



## GREEN ENGINEERED SILICA AND SILICON MATERIALS TECHNOLOGY



HPQ  
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The Corporation is a technology company engaged in **green** engineering processes that is: 1) Developing the Fumed Silica Reactor (FSE), a new plasma process that will allow a direct Quartz to Fumed Silica transformation; 2) Aiming to become a manufacture of **green** Silicon anode materials; 3) Working with NOVACIUM SAS developing a compact process for the production of **green hydrogen** via hydrolysis of silicon and other materials and 4) developing the PUREVAP™ Quartz Reduction Reactor (QRR), a new carbothermic process to transform Quartz into **green Silicon** (patent granted in the United States & pending in other jurisdictions)

The terms Silicon, Silicon Metal and Si are used interchangeably. Metallurgical Grade Silicon or MG Si refers to Silicon Metal of a purity between 98.0% Si and 99.5% Si. High Purity (HP Si) or Upgraded Metallurgical Grade Silicon (UMG Si) refers to Silicon Metal of a purity between 99.9% Si and 99.99% Si.

# HPQ KEY MANAGEMENT



**Bernard J Tourillon, BAA. MBA CHAIRMAN, PRESIDENT, CEO AND DIRECTOR**

Over the last 35 years, Mr. Tourillon has held senior level executive positions with extensive finance, accounting, marketing, administration, and business development experiences in diverse industries including banking, manufacturing, exploration, mining, and technologies companies. Since joining HPQ Silicon in 2006, he has participated in fundraising activities and financial transactions worth over \$75 million.

Since 2015, he has been leading the transformation of HPQ Silicon from a simple High Purity Quartz and Gold exploration Company into a green tech focused Corporation.

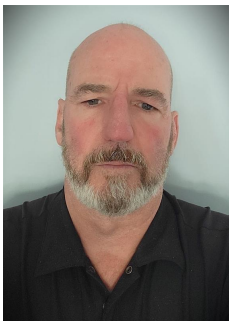
Mr. Tourillon was instrumental in securing the partnership with PyroGenesis Canada Inc, a world leader in plasma technology and high temperatures processes, and the creation of NOVACIUM SAS – a French associated company of HPQ responsible for groundbreaking R&D in the battery domains.



**Francois Rivard, VICE PRESIDENT AND CHIEF FINANCIAL OFFICER**

Over the last 35 years, Mr. Rivard has held senior accounting positions in diverse industries including banking, manufacturing, exploration, mining, and technologies companies. He joined HPQ Silicon in 2006.

Since 2015, he has been working with HPQ CEO transform HPQ Silicon from a simple High Purity Quartz and Gold exploration Company into a green tech focused Corporation.



**Daryl Hodges H. BSc, M.Sc., INDEPENDENT LEAD TECHNICAL DIRECTOR**

Mr. Hodges has experience in the mining industry and in the capital markets. In the last 25 years, Mr. Hodges has participated in fundraising activities and financial transactions worth over \$4 billion.

Since 2015, he has been participating in the transformation of HPQ Silicon from a gold exploration company into a Specialty Silicon company, first as an advisor and subsequently as a board member. On the Board of Directors his roles include Audit Committee and Technical Committee participation.

Mr. Hodges has a BSc and MSc degree in Earth Science.



# SILICON – SILICA : MULTITUDE OF EVERYDAY USES AND NO SUBSTITUTE



**Fumed Silica**

Specialized powder additive with widespread industrial uses



**Silicon Metal**

Specialized metal used in electronics, solar panels, auto alloys and industrial feedstock



**Silicon Battery Anode Materials**

Unique engineered silicon oxide additive to graphite batteries

## THE SILICON CHALLENGE:

Current silicon production processes are outdated, complicated, expensive, and generate massive CO2 footprints

## THE HPQ OPPORTUNITY:

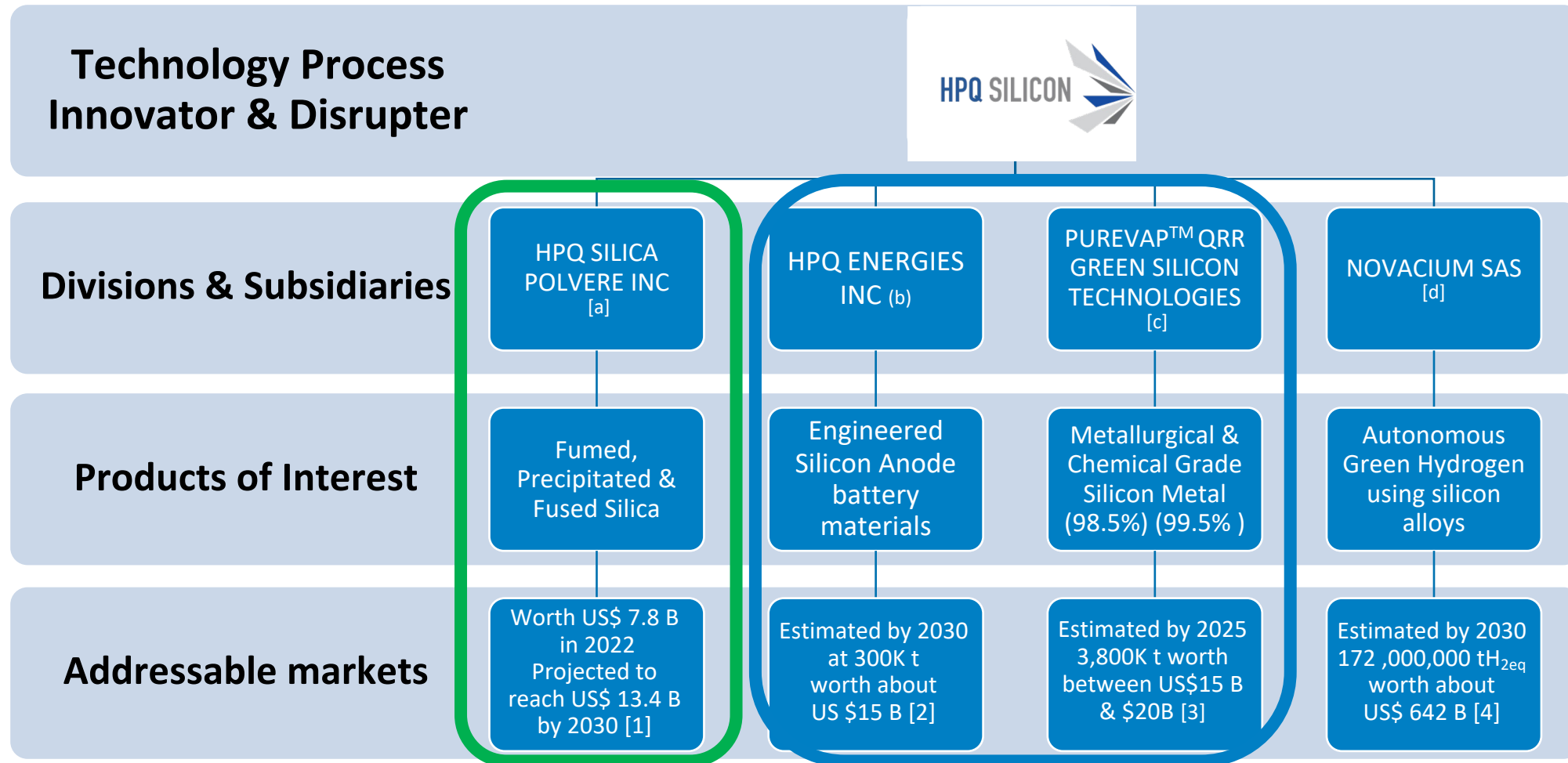
- **New Scalable Processes**, perfect for customized solutions
- **Low Capex and Op Cost**, creates high margin potential
- **Low Carbon Footprint**, significantly reduces carbon taxes



# HPQ PLAN: DEVELOP & MONETIZE NEW GREEN SILICON / SILICA TECHNOLOGIES

HPQ has successfully scaled its QRR reactor, now focused on commercializing TWO disruptive initiatives:

