

# HPQ Silicon and Pyrogenesis Sign a Nano Silicon Development Agreement to Pursue Strong Industry Interest Generated by PUREVAP Nano Silicon Reactor

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MONTREAL, Aug. 18, 2020 - [HPQ Silicon Resources Inc.](#) ("HPQ" or the "Company") TSX-V: HPQ; FWB: UGE; Other OTC : URAGF; is pleased to announce that HPQ Nano Silicon Powders Inc ("HPQ NANO"), a 100% owned HPQ subsidiary, and PyroGenesis Canada Inc. (TSX-V: PYR) have signed a development agreement covering the *PUREVAP™ Nano Silicon (Si) Reactor* ("NSiR") development program and the future commercialisation of nano silicon materials made with this new, proprietary and low cost manufacturing process. The process will transform Silicon (Si) into spherical Silicon nanopowders and nanowires for use in Li-ion batteries.

## INDUSTRY INTEREST GENERATED FROM PREVIOUS ANNOUNCEMENTS NECESSITATE AGREEMENT

On January 15, 2020 the Companies announced proof of concept testing demonstrating capacity to produce spherical nanopowders & nanowires from silicon (Si) needed by the Lithium-ion battery market.

That announcement was followed by an announcement on February 11, 2020 stating the Companies were developing NSiR for low-cost manufacturing of spherical Silicon (Si) nanopowders & nanowires for next generation Lithium-ion batteries.

As a result of these two announcements, strong and increasing industry interest in our project, even at this early stage of our development, dictates that HPQ and PyroGenesis take this next step.

## INTEREST IN *PUREVAP™ NSiR* GAME CHANGING LOW COST POTENTIAL

Research indicates that replacing graphite with Nano Silicon (Si) Powders could allow the manufacturing of high-performance Li-ion batteries to deliver an almost tenfold (10x) increase in anode capacity, inducing a 20-40% gain in the energy density of the next generation of Li-Ion batteries. Silicon Nanomaterial potential to meet energy storage demand of the future is undeniable and is generating massive investments.

Despite the strong research and investment in Silicon nanomaterial, current manufacturing processes to make Nano Silicon powders are not scalable or commercially viable. HPQ and Pyrogenesis, via this agreement, are developing a process to address both the scalability and cost hurdles required by the industry.

*"The *PUREVAP™ NSiR* process was conceived and is being developed so that HPQ NANO can deliver to advanced materials companies and battery manufacturers a cost competitive, tailor-made product, that can replace graphite in batteries and thereby allow the deployment of truly powerful next generation Li-ion batteries. Industry interest in our project is strong, even at this early stage of our development"* said Bernard Tourillon, President & CEO of HPQ Silicon. *"This agreement allows us to devote all our efforts in a dedicated entity focussed on starting, as soon as possible, the *PUREVAP™ NSiR* and shipping samples of our Silicon nanomaterials. Once the *PUREVAP™ NSiR* process is operational, expected to be in Q4 of 2020, HPQ NANO will implement the steps required to take full advantage of this unique multibillion-dollar business opportunity"*.

*"This Agreement represents another significant milestone in our relationship with HPQ. Battery*

*storage is the future and it is indeed exciting for us to now be using our plasma expertise in addressing the challenges facing the lithium battery market,&rdquo;* said M. P Peter Pascali, President and CEO of PyroGenesis Canada Inc. *&ldquo;This milestone is also a testament to what can be achieved when two companies, and their Boards, work together with a common purpose and a clear understanding of the many unforeseen challenges in bringing such product lines to fruition.&rdquo;*

#### PROCESS VALIDATION AND IMPROVEMENT, NANO Si PRODUCTION & DEMONSTRATING SCALABILITY

The key areas covered by the agreement between HPQ NANO and PyroGenesis are:

1. *PUREVAP™ NSiR* process development program, schedule and cost assumed by HPQ NANO;
2. Acquisition of the *PUREVAP™ NSiR* Intellectual Property as it relates to the manufacturing of Nano Silicon powders and nanowires by HPQ NANO;
3. Revenue distribution between HPQ NANO and PyroGenesis from the sales of Nano Silicon materials made with the *PUREVAP™ NSiR*.

The *PUREVAP™ NSiR* process development program is made of two distinct and complimentary phases, each with their own goals, timelines and milestones.

#### PHASE 1, VALIDATING AND IMPROVING THE PROCESS, MAKING SAMPLES BY END OF Q4 2020

The main goal of Phase 1 is modifying the existing *Gen2 PUREVAP™ QRR* reactor into the *Gen1 NSiR* for the purpose of producing nano silicon materials. The resulting new *Gen1 NSiR* will be a batch process system with a design production capacity of 30 kg/month of nano silicon powders. In order to meet the aggressive Phase 1 timeline agreed by the Parties, HPQ NANO will pay \$200,000 to PyroGenesis over the next 15 weeks needed to complete the process engineering, mechanical engineering, fabrication and system commissioning.

Once the *Gen1 NSiR* is operational, as series of test runs will be done in order to produce nano Silicon materials. In addition to producing samples for potential customers, the nano Silicon material produced will be analysed and characterized in order to define important process parameters, fine tune operating parameters and assess the performance of all the components of the systems. HPQ NANO and PyroGenesis have agreed that each series of 10 tests would cost HPQ NANO \$132,000.

#### PHASE 2, VALIDATING COMMERCIAL SCALABILITY, DELIVERING NANO SI MATERIALS

Phase 2 main objective is validating the commercial scalability of the *PUREVAP™ NSiR*. Using data collected during *Gen1 NSiR* testing phase a completely new *Gen2 NSiR* system will be designed and built. 35 weeks will be needed to complete the process engineering, mechanical engineering, fabrication and system commissioning and HPQ NANO will pay \$210,000 to PyroGenesis for this phase.

