



**HPQ PUREVAP™ COMMERCIAL PLANT COSTING INDICATES SIGNIFICANT CAPEX SAVINGS
VERSUS CONVENTIONAL PLANTS PRODUCING SILICON METAL**

MONTREAL, QUEBEC, CANADA (July 11th, 2019) HPQ Silicon Resources Inc. – (www.HPQSilicon.com) (TSX-V: HPQ), (OTCPink: URAGF), (FWB: UGE) is pleased to present the salient points of an updated budgetary estimate regarding the significant cost advantages of building a commercial scale *PUREVAP™ Quartz Reduction Reactor (QRR)*, versus conventional processes to produce Silicon Metal (Si). The budgetary estimates were prepared by PyroGenesis Canada Inc (“PyroGenesis”) (TSX-V: PYR), using the data generated during our Gen1, Gen2 testing and Gen3 design & build phases.

PUREVAP™ THE SCALABLE, VERSATILE, & ADAPTABLE PROCESS THAT WILL CHANGE SI PRODUCTION

PyroGenesis calculates the maximum scaled up size of a single *PUREVAP™QRR* would allow the production of 2,500 metric tonnes (“MT”) of Silicon Metal per year. The total capacity of any *PUREVAP™ QRR* plant is therefore scalable by increments of 2,500 MT per year, making the *PUREVAP™QRR* process the most versatile and adaptable process to produce Silicon Metal (Si). This conclusion stems from the data of the two most recently built plants (“Greenfield”) to produce Metallurgical Grade Si (Mg Si), where conventional smelter processes require a minimum scale capacity of ~ 30,000 MT of Mg Si per year to be viable.

HPQ PUREVAP™ QRR TO REDUCE CAPEX COST PER KG OF ANNUAL CAPACITY BY UP TO 51%

Comparing the capacity and cost per Kg of annual capacity for a *PUREVAP™ QRR* plant versus the same data from the two most recent Greenfield plants, which were built using conventional processes to produce Mg Si, the scale of the *PUREVAP™ QRR* competitive cost advantages become very apparent.

1. HPQ commercial scale up plans call for the commissioning of a first 2,500 metric tonnes per annum (“MTA”) *PUREVAP™ QRR* and, once demand requires, a second 2,500 MTA *PUREVAP™ QRR*, would be added to the plant. Pyrogenesis budgetary estimates for the first 2,500 MTA *PUREVAP™ QRR* indicate a cost per Kg of annual capacity of approximately US\$ 8.89. Thereafter, simply increasing annual capacity to 5,000 MTA, with the addition of a second 2,500 MTA *PUREVAP™ QRR*, significantly reduces the cost per Kg of annual capacity down to only US\$ 6.22.
2. PCC BakkiSilicon hf is a new entrant that signed a turnkey contract for its Greenfield plant commissioned in 2018 in Húsavík (Iceland). The plant set up is the standard two furnaces layout and cost over US\$ 300 Million to build. With an annual capacity of 32,000 MTA of Mg Si, this project has a cost per Kg of annual capacity of US\$ 9.38. (51% higher than *PUREVAP™*)¹
3. Mississippi Silicon, a subsidiary of a large Brazilian tier 1 producer (Rima Industrial S/A), which has in house expertise in building new Greenfield plants, built a new plant that was commissioned in 2015 in Burnsville, Mississippi (USA). The plant uses the standard two furnaces layout and cost over US\$ 220 Million to build. With an annual capacity of 36,000 MT of Mg Si, this project has a cost per Kg of annual capacity of US\$ 6.11.² A *PUREVAP™ QRR* can match the cost per Kg of capacity of a tier 1 producer Greenfield plant at a fraction of the investment required (85% less).

¹ <https://www.pcc.eu/en/official-start-of-construction-for-pccs-silicon-metal-project-in-iceland/>

² A) <https://www.missilicon.com/>, B) <https://www.missilicon.com/news/premier-mississippi-silicon-plant-opens>



“According to an engineering and consultant firm specialized in building Greenfield Silicon Metal plants, the three critical elements for success are: 1) Access to cheap power; 2) Carbon Sourcing Management; and 3) Control over Capex of new plants. Being a Quebec based Company; access to cheap, clean and reliable power is not an issue. Regarding Carbon Sourcing Management and Capex Control, our results to date demonstrate that we are definitely moving in the right direction. With the Gen3 phase start just around the corner, we are getting closer to the time when market participants will have no choice but to take notice that we are the only viable low Capex and Opex alternative to producing Silicon Metal, the energy metal of the future” stated Bernard Tourillon, President & CEO of HPQ Silicon Resources Inc.