- Green Fumed Silica Manufacturing, in discussions with industry leaders for product development and commercialization
- Green engineered Silicon battery materials – plans to start commercializing ongoing



# UPCOMING CATALYSTS

## 01. GREEN FUMED SILICA INITIATIVE

- Finish FSR and commissioning of the test pilot plant: Q2 2024
- Start Producing Fumed Silica: Q3 2024
- Operating FSR and replicating lab results at scale: H2 2024
- Send samples to third Parties, continue offtake / collaboration discussions: Q3 2024
- Finalize Offtake agreement or other transaction (Joint Development or Collaboration Agreements) for first commercial plant

## 02. ENGINEERED SILICON BATTERIES MATERIAL

- Demonstrating our control of the industrial process needed to make commercially our engineered Silicon material by:
  - Making 18650 industrial batteries using our engineered Silicon
  - Testing and comparing the performance of these batteries versus similar batteries made only with graphite
  - Improving the performance of our engineered SiOx batteries

## 03. GREEN HYDROGEN ON DEMAND WITHOUT ELECTRICITY INITIATIVE

- Building a first prototype for commercialization of Novacium autonomous process for making hydrogen via hydrolysis

## HPQ CAPITAL STRUCTURE

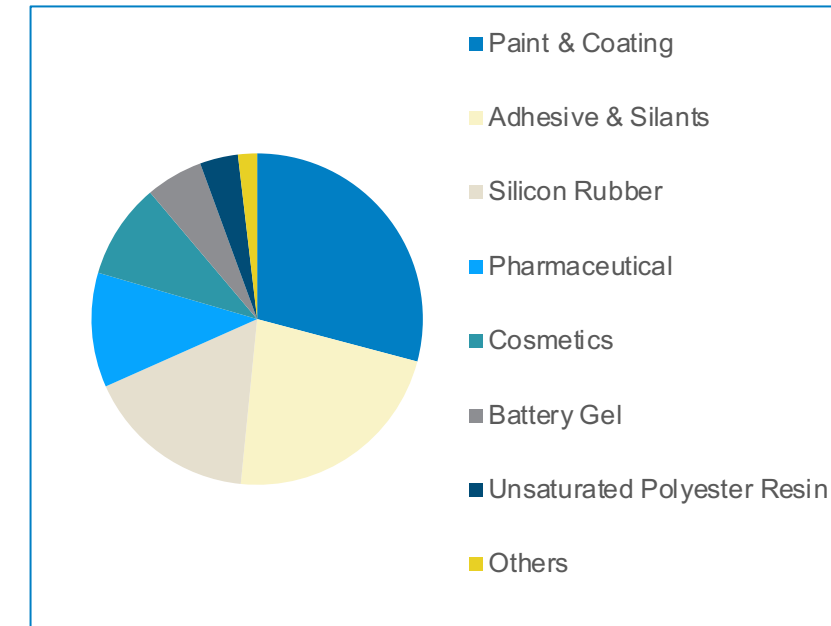
Major Investors	Basic	Fully Diluted
IQ (Investissement Québec)	8,7%	8,0%
Management & Board	6.3%	10.4%
Strategic Investors	7,0%	6.0%

	Million
<b>Indicative 12 months rolling budget</b>	
General & Administration (12 months)	\$ 1.4
Novacium Capital Increase (One Time)	\$ 1.5
Silicon for Batteries and Hydrogen R&D (12 months)	\$ 1.4
Fumed Silica project (12 months)	\$ 2.0
QRR Project minimum	\$ 0.250
One-time legal fees	\$0.165
<b>TOTAL</b>	<b>\$ 6.7</b>

# FUMED SILICA MARKET – HPQ NEAR PRODUCTION PROPOSAL

- Fumed Silica is a specialized industrial powder with huge surface area
  - Used as a thickener, anti-cake, anti-settling, and thixotropic (ketchup) agent
  - Used in various industries, there are no substitutes – see chart
  - The primary driver of the fumed silica market is increased demand from the major end-use industries
  - Environmental issues, complexity, and cost associated with conventional manufacturing processes are hindering market growth
  - HPQ is developing a process that solves all these in one step
- Key market players: Evonik Industries (Germany), Cabot Corporation (U.S.) Wacker Chemie AG (Germany), and Tokuyama Corporation (Japan) <sup>[1]</sup>

*Fumed Silica Market (%) by Industry*



*Source: MRFR Analysis*

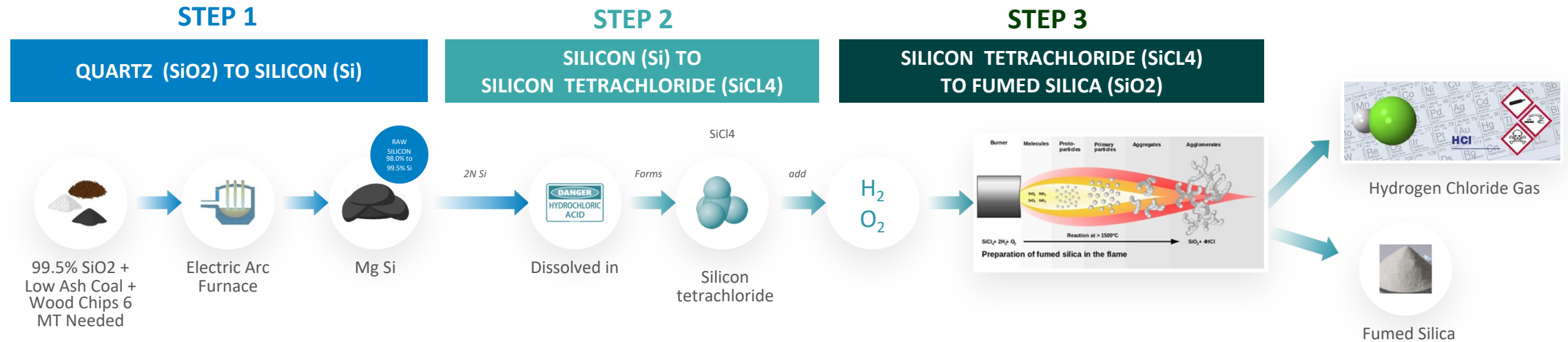
In 2023, Fumed silica sales reached US\$1.9 billion and is expected to grow at a rate of 5.5% CAGR <sup>[2]</sup>

- This translates to approximatively 16,000 tonnes of new demand per year, every year
- Canada does not produce Fumed Silica, annual consumption about 24,000 tonnes <sup>[1]</sup>
- With the push toward onshoring, North American demand is expected to grow substantially



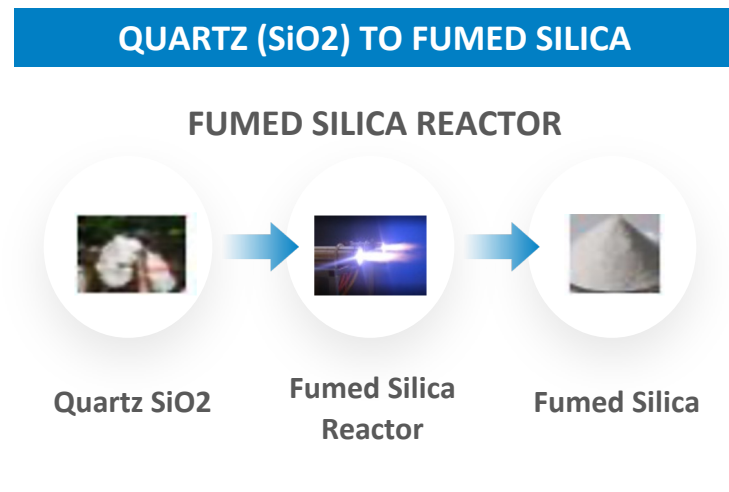
# CONVENTIONAL FUMED SILICA PROCESSES:

