



HPQ - SILICON
RESOURCES



Innovative Silicon Solutions

HPQ
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THE BEST MARKET

DISCLAIMERS

This presentation includes certain

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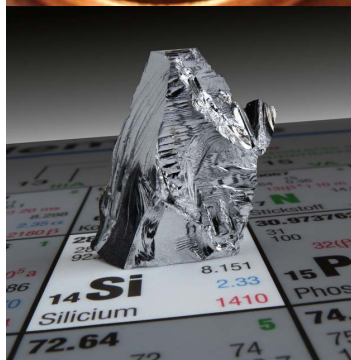
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The Corporation is focused on developing the *PUREVAP™ processes*. The *PUREVAP™ Quartz Reduction Reactor (QRR)*, (Patent Pending) a new carbothermic process to transform Quartz into Silicon, and the *PUREVAP™ Nano Silicon (Si) Reactor (NSiR)*, (Provisional Patent applied) a new process to transform Silicon (Si) into Spherical Nano powders and Nano wires for Lithium-ion batteries. 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.

Any monetary values given to end product produced by the equipment, projected capital or operating cost and savings associated with the development of process should not be construed as being related to establishing the economic viability or technical feasibility on any of the Company’s quartz properties or more specifically the Roncevaux Quartz Project, Matapedia Area, in the Gaspé Region, Province of Quebec.

