ([FRA: 008](#)), a technology company specializing in green engineering processes for silica and silicon material production, is pleased to provide shareholders with an update on the PUREVAP™ Gen3 Quartz Reduction Reactor (“Gen3 QRR”) project being developed in partnership with technology provider [PyroGenesis Canada Inc.](#) ([TSX: PYR](#)) ([NASDAQ: PYR](#)) ([FRA: 8PY](#)) (“PyroGenesis”).

The most recent results from our continuous testing have achieved the highest Silicon purity level recorded to date, reaching 99.96%. This milestone signifies the successful removal of an additional 400,000 parts per billion (PPB) of impurities compared to our previous record of 99.92% purity. The achievement brings us one step closer to our goal, making the production of 4N Silicon in a single step not only feasible but within our grasp.

### WITH EACH TEST: HPQ GEN3 QRR IS DELIVERING HIGHER PURITY LEVELS IN A SINGLE STEP

Silicon material produced during tests #6 was sent for ICP-MS Silicon Bulk Sample Analysis at Air Liquide Electronics (Balazs NanoAnalysis), and the results delivers a record 99.96% (3N+) Silicon Bulk Purity, outperforming test #5 results of 99.92%.

The key trend emanating from the Gen3 QRR testing to date and the silicon purity results are:

- 1) Reproducibility of the one step production of **Silicon that exceeds the highest purity threshold (2N)** of commercially available silicon material, and
- 2) Reproducibility of the one-step production of **Battery Grade Silicon (3N+)**, the purity required for feedstock in the manufacturing of Silicon Base anode material, and
- 3) Reproducibility of the production of silicon using **25% less feedstock** than conventional carbothermic processes that use a ratio of 6 tonnes (t) of raw materials to produce 1 t of metallurgical grade silicon (MG Si – 98.5% to 99.5%) [1].

*“The reproducibility of the results obtained by Gen3 QRR is another demonstration of how HPQ PUREVAP™ QRR process is modernizing the production of high-purity Silicon, transforming a century-old industrial process known for its significant CO<sub>2</sub> emissions into an efficient, scalable, and low carbon manufacturing process,” stated Bernard Tourillon, President & CEO of HPQ Silicon. “With Silicon now officially included in the US Department of Energy (DOE) 2023 Final Critical Materials List [2], the timing for the advancement of our Purevap project could not be better.”*

Over the past year, HPQ's three key initiatives – Silicon, Fumed Silica, and Autonomous Hydrogen Generation via Hydrolysis – have achieved significant milestones as we diligently executed our business plan.

### HPQ SILICON INITIATIVE:

The demand for silicon is projected to surpass 3.8 million tonnes, valued between US\$15 billion and US\$20 billion, by 2025 [3]. These numbers do not take into consideration the 300,000 t of Silicon-based anode material demand projected by 2030, representing another market estimated to be worth about US\$ 15 billion [4] that will need 3N+ Silicon as feedstock.

The conventional silicon manufacturing processes, with purity ranging from 98.5% to 99.5%, are both expensive and energy intensive. The process, invented in 1899, is still utilized today, making Silicon production the largest CO<sub>2</sub> emitter among all metals and non-ferrous metals. This information is based on the Intergovernmental Panel on Climate Change (IPCC), a United Nations body dedicated to climate change research [5].



HPQ is advancing its exclusive PUREVAP™ Quartz Reduction Reactor (QRR) technology, introducing a novel, compact, modular process that produces silicon with zero CO<sub>2</sub> emissions. This innovation employs 25% less feedstock compared to traditional methods [6].

At the core of the PUREVAP™ QRR lies its Closed Electric Arc Furnace (CEAF) design, designed to operate under precisely controlled atmospheric conditions. This cutting-edge furnace allows the semi-continuous input of Silica (SiO<sub>2</sub>) and a carbon reductant, streamlining the production of 3N+ silicon in a single step. Importantly, the QRR's design ensures efficient capture of the CO gas ("Co(g)") generated during the carbothermic reaction, enabling its potential for further utilization.

Investors are invited to explore the HPQ Silicon website and access our latest presentation, providing an elaborate insight into our development strategy for our three key initiatives, including their indicative short, medium, and long-term developmental steps.