MULTI STEPS – CAPITAL INTENSIVE – LOW MARGIN – GENERATES TOXIC GAS – MASSIVE CO<sub>2</sub> FOOTPRINT



# HPQ POLVERE FUMED SILICA PROCESS:

ONE STEP – LOW CAPEX – HIGH MARGIN – NO CHEMICAL NEEDED – MINIMAL CO<sub>2</sub> FOOTPRINT



<b>KEY DISRUPTIVE MATRIX</b>	<b>FUMED SILICA MANUFACTURING</b>		
	<b>USING TODAY CONVENTIONAL PROCESSES</b>	<b>WITH HPQ POLVERE FUMED SILICA REACTOR</b>	<b>HPQ POLVERE DISRUPTIVE ADVANTAGES</b>
<b>CAPEX (Cost per Kg of capacity)</b>	<b>US\$ 145.91</b>	<b>US\$9.50</b>	<b>93% Less [1]</b>
<b>Energy Consumption (kWh / Kg of Fumed Silica)</b>	<b>100 – 120 [2]</b>	<b>10 – 15 [3]</b>	<b>87.5 to 90% Less</b>
<b>EBITDA Margins</b>	<b>20%</b>	<b>60% - 65%</b>	<b>3X better [4]</b>
<b>GHG Impact (Kg CO<sub>2</sub> eq / Kg of Fumed Silica)</b>	<b>8 – 17 [5]</b>	<b>1 – 2.5 [6]</b>	<b>84 to 88% Less</b>
<b>European Carbon Taxes (90€ per tonne released [7])</b>	<b>720€ - 1 530€</b>	<b>90€ - 225€</b>	<b>630€ to 1 350€ Less</b>
<b>HCl Production (Kg / Kg Fumed Silica)</b>	<b>2.4 [8]</b>	<b>0</b>	<b>NO HCl GAZ</b>

HPQ **unique opportunity** for Fumed Silica **participants** looking for a **process** to meet new demand for the low carbon Fumed Silica materials **end buyers are looking for**

# HPQ POLVERE FUMED SILICA REACTOR (FSR): A PARADIGM SHIFT IN FUMED SILICA

## HPQ POLVERE FSR: A LOW CAPEX AND OPEX PROCESS

Commercialization strategy: commence with a 1,000 TPA Fumed Silica Reactor, scale up capacity at 1,000 TPY increments

**Internal scoping study** indicates that FSR will have:

- Capex between US\$9.00 and US\$10.00 per Kg of annual capacity [1]
- Energy consumption between 10 – 15 KWh. per Kg of Fumed Silica [2]
- EBITDA margins between 60% and 65% - (assuming US\$5.00 per Kg - material having surface area of 150 m<sup>2</sup>/g [3])
- EBITDA margins between 70% and 75% - (assuming US\$8.00 per Kg - material having surface area of 200 m<sup>2</sup>/g [3])
- Assuming \$8.00/kg, payback period per 1,000 TPY Reactor is estimated to be 1.7 years [4]

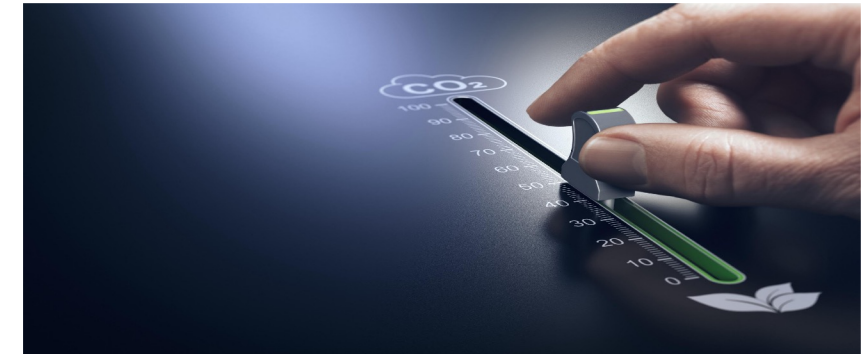
## THE FSR IS ALSO THE ONLY LOW CARBON FOOTPRINT PROCESS

Fumed Silica Reactor (FSR) Carbon Footprint projected between:

- 1 – 2.5 kg of CO<sub>2</sub> eq per Kg of Fumed Silica produced range [5]

## CARBON EMISSIONS RELATED TAX SAVINGS USING HPQ FSR:

Presently, at 90€ per tonne (t), carbon taxes in Europe will become 720€ to 1,530€ for traditional producers [6] but will tax producers using FSR between 90€ and 225€ per t of Fumed Silica produced or sold in Europe



# INDICATIVE OVERVIEW OF FINANCIAL POTENTIAL OF HPQ FSR PROCESS <sup>[1]</sup>

QUICK PRO FORMA OF POTENTIAL REVENUE MODEL PER 1K TPY FSR						
MATERIAL PRODUCED	A150		A200		A300	
SALES US\$	\$	5,000,000	\$	8,000,000	\$	10,000,000
PYR ROYALTIES	\$	500,000	\$	800,000	\$	1,000,000
GROSS SALES	\$	4,500,000	\$	7,200,000	\$	9,000,000
	WORST CASE	BEST CASE	WORST CASE	BEST CASE	WORST CASE	BEST CASE
COST TO MAKE FS	\$ 1,400,000	\$ 1,000,000	\$ 1,400,000	\$ 1,000,000	\$ 1,400,000	\$ 1,000,000
EBITDA	\$ 3,100,000	\$ 3,500,000	\$ 5,800,000	\$ 6,200,000	\$ 7,600,000	\$ 8,000,000
EBITDA Margin	62%	70%	73%	78%	76%	80%

KEY ASSUMPTIONS			
Material BET Characteristics	A150	A200	A300
Selling price US\$/Kg (1)	\$ 5.00	\$ 8.00	\$ 10.00
US\$ Costs to build a 1,000 TPY			
Plant Equipment	\$	10,000,000.00	
Building and Other (2)	\$	5,000,000.00	
TOTAL	\$	15,000,000.00	
(1) Does not assume any premium for Low carbon nature of the material			
(2) Building to be size to accommodate 4 - 1,000 TPY units			
Canadian market + new demand is sufficiency large to accomade > 10 HPQ FSR units			
	WORST CASE	BEST CASE	
US\$ Estimated cost to produced by KG	\$ 1.40	\$ 1.00	



# THE BEGINNING: PUREVAP™ QRR

## “Silicon Metal in one step”

### HISTORIC SUCCESS:

- Successful scaling up production by 2,500X from PUREVAP™ Gen2 QRR.
- Successful one-step production of Battery Grade Silicon (>99.9%, or 3N+)
- Successful semi-continuous production and silicon metal pours
- Success using 25% less feedstock than conventional processes
- Variety of products: MG Si (98.5% to 99.5%), 2N, and 3N+