PUREVAP™ QRR SCALE, LOW OPEX AND CAPEX INDICATE STRONG ECONOMIC VIABILITY

In the June 17, 2019 releases the Company indicated that *PUREVAP™ QRR* efficiency could generate a 20% reduction in the cost of making 99+ % metallurgical grade silicon metal (“2N Mg Si”) Si versus conventional processes. Today, the budgetary estimates provided by PyroGenesis indicates that the minimum capital investment needed by HPQ to become a Silicon Metal producer is 90% smaller than what Mississippi Silicon invested and 93% less than what PCC BakkiSilicon hf invested. The combination of HPQ *PUREVAP™ QRR* Opex, Capex and Scalability advantages is what makes the process so competitive in the Silicon Metal space.

The Gen3 pilot plant testing, that is set to commence soon, aims to validate these hypotheses of future commercial production economic viability.

PUREVAP™ QRR IMPURITY REMOVAL CAPABILITY ALLOW HPQ TO TARGET HIGH VALUE MARKETS

Gen2 testing demonstrated that the *PUREVAP™ QRR* process could reach greater than 99% selective impurity removal efficiency, meaning that, working only with operational parameters, unwanted impurities can be volatilized from the final silicon phase, in the reactor.

Upcoming Gen3 pilot plant testing will validate the *PUREVAP™ QRR* one step selective impurity removal efficiency and demonstrate that operational parameters control will allow HPQ to adapt the final purity of the Silicon Metal (Si) tapped out from its commercial reactors and produce Si chunks of either:

- The 99.99+% Si purity required for niche market applications or feedstock for our metallurgical route to produce Solar Grade Silicon (SoG-Si UMG);
- The 99.5% Si purity required by end buyers in the Silicones, Polysilicon for Photovoltaic or Batteries sectors, and
- The 98.5% Si purity required by end buyers in the aluminium sector

PUREVAP™ QRR ELIMINATES NEED FOR POST METAL REFINING

Until now, only the standard two-step commercial process to produce metallurgical grade silicon metal (“Mg Si”) existed. Under this pathway, raw materials (SiO₂ and Reductant) are fed into giant submerged arc furnaces, where the carbothermic reaction occurs, then the molten silicon is tapped into a ladle where the oxidation and slag refining step is done. Without the final slag-refining step, conventional smelters are not able to produce Mg Si (98.5 -99.5% Si).

The *PUREVAP™ QRR* process **ONE STEP** selective impurity removal efficiency eliminates the need for the tapped liquid metal exiting the reactor to go through an oxidation and slag-refining step, which is another reason why *PUREVAP™* Capex and Opex are going to be significantly lower than conventional processes of making Silicon Metal.



Pierre Carabin, Eng., M. Eng., Chief Technology Officer and Chief Strategist of PyroGenesis has reviewed and approved the technical content of this press release.

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.

About HPQ Silicon

HPQ Silicon Resources Inc. is a TSX-V listed resource company focuses on becoming the lowest cost producer of Silicon Metal and a vertically integrated and diversified High Purity, Solar Grade Silicon Metal (SoG Si) producer and a manufacturer of multi and monocrystalline solar cells of the P and N types, required for production of high performance photovoltaic conversion.

HPQ's goal is to develop, in collaboration with industry leader PyroGenesis (TSX-V: PYR) the innovative PUREVAP™ "Quartz Reduction Reactors (QRR)", a truly 2.0 Carbothermic process (patent pending), which will permit the transformation and purification of quartz (SiO₂) into Metallurgical Grade Silicon Metal (Mg Si) at prices that will propagate it clean energy potential.

HPQ's goal, working with industry leader Apollon Solar, is also to develop a metallurgical approach to producing Solar Grade Silicon Metal (SoG Si) that will take full advantage of the PUREVAP™ QRR production of high purity silicon metal (Si) in one step and reduce by a factor of at least two-thirds (2/3) the costs associated with the transformation of quartz (SiO₂) into SoG Si. The pilot plant equipment that will validate the commercial potential of the process is on schedule to start in 2019.

Disclaimers:

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 securities regulatory authorities, which filings can be found at 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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