We are delighted to present the immediate development milestones for our PUREVAP™ QRR project:

1. Successful completion of a Silicon pour.
2. Achievement of one-step production of 4N Silicon.
3. Commencement of commercial operations with six continuous production cycles daily, yielding 20 kg of Silicon per pour.
4. Validation of QRR's capacity to produce up to 4N+ Si higher conversion efficiency of 75% compared to 50-60% with the conventional way [6].
5. Initiation of crucial engineering studies for the future Gen4 PUREVAP™ - a 2,500 TPY system.
6. Production of Silicon materials for HPQ Silicon's anodes initiative.
7. Securing grant financing for proof-of-concept studies concerning HPQ Green Silicon capability.
8. Launch of proof-of-concept studies for HPQ Green Silicon initiative. Centered on the capture of CO gas generated during direct carbothermic production of silicon from quartz and convert it to solid carbon that can be re-injected in the next production cycle [7].

## REFERENCE SOURCES

- [1] From Ferroglobe PLC investor presentation dated October 17, 2017 (Page 11).
- [2] July 31, 2023, US DOE release: [U.S. Department of Energy Releases 2023 Critical Materials Assessment to Evaluate Supply Chain Security for Clean Energy Technologies](#)
- [3] Data compiled from information found in the presentations made by CRU International Limited ("CRU"), a world-leading metal market research firm, during their Silicon Market Outlook conferences of November 2018, November 2020, and October 2022. Information further validated by Straits Research Silicon Metal Market: Information by Product Type (Metallurgical and Chemical), Application (Aluminium Alloys, Silicone, and Semiconductors), and Region — Forecast till 2030, report that indicated that the global silicon metal market size was valued at USD 12.4 billion in 2021, and is expected to reach USD 20.60 billion by 2030, growing at a CAGR of 5.8% during the forecast period (2022–2030).
- [4] QY Research, SNE Research, Shinhan Securities / NBM June 2023 Deck page 11
- [5] Bernstein L, Roy J, Delhotal KC, Harnisch J, Matsushashi R, PriceL, Tanaka K, Worrell E, Yamba F, Fengqi Z (2007) Industry. [In: Climate change 2007: Mitigation. Contribution of working group III to the fourth assessment report of the intergovernmental panel on climate change](#). Cambridge University Press, Cambridge, UK and New York, USA



[6] Originally mentioned in a June 17<sup>th</sup>, 2019, HPQ release, the information emanated from a Confidential PyroGenesis report estimating the PUREVAP™ process efficiency. These numbers will be further validated and refine after the completion of the GEN4 Conceptual and Preliminary engineering studies.

[7] Originally mentioned in a June 27<sup>th</sup>, 2023, HPQ release.

#### **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 m<sup>2</sup> and 2,940 m<sup>2</sup> 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](http://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. \(TSX: PYR\)](#) ([NASDAQ: PYR](#)) 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 five (5) pillars:

- 1) Becoming a green low-cost (Capex and Opex) producer of High Purity Silicon (2N+ to 4N) using our proprietary **PUREVAP™ “Quartz Reduction Reactors” (QRR)** being developed by PyroGenesis.
- 2) Becoming North America’s first producer of micron size High Purity Silicon (3N & 4N) powders with the assistance of NOVACIUM SAS.
- 3) Working to become the first producer of nano silicon materials from High Purity Silicon chunks using our proprietary **PUREVAP™ Nano Silicon Reactor (NSiR)** being developed by PyroGenesis.
- 4) Becoming a green low-cost (Capex and Opex) producer of Fumed Silica using our proprietary **FUMED SILICA REACTOR** being developed by PyroGenesis.
- 5) Developing a small and compact process for the on-demand production of hydrogen via hydrolysis of Silicon and other materials.

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

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This press release contains certain forward-looking statements, including, without limitation, statements containing the words "may", "plan", "will", "estimate", "continue", "anticipate", "intend", "expect", "in the process" and other similar expressions which constitute "forward-looking information" within the meaning of applicable securities laws. Forward-looking statements reflect the Company's current expectation and assumptions and are subject to a number of risks and uncertainties that could cause actual results to differ materially from those anticipated. These forward-looking statements involve risks and uncertainties including, but not limited to, our expectations regarding the acceptance of our products by the market, our strategy to develop new products and enhance the capabilities of existing products, our strategy with respect to research and development, the impact of competitive products and pricing, new product development, and uncertainties related to the regulatory approval process. Such statements



reflect the current views of the Company with respect to future events and are subject to certain risks and uncertainties and other risks detailed from time-to-time in the Company's ongoing filings with the security's regulatory authorities, which filings can be found at [www.sedar.com](http://www.sedar.com). Actual results, events, and performance may differ materially. Readers are cautioned not to place undue reliance on these forward-looking statements. The Company undertakes no obligation to publicly update or revise any forward-looking statements either as a result of new information, future events or otherwise, except as required by applicable securities laws.

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