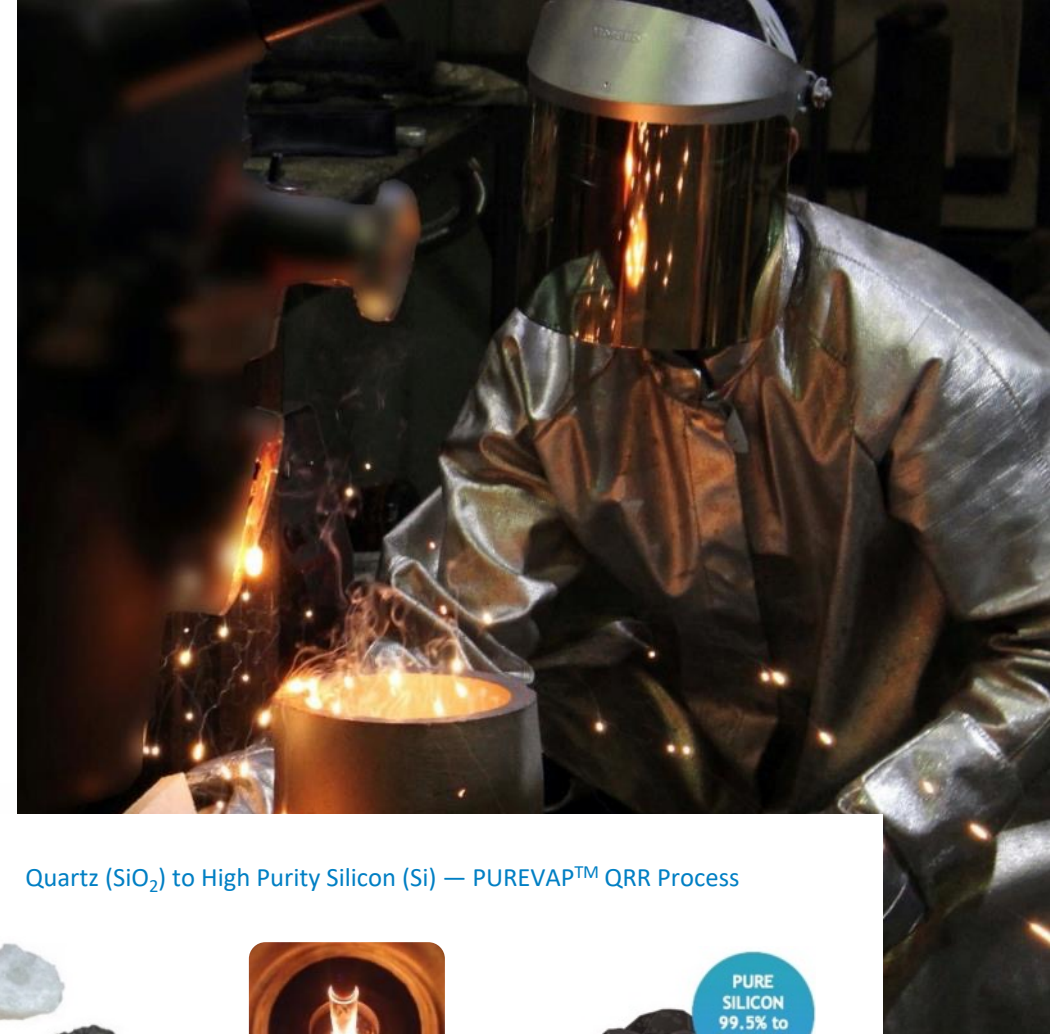
**The QRR Reactor has proven its capability to produce 3N + silicon in one step**

### New focus:

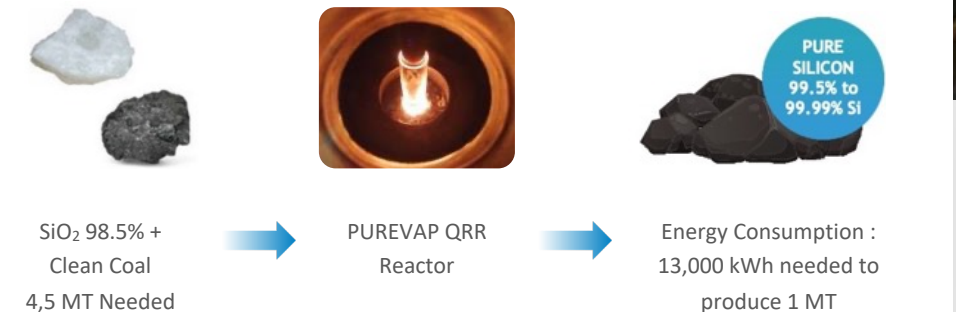
- **Using QRR feedstock for value – add downstream products**
- **Carbon off-gas capture capability provides green energy by-product**

### FUTURE TRENDS:

- 3N and 4N purity silicon powders can potentially be modified for use in batteries,
- Mixing a small amount (5-10%) silicon oxide (SiOx) to graphite anode composite is a huge opportunity to improve lithium battery performance

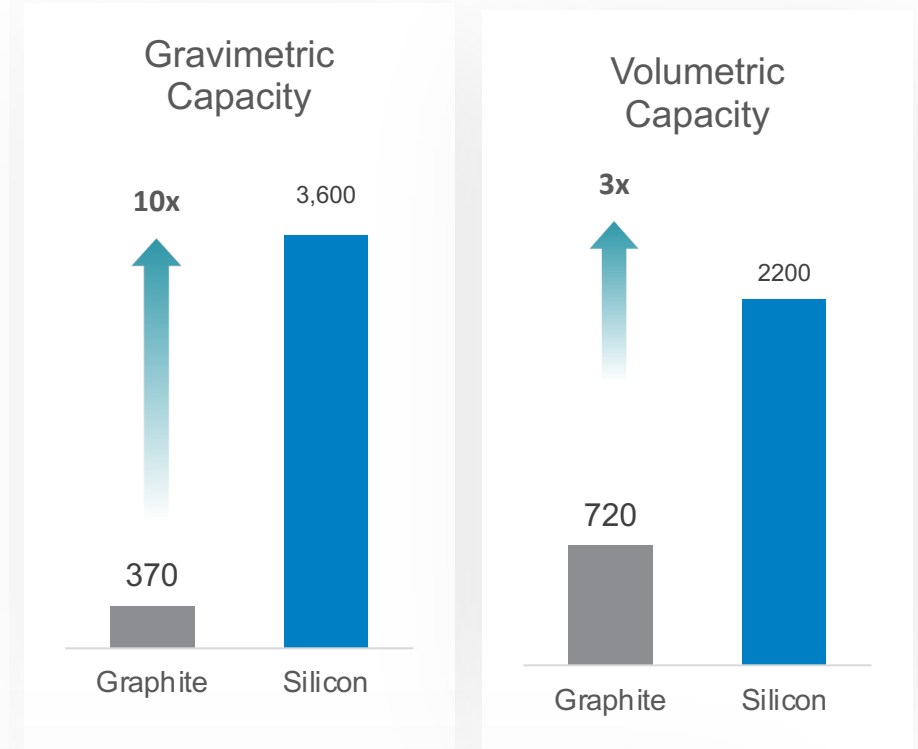


Quartz (SiO<sub>2</sub>) to High Purity Silicon (Si) — PUREVAP™ QRR Process



# SILICON-BASED BATTERY ANODES: A HUGE OPPORTUNITY

- Rechargeable Battery and EV Demand is growing exponentially & Performance Improvements are Required
- Resulting battery raw material demand adds supply stress
- Graphite:
  - Is the largest (by %) key mineral in an EV battery
  - Demand exceeds supply for the first time in 2022 [1]
  - Deficit projected to grow to 8M tonnes by 2040 [2]
- Replacing a small percentage (5 to 10%) [3] of graphite in the anode chemistry with silicon-based ( $\text{SiO}_x$ ) anodes material could:
  1. Improve battery performance
  2. Addresses the ongoing graphite deficit



**Silicon-based (Si) anode material for batteries demand is projected to exceed 300K Tonnes (t) by 2030, worth about US\$ 15 B [4]**

# HPQ SILICON – NOVACIUM ENGINEERING FOR BATTERY ANODES



HPQ and Novacium are working on the manufacture of commercial “Novacium Engineered Silicon” - based anode materials



## SUCCESS TO DATE:

- Manufacturing 18650 industrial batteries using graphite and Novacium Engineered Silicon material for anodes
- Full scale battery testing underway, results published started Q1 2024