The *Gen2 NSiR* will be a semi-continuous process system with a design production capacity of 300 kg/month (or about 3,5 MT/year) of nano silicon powders or nanowires, giving HPQ NANO a large enough production capacity to be able to start selling nano silicon materials. In addition to producing nano Silicon material, a series of *Gen2 NSiR* tests will be done to define the important process parameters and operating parameters required to allow the process and the systems to be scaled up to a commercial production capacity of about 2,500 MT of Nano-Silicon powders per year.

#### *PUREVAP™ NSiR* INTELLECTUAL PROPERTY AS IT RELATES TO NANO SILICON MATERIALS

The agreement also covers HPQ NANO acquisition of the intellectual property rights to the *PUREVAP&trade; Nano Silicon (Si) Reactor* process as it relates exclusively to the production of Micron size and Nano size Silicon Powders and Silicon Nanowires (the &ldquo;Field&rdquo;) from PyroGenesis. The acquisition cost of the *PUREVAP&trade; NSiR* IP is CAD\$2,400,000 and HPQ NANO has 30 days from the effective date of the agreement to make the payment to PyroGenesis.

PyroGenesis will retain a royalty-free, exclusive, irrevocable worldwide license to use the process for purposes other than the production of Micron size and Nano size Silicon Powders and Silicon Nanowires. Should PyroGenesis be approached by any other parties for any research and development or commercial purposes outside of the Field, HPQ NANO shall have a right of first refusal, provided that, however, HPQ NANO exercise its right of first refusal within thirty (30) days of PyroGenesis receiving a bona-fide offer.

#### *NSiR REVENUES SPLIT BETWEEN HPQ NANO AND PYROGENESIS FROM SALES OF NANO Si MATERIALS*

HPQ and PyroGenesis evaluated the short and long-term advantages of forming, at the start, a stand-alone joint venture responsible for manufacturing and selling Nanoscale Silicon (Si) powders.

A gradual approach was deemed more efficient, therefore HPQ Silicon created a fully own subsidiary, HPQ NANO Silicon Powders Inc, to be the stand-alone Corporation that would finance the Research and Development programs and manage the future commercialisation of Nanoscale Silicon (Si) materials made with the *PUREVAP™ NSiR* with PyroGenesis being granted the right to convert, at any time and at its sole discretion, its Royalty into a 50% equity stake in HPQ NANO.

As a result of this, HPQ NANO agrees to pay PyroGenesis, on an annual basis, and until conversion, the following minimum royalty (Nano-Royalty) on the gross sales of nano materials produced with the *PUREVAP™ NSiR* Process and Systems:

- For 2021, the greater of 10% of HPQ NANO gross sales or fifty thousand dollars (CDN\$50,000);
- For 2022, the greater of 10% of HPQ NANO gross sales or one hundred thousand dollars (CDN\$100,000);
- For 2023, the greater of 10% of HPQ NANO gross sales or one hundred and fifty thousand dollars (CDN\$150,000);
- For 2024 and beyond, the greater of 10% of HPQ NANO gross sales or two hundred thousand dollars (CDN\$200,000).

#### About Silicon

Silicon (Si), also known as silicon metal, is one of today's strategic materials needed to fulfil the Renewable Energy Revolution ("RER") presently under way. Silicon does not exist in its pure state; it must be extracted from quartz (SiO<sub>2</sub>), in what has historically been a capital and energy intensive process.

#### About HPQ Silicon

[HPQ Silicon Resources Inc.](#) (TSX-V: HPQ) is a Canadian producer of Innovative Silicon Solutions, based in Montreal, building a portfolio of unique high value specialty silicon products needed for the coming RER.

Working with PyroGenesis Canada Inc. (TSX-V: PYR), a high-tech company that designs, develops, manufactures and commercializes plasma - based processes, HPQ is developing:

- The *PUREVAP™ "Quartz Reduction Reactors" (QRR)*, an innovative process (patent pending), which will permit the one step transformation of quartz (SiO<sub>2</sub>) into high purity silicon (Si) at reduced costs, energy input, and carbon footprint that will propagate its considerable renewable energy potential;
  - HPQ believes it will become the lowest cost (Capex and Opex) producer of silicon (Si) and high purity silicon metal (3N – 4N Si);
- The *PUREVAP™ Nano Silicon Reactor (NSiR)*, a new proprietary process that can use different purities of silicon (Si) as feedstock, to make spherical silicon nanopowders and nanowires;
  - HPQ believes it can also become the lowest cost manufacturer of spherical Si nanopowders and silicon-based composites needed by manufacturers of next-generation lithium-ion batteries;
  - During the coming months, spherical Si nanopowders and nanowires silicon-based composite samples requested by industry participants and research institutions' will be produced using *PUREVAP™ SiNR*.

HPQ is also working with industry leader Apollon Solar of France to:

- Use their patented process and develop a capability to produce commercially porous silicon (Si) wafers and porous silicon (Si) powders;
  - The collaboration will allow HPQ to become the lowest cost producer of porous silicon wafers for all-solid -state batteries and porous silicon powders for Li-ion batteries.
  - The plan is to deliver porous Si wafer to a battery manufacturer (under NDA) for testing in 2020.

This News Release is available on the company's CEO Verified Discussion Forum, a moderated social media platform that enables civilized discussion and Q&A between Management and Shareholders.

*Disclaimers:*

*The Corporation's interest in developing the PUREVAP®; QRR and any projected capital or operating cost savings associated with its development should not be construed as being related to the establishing the economic viability or technical feasibility of any of the Company's Quartz Projects.*

*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 on-going 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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