

# HPQ Rocks the Silicon Boat

As the world pushes ever onward with its sustainable energy goals, the demand for precursor materials continues to climb. Government incentive programs around the world are driving up the installation of photovoltaic (PV) cells every day, and high-purity polysilicon is the requisite material that makes it all possible. Already, massive quantities of the highest-grade polysilicon are used in the manufacture of silicon-based microprocessors, but the sheer surface area required for a solar-powered world means that the material will likely go into drastic undersupply as the market peaks. The last time this occurred, the spot price rose from \$60/kg in 2005 to around \$450/kg by 2008.

The fact that HPQ is also the largest holder of high-purity quartz properties in Quebec is no accident; the ability to feed their own pilot plant means that they will be better-placed than anyone to pump out polysilicon in time for the PV explosion. In fact, their pilot plant is expected to produce 200 metric tons each year, and is a mere months away from completion. Management reports that the project is on schedule and on budget, and the completed furnace is expected to be delivered at the end of summer. Refining silicon dioxide into industry standard stuff is normally an extremely costly process, but HPQ Silicon Resources Inc. (TSXV: HPQ) ("HPQ") have been developing a vertically integrated production model that should be capable of delivering a market-ready product in a single step. The guys at HPQ teamed up with renowned plasma technologists Pyrogenesis to bring into existence a quartz vaporization reactor that can create solar-grade silicon metal from a relatively poor feedstock, and at crazy-low prices.

Additionally, the company owns two gold properties in the Beauce region of Quebec that should be able to support small surface-mining operations. A memorandum of understanding was recently signed with the aim of advancing one of the projects

towards production. Once achieved, this will have the effect of supplementing the silicon operations, reducing CapEx, OpEx, as well as risk, and creating an all-round attractive proposition.

Over the last twelve months, lab tests of the plasma reactor have been entirely positive, and all payments are completely up to date. Just last month, Pyrogenesis successfully demonstrated single-stage production of PV-grade silicon metal from HPQ's feedstock, and all we are waiting for is the final results to tell us if the plant can produce the highest-purity material at volumes sufficient for the industry.

The company also wins-out on environmental impact, as its process produces 75% lower greenhouse gas emissions than the current industry standard process. The overall efficiency savings that the project entails results in a CapEx of around 5% of what would normally be expected, and less than 20% of the normal cash cost.

This summer is the final window of opportunity before full commercialization brings the cash through the doors. Once conveyor belts begin rolling and material begins to ship out, value is added daily. The solar-power market can be difficult to break into, but HPQ's technology will give them the lowest production costs I have ever seen, giving them a serious edge with which to slice into the supply chain. This process will be the only one in existence that can turn low quality quartz into high purity silicon metal in a single step, so HPQ et al are certainly worth your attention.

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# HPQ Silicon set to disrupt technology in solar panel market

☒ Last week I had the privilege to sit down with Bernard Tourillion, Chairman and CEO of **HPQ Silicon Resources Inc.** (“HPQ”) (TSXV: HPQ).

On 2 November 2016, HPQ achieved breakthrough in silica/quartz technology in that their processing engineering firm, PyroGenesis Canada Inc (“PyroGenesis”) released a report indicating that PUREVAP™ QRR process is capable of using silicon dioxide (SiO<sub>2</sub>) feed material that does not even meet the minimal industry specification to make Ferrosilicon<sub>2</sub> and produce Silicon Metal (Si) of greater purity than what can be achieved by traditional processes used to make Metallurgical Grade Silicon Metal (98.5% to 99.5% Si).

For us non-process engineering experts, let’s unpack what this means and the significance of this achievement.

Silicon dioxide silica, quarts and SiO<sub>2</sub> are synonyms for one of the world’s most common mineral deposits. While high purity deposits are ubiquitous, high purity deposits with SiO<sub>2</sub> above 99% grade and low levels of impurities is rare. As such, the EU began including high purity silica on its critical list in 2014. Moreover high purity silica is recognized as a critical input into making solar panels and the US Department of Justice recognized the need for high purity silica in artillery manufacture.

Until now, high silica purity grades for use in solar panels could only be achieved by refining medium grade silica into high purity metal using the Siemens process.

HPQ commissioned PyroGenesis to develop the PureVAP™ process

which was capable of taking low grade silica material and in a single-step process, developing high grade silica. On the 2<sup>nd</sup> of November, a significant milestone toward that goal was achieved. Testing are still ongoing with the goal of making material for use in solar panel,

With respect to costs, the PureVAP™ process capex requirements is estimated at around \$18.5/kg Si, compared to \$75/kg for the Siemen's Process in China or \$100/kg in the USA.

The goal now is for HPQ to receive the PureVAP™ patent and to move to a commercial phase with an objective of building around 20,000 tpa of capacity within the next 5-7 years.

With respect to funding, HPQ is entitled to R&D research credits worth about 30% of C\$7.726m from Canada. The project is further eligible for government funding (Provincial and Federal) which will cover 55-80% of the projected costs. Furthermore, over C\$2.77m worth of warrants are already in the money and management hopes to explore several non-dilutive options for financing the pilot plant.

I discussed the business model with well-known traders who prefer to remain anonymous. They indicated that HPQ seems sound, provided they could get a contract with an end user as the solar panel market is said to be "difficult to get a foot in." To this end, what impressed me is Bernard's constant focus on commercialization. He mentioned that already they had been approached by a French solar panel manufacturer to explore synergies.

In my experience, few junior mining projects consider the commercial viability so soon, tending to rather focus on geology, processing and financing. HPQ has focused on the commercial aspects almost from day one, ensuring that they could produce a low-purity material in order to take advantage of the growth of the solar panel market and now already making

contact with potential end-users. An experienced management team, access to finance and proof of concept with a much lower capex estimate. HPQ is definitely one to watch.