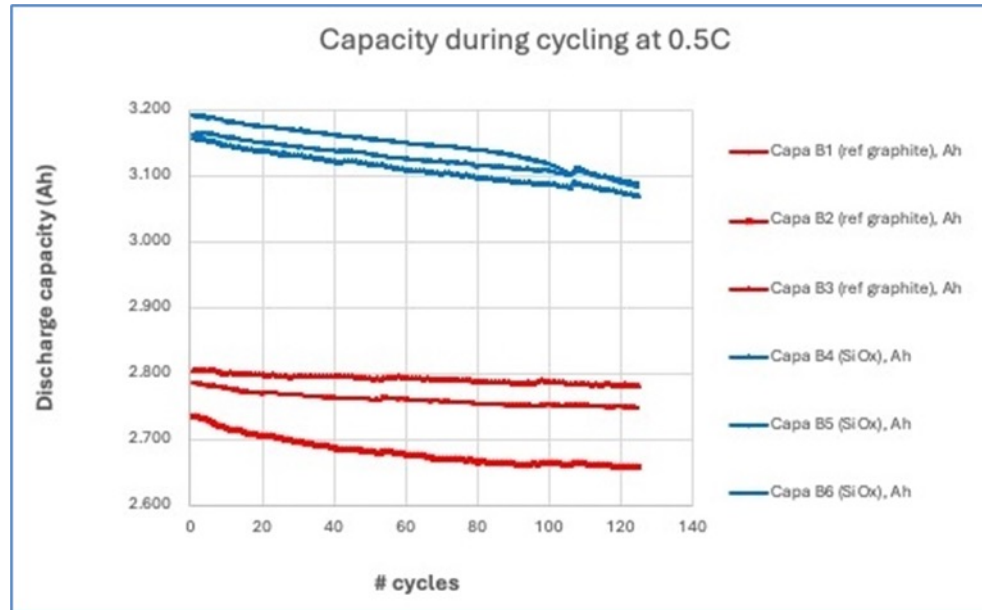
## GOAL FOR FUTURE:

- Pilot scale Engineered Silicon materials manufacturing capacity in 2025
- Commercial Engineered Silicon materials manufacturing capacity in 2028

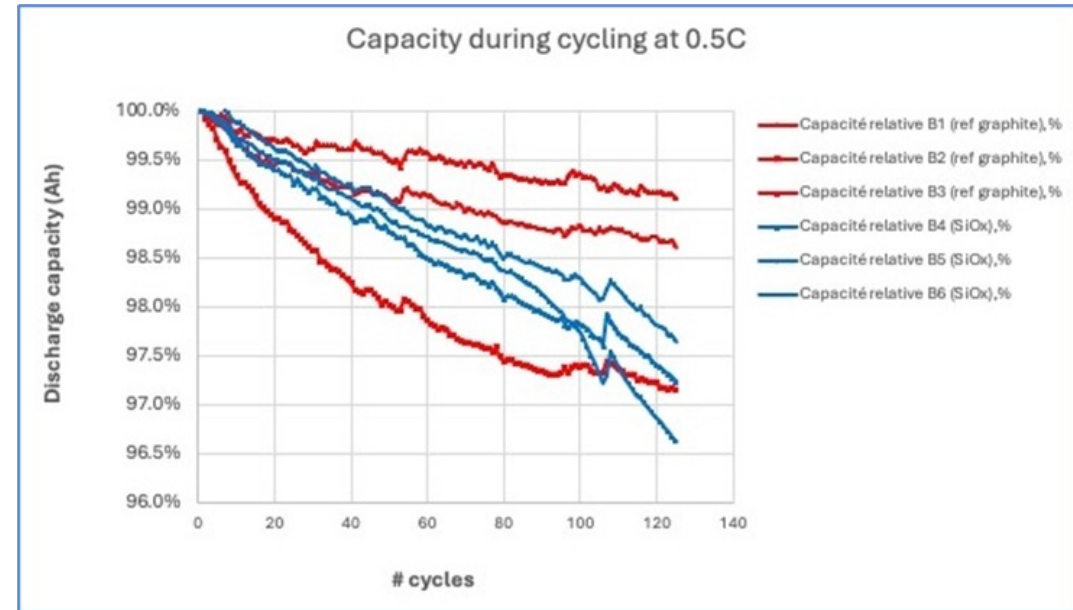
HPQ plans to use its 3N silicon from the PUREVAP™ QRR process as the feedstock to make Novacium Engineered Silicon anode materials



# SILICON IN BATTERY ANODES: POSITIVE TEST RESULTS CONTINUE



*Battery capacity during 125 cycles tests of HPQ and Novacium Gen 1 18650 industrial battery [1].*



*Capacity change during 125 cycles tests of HPQ and Novacium Gen 1 18650 industrial battery [1].*

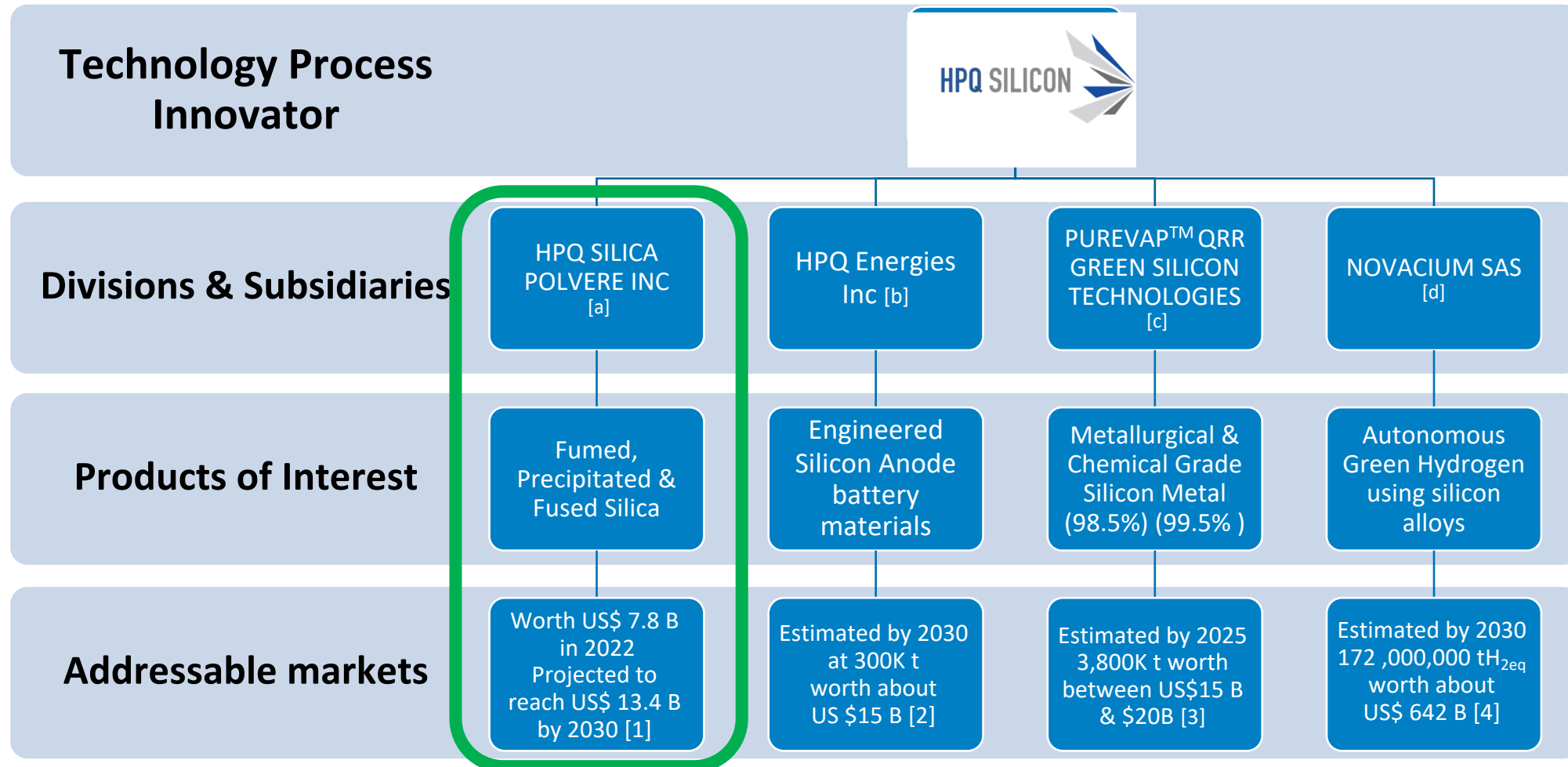
**HPQ and Novacium are rapidly developing cutting-edge rechargeable batteries**

- Initial, non-optimized test results are exceeding expectations
- Uses the industry standard 18650 battery format for rapid adaptation

# HPQ PLAN: DEVELOP & MONETIZE NEW GREEN ENGINEERING TECHNOLOGIES

## Green Fumed Silica Manufacturing Disruptive technology

- 93% lower Capex, 90% less energy consumption, 88% less CO2 emission and Operating Margin 3X better than traditional process
- Measured and achievable growth plans to start commercializing by the end of 2024



# FUMED SILICA INDICATIVE TIMELINE: FAST TRACK TO COMMERCIALIZATION

PROJECT	2024	2025	2026	2027
<b>FUMED SILICA REACTOR (FSR)</b>	<div>Engineering – Construction – Commissioning of FSR Pilot Plant</div> <div>FSR Pilot plant testing &amp; validation of technology</div>	<div>Fumed Silica production using the 50 TPY pilot plant</div> <div> <div>Engineering studies regarding building 1,000 TPY FSR</div> <div>All aspects related to the Construction – Commissioning of 1000 TPY FSR commercial plants</div> </div>		<div>Fumed Silica production from our first of many 1,000 TPY FSR plants</div>

## FUMED SILICA INITIATIVE UPCOMING CATALYSTS

- Finish FSR assembly and commissioning of the test pilot plant: Q2 2024
- Start producing Fumed Silica: Q3 2024
- Operating FSR under a batch protocol, replicating lab – scale results: H2 2024
  - ✓ Produce materials with surface areas between 150 – 200 m<sup>2</sup>/g (\$5.00 to \$8.00 / kg)
- Send samples to third Parties, continue offtake / collaboration discussions: Q3 2024
- Operate FSR under semi-continuous conditions, target 200kg of commercial-grade fumed silica: 2024
- Optimize FSR to target food/pharma grade fumed silica - surface area exceeding 300 m<sup>2</sup>/g (USD\$10/kg)
  - ✓ Used in 'beauty and personal care' products—will drive increase demand, projected to constitute 30% of the entire Fumed Silica market by 2032 [1].
- Finalize a first Offtake agreement or other transaction to build an initial first 1,000 TPY FSR plant: 2024



# UPCOMING CATALYSTS

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- Building a first prototype for commercialization of Novacium autonomous process for making hydrogen via hydrolysis

## HPQ CAPITAL STRUCTURE

Major Investors	Basic	Fully Diluted
IQ (Investissement Québec)	8,7%	8,1%
Management & Board	6.3%	10.7%
Strategic Investors	7,0%	6.1%

52 weeks			
	Price	Low	High
(As of May 6, 2024)	\$ 0,25	\$ 0,17	\$ 0,42

	Million
Basic Shares Outstanding	367,2
Options (Average Price \$0.46 / Duration 4 years)	17,7
Warrants (Average Price \$0.276)	2.6
Fully Diluted Shares Outstanding	387.6
Market Capitalization (Basic)	\$ 91.8
Market Capitalization (Fully Diluted)	\$ 96.9
Cash. Cash equivalent and in the money options and warrants	\$ 3.0

# — MANAGEMENT, BOARD & OTHERS



## Management

- ▶ Bernard J. Tourillon, BAA, MBA  
Chairman, President, CEO and Director
- ▶ Noelle Drapeau, LLL, MBA, PMP  
Corporate Secretary and Director
- ▶ Francois Rivard  
VP, CFO
- ▶ Derick A. Lila, MSc, MA  
Director Marketing Communications



## Independent Directors

- ▶ Richard Mimeau, B.Sc.  
Director
- ▶ Peter Smith, PhD, P. Eng.  
Director
- ▶ Robert Robitaille, M.B.A., L. Ph.  
Director
- ▶ Daryl Hodges H. BSc, M.Sc.  
Director
- ▶ Patrick Levasseur  
Director



## Consultants

- ▶ Marcel Drapeau, BA, BSC. Comm, LLL
- ▶ PyroGenesis Canada Inc
- ▶ Karl Rheinberger and Ludmila Livertovsky



## Transfer Agent

- ▶ Computershare



## Auditors

- ▶ KPMG S.E.C.N.R.L.



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# TECHNICAL APPENDIX

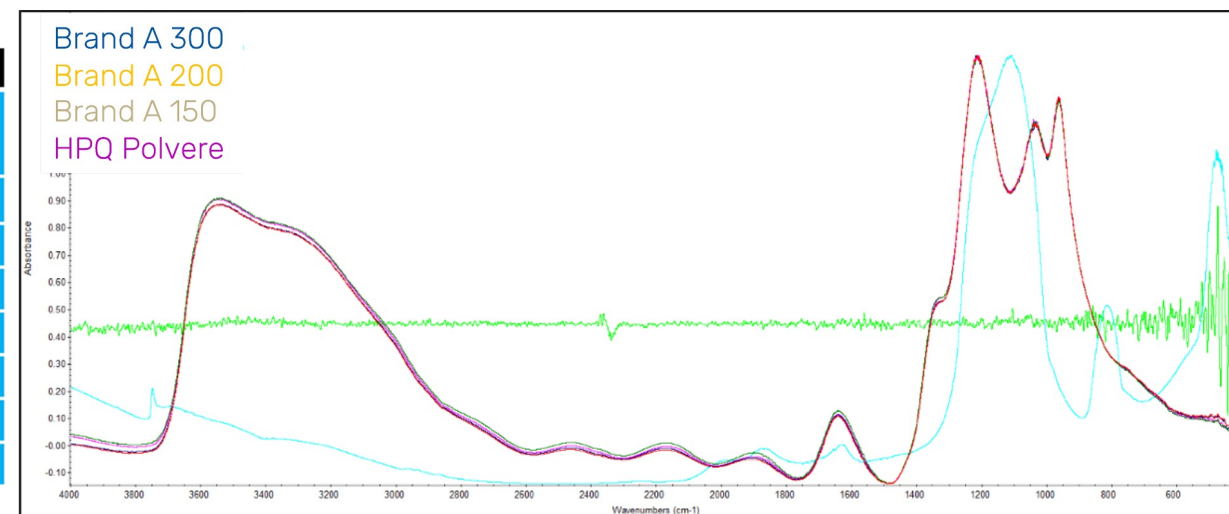


# HPQ POLVERE FUMED SILICA MILESTONES TO DATE

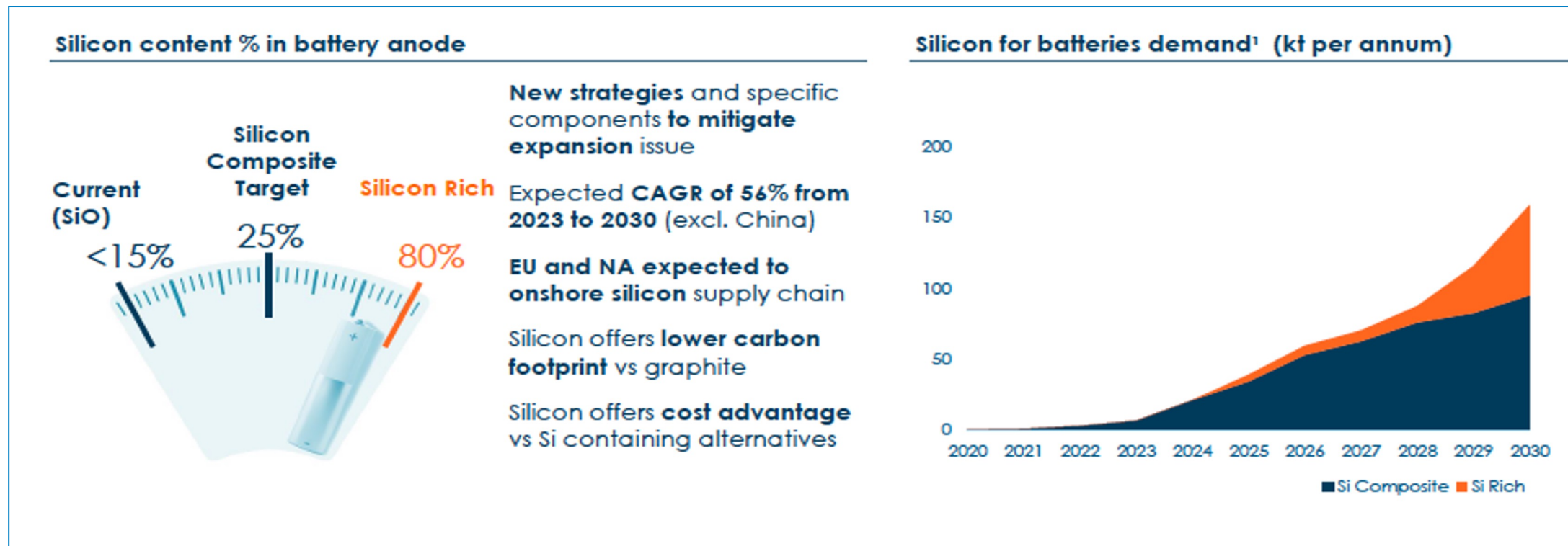
- Lab scale Fumed Silica Reactor (“FSR”) produced **Commercial grade fumed silica** in 2023
- HPQ Polvere has signed NDAs with three (3) major Fumed Silica participants
- Samples have been sent for analysis of **commercial potential** and feedback is very positive
- Independent testing done at McGill University
- **Key takeaway:**
  - HPQ Polvere FSR can **produce Commercial Grade Fumed Silica in one step** at lab scale
  - Chemically, HPQ material is identical to the Commercial Brand A 150, 200, and 300 products
  - **Material Rheology (strength) between Commercial brand A 150 & A 200 material but is very close to A 200**
- Table below summarizes these key results

Behavior in relation to water Hydrophilic				
Test Methods	Unit	Fumed Silica Commercial A	Fumed Silica Commercial B	Fumed Silica Polvere
BET Surface Area	m <sup>2</sup> /g	125 – 175	175 – 225	135 – 185
Ignition Loss (LOI)	%	≤ 1.5	≤ 1.5	≤ 1.5
Moisture	%	≤ 1.5	≤ 1.0	≤ 1.0
pH Value		3.7 – 4.7	3.7 – 4.5	4.7 – 6.7
HCl	%	< 0.020	< 0.020	Nil
Viscosity	(cP)	27,597	118,000	90,780
Thickening Efficiency	mPas	Good	Excellent	Excellent

[1]



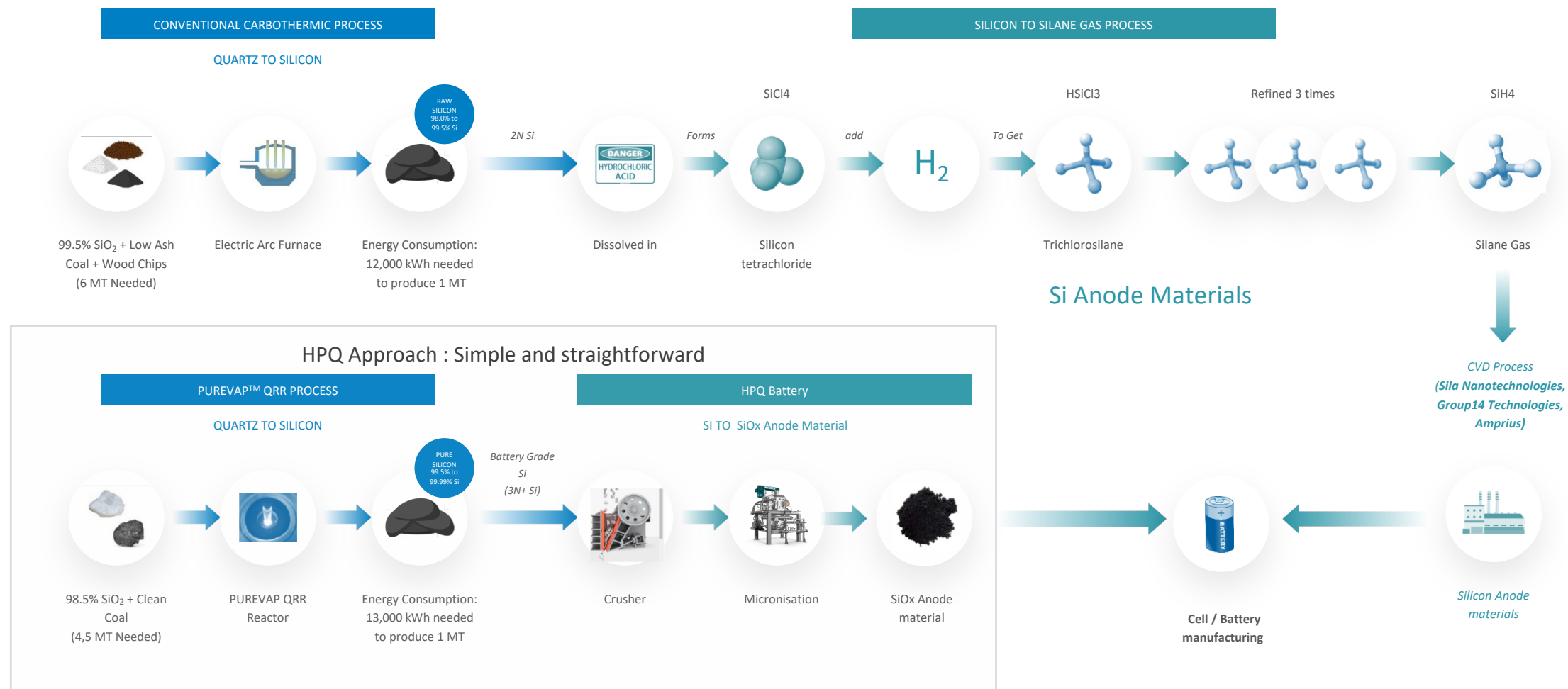
# SILICON IN BATTERY ANODES: HELPING ACCELERATE THE EV TRANSITION



Combining HPQ's PUREVAP™ QRR and Novacium's proprietary expertise, HPQ is well-positioned to seize this once-in-a-lifetime opportunity



# — HPQ / NOVACIUM BATTERY INITIATIVE VS COMPETITION



# REFERENCES & SOURCES

## APPENDIX



# — REFERENCES AND SOURCES

In the following pages, you will find supplementary information, references and/or the sources of key points made in the presentation

## Page 5

- a) HPQ Silica Polvere Inc (“Polvere”) is a 100% owned HPQ subsidiary. HPQ acquired the Fumed Silica Reactor intellectual properties from PyroGenesis Canada Inc (“PCI”), subcontracted to them the R&D associated with developing the technologies, agreed to an exclusive equipment procurement deal and granted PCI a royalty payment equal of 10% of Polvere Fumed Silica sales, with set minimums. PCI does have the option to sale its Royalty in exchange for 50% of HPQ remaining equity stake in Polvere.
- [1] Fumed Silica Market Outlook (2022-2030) (<https://www.factmr.com/report/2301/fumed-silica-market>) Specialty Silica Market projected to reach \$13.4 billion by 2030, exhibiting a CAGR of 7.0%, Says Coherent Market Insights (CMI). <https://www.globenewswire.com/news-release/2023/08/03/2718371/0/en/Specialty-Silica-Market-projected-to-reach-13-4-billion-by-2030-exhibiting-a-CAGR-of-7-0-Says-Coherent-Market-Insights-CMI.html> Specialty Silica Market projected to reach \$13.4 billion by 2030, exhibiting a CAGR of 7.0%, Says Coherent Market Insights (CMI). (<https://www.globenewswire.com/news-release/2023/08/03/2718371/0/en/Specialty-Silica-Market-projected-to-reach-13-4-billion-by-2030-exhibiting-a-CAGR-of-7-0-Says-Coherent-Market-Insights-CMI.html>)
- b) HPQ Energies Inc (“HPQe”) formally HPQ NANO Powders Inc, is a 100% owned HPQ subsidiary that is responsible for all aspect related to silicon materials for batteries and other high value silicon materials.
- [2] QY Research, SNE Research, Shinhan Securities / NBM June 2023 Deck page 11
- c) PUREVAP™ QRR Green Silicon Technologies are 100% owned by HPQ. HPQ acquired the QRR Intellectual properties from PyroGenesis Canada Inc (“PCI”), subcontracted to them the R&D associated with developing the technologies, agreed to an exclusive equipment procurement deal and granted PCI a Royalty payment equal of 10% of HPQ PUREVAP™ QRR Silicon metal sales, with set minimums. HPQ is therefore financing 100% of the development cost of this technology and will collect 90% of the Silicon metal sales made with the QRR.
- [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).
- d) Novacium SAS. In 2022, HPQ partnered with three leading French research engineers to create Novacium, a “jeune entreprise innovante (J.E.I)” based in Lyon, France, working in high-added-value material fields connected to renewable energy. Presently HPQ only owns 20% of the equity of Novacium, making Novacium an affiliated company of HPQ Silicon Inc, but accounting rules require that we consolidate Novacium operations in our financial statement.
- [4] Deloitte’s 2023 global green hydrogen outlook, page 13

## Page 7

- [1] Marketsandmarkets.com fumed silica report global forecast to 2022
- [2] GML, Global Market Insight. Fumed Silica Market - By Product (Hydrophilic, Hydrophobic), By Application (Pharmaceutical, Beauty & Personal Care, Silicone Elastomers, Paints, Coatings & Inks, UPR, Adhesives & Sealants, Food & Beverages) & Global Forecast, 2024 – 2032.

# — REFERENCES AND SOURCES

In the following pages, you will find supplementary information, references and/or the sources of key points made in the presentation

## Page 8

- [1] Management has calculated the Capex advantage for the Fumed Silica Reactor (FSR) based on a rough order of magnitude study by PyroGenesis, that mentioned that our one-step process for making Fumed Silica was estimated to cost about CAD\$13 million, which equals an average Capex per kilogram of annual capacity between US\$9.00 and US\$10.00. . These figures will be updated upon completion of the pilot testing phase

Whereas the industry data comes from:

- i. Conversion of Quartz to Silicon Metal (Si), with an average Capex of around US\$9.38 per kilogram of annual capacity (for reference, the PCC BakkiSilicon Plant in Iceland cost US\$300 million for an annual capacity of 32,000 tonnes).
  - ii. Conversion of Si to Silicon Tetrachloride (SiCl<sub>4</sub>), with an average Capex of approximately US\$125.00 per kilogram of annual capacity (e.g., Wacker Chemie AG Polysilicon's US production plant cost US\$2.5 billion for an annual capacity of 20,000 tonnes).
  - iii. Burning Silicon Tetrachloride (SiCl<sub>4</sub>) with Hydrogen and Oxygen to produce Fumed Silica (SiO<sub>2</sub>), incurring an average Capex of around US\$11.54 per kilogram of annual capacity (Wacker Chemie AG's US Fumed Silica plant cost US\$150 million for an annual capacity of 20,000 tonnes).
- [2] Frischknecht, Rolf, et al. "Life cycle inventories and life cycle assessment of photovoltaic systems." International Energy Agency (IEA) PVPS Task 12 (2020).
- [3] PyroGenesis Canada Inc
- [4] 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 5% range in HPQ Polvere's EBITDA margins considers PyroGenesis' option to convert its 10% royalties into a 50% ownership stake in HPQ Polvere's remaining equity.

Management has calculated the EBITDA margins from the industry data from:

- i. Average EBITDA margins of 20% are derived from two sources, ([https://www.chemistryviews.org/details/news/10193941/Evonik\\_Acquires\\_Huber\\_Silica/](https://www.chemistryviews.org/details/news/10193941/Evonik_Acquires_Huber_Silica/)) and (<https://corporate.evonik.com/en/investor-relations/despite-difficult-environment-third-quarter-better-than-second-225109.html>).
- [5] Frischknecht, Rolf, et al. "Life cycle inventories and life cycle assessment of photovoltaic systems." International Energy Agency (IEA) PVPS Task 12 (2020).
- [6] The 1 Kg eq of CO<sub>2</sub> per Kg of Fumed Silica is based on Hydro Quebec data that indicate in Quebec 1.3 g of CO<sub>2</sub> are generated eq per KWh. While the 2.5 is based on the Canadian average for electricity generation carbon intensity of 150 g per KWh
- [7] The Wall Street Journal article, April 18, 2023, "World's First Carbon Import Tax Approved by EU Lawmakers"
- [8] 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 (United States).

## Page 9

- [1] According to a rough order of magnitude study by PyroGenesis, our one-step process for making Fumed Silica is estimated to cost about CAD\$13 million, which equals an average Capex per kilogram of annual capacity between US\$9.00 and US\$10.00.

# — REFERENCES AND SOURCES

In the following pages, you will find supplementary information, references and/or the sources of key points made in the presentation

## Page 9

[2] Based on PyroGenesis data

[3] 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 5% range in HPQ Polvere's EBITDA margins considers PyroGenesis' option to convert its 10% royalties into a 50% ownership stake in HPQ Polvere's remaining equity. Management has calculated the EBITDA margins from the industry data taken from:

- i. Average EBITDA margins of 20% are derived from two sources, ([https://www.chemistryviews.org/details/news/10193941/Evonik\\_Acquires\\_Huber\\_Silica/](https://www.chemistryviews.org/details/news/10193941/Evonik_Acquires_Huber_Silica/)) and (<https://corporate.evonik.com/en/investor-relations/despite-difficult-environment-third-quarter-better-than-second-225109.html>).

[4] Management has calculated the payback period for the Fumed Silica Reactor (FSR) based on data from PyroGenesis, data derived from third party sources and publicly available information. These figures will be updated upon completion of the pilot testing phase.

[5] The 1 Kg eq of CO<sub>2</sub> per Kg of Fumed Silica is based on Hydro Quebec data that indicate in Quebec 1.3 g of CO<sub>2</sub> are generated eq per KWh. While the 2.5 is based on the Canadian average for electricity generation carbon intensity of 150 g per KWh.

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

## Page 10

[1] Management has prepared the "*Indicative overview of Financial potential of HPQ FSR Process*" based on data derived from PyroGenesis rough order of Magnitude study ([HPQ January 10<sup>th</sup>, 2024, release](#)), third party sources and publicly available information. These figures will be updated upon completion of the pilot testing phase. Based on PyroGenesis data.

## Page 12

[1] July 2022 article by Rick Mills in .mining.com intitled Graphite deficit starting this year as demand for ev battery anode ingredient exceeds supply

[2] July 2022 article by Rick Mills in .mining.com intitled Graphite deficit starting this year as demand for ev battery anode ingredient exceeds supply

[3] The Royal Society of Chemistry 2020 Sustainable Energy Fuels, 2020, 4, 5387–5416

[4] QY Research, SNE Research, Shinhan Securities / NBM June 2023 Deck page 11.

## Page 14

[1] Novacium technical team analysis of the data from the ongoing charging and discharging cycle tests conducted at a world-leading university, the name of which is kept confidential for competitive reasons.

## Page 15

[a] and [1], [b] and [2], [c] and [3], and [d] and [4] – Please revert to sources for page 5 as they are the same.

## Page 16

[1] GML, Global Market Insight. Fumed Silica Market - By Product (Hydrophilic, Hydrophobic), By Application (Pharmaceutical, Beauty & Personal Care, Silicone Elastomers, Paints, Coatings & Inks, UPR, Adhesives & Sealants, Food & Beverages) & Global Forecast, 2024 – 2032