WHY SILICON? DEMAND TO REACH 3.8 M MT WORTH US\$ 10 BILLION BY 2025¹

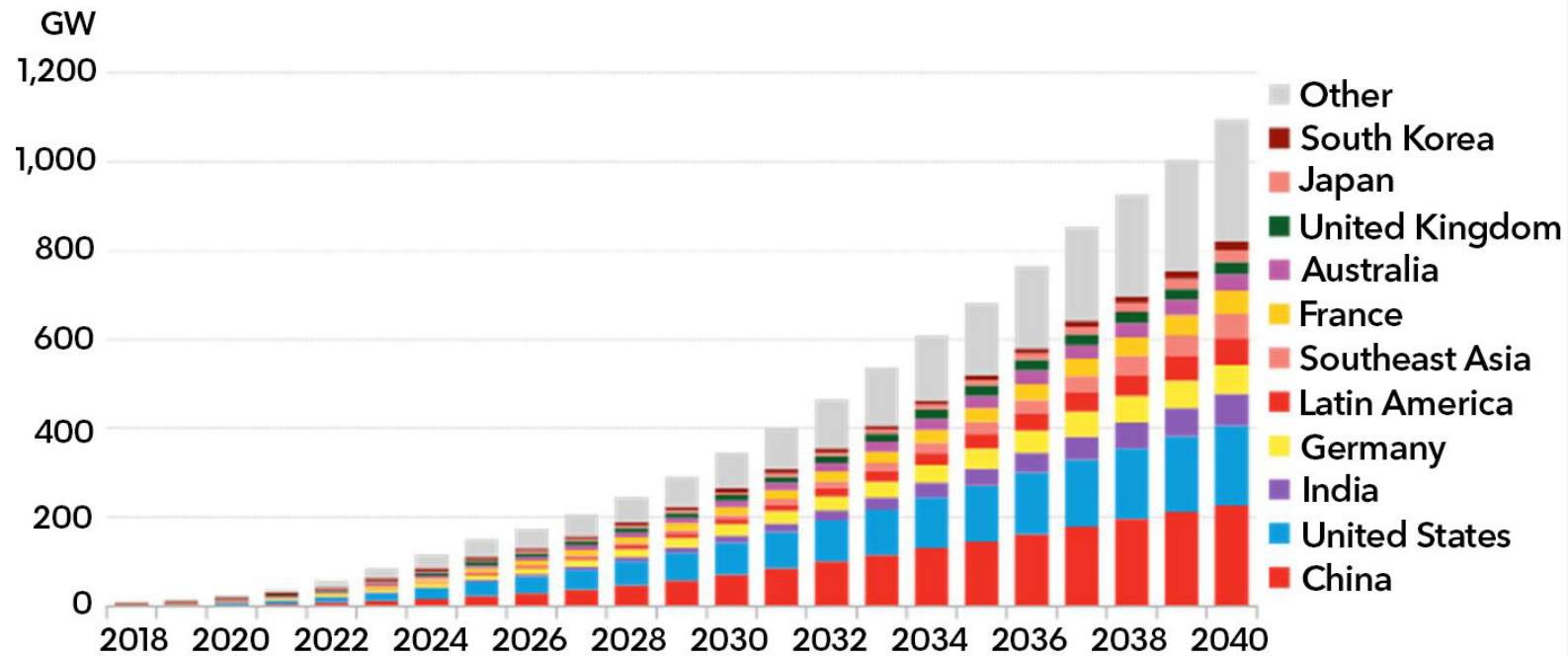


- **GROWTH WILL BE DRIVEN BY DEMAND FOR CHEMICAL GRADE SILICON (2N+ Si)**
- **2N+ Si IS THE FEEDSTOCK NEEDED:**
 - To make Silicones, a market expected to grow to US\$ 23 B by 2025 (CAGR 10.7%)²
 - To produce Polysilicon for solar energy, a market expected to surpass US\$ 200 By 2026 (CAGR 20%)³
 - For the battery sector, a new market coming online, that is expected to exceed 200K MT by 2030⁴

ENERGY STORAGE DEMAND ABOUT TO EXPLODE

ENERGY STORAGE CAPACITY MUST INCREASE TO OFFSET THE VARIABILITY OF RENEWABLE ENERGY

Global cumulative energy storage installations



Source: BloombergNEF

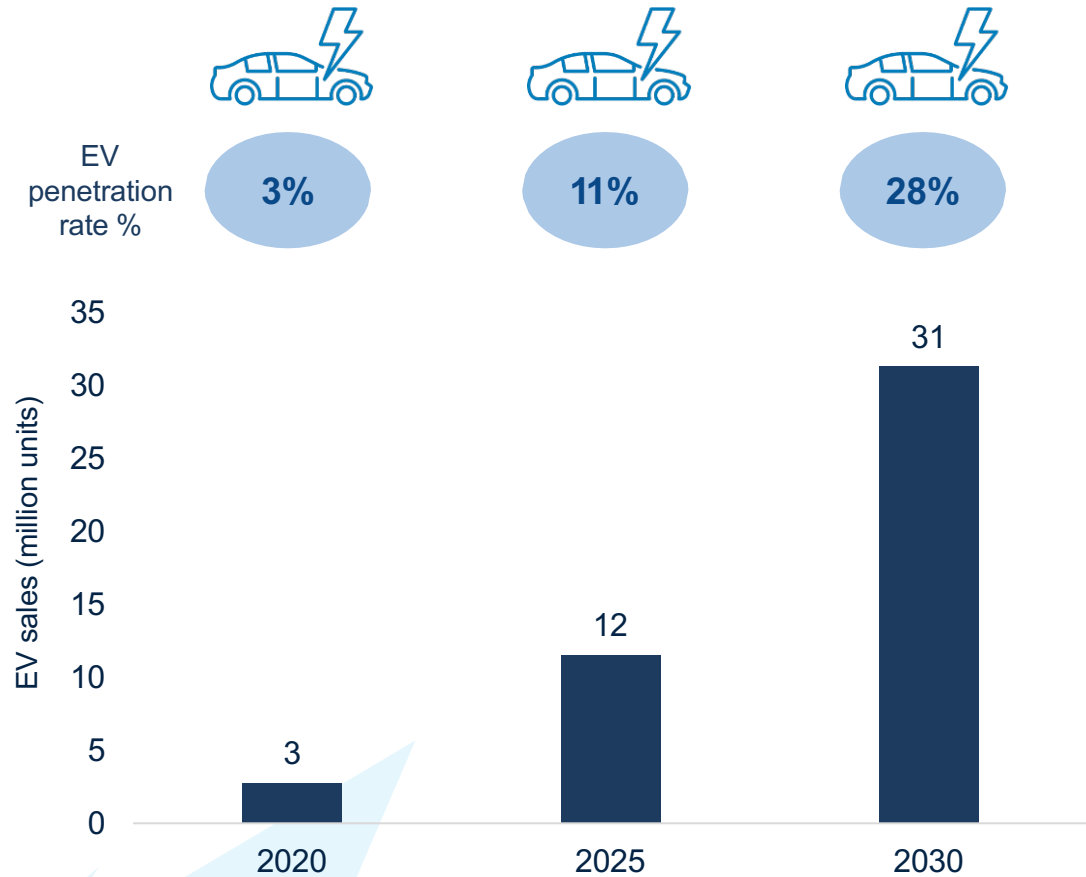


“Investment dedicated to energy storage will exceed \$40 billion by 2040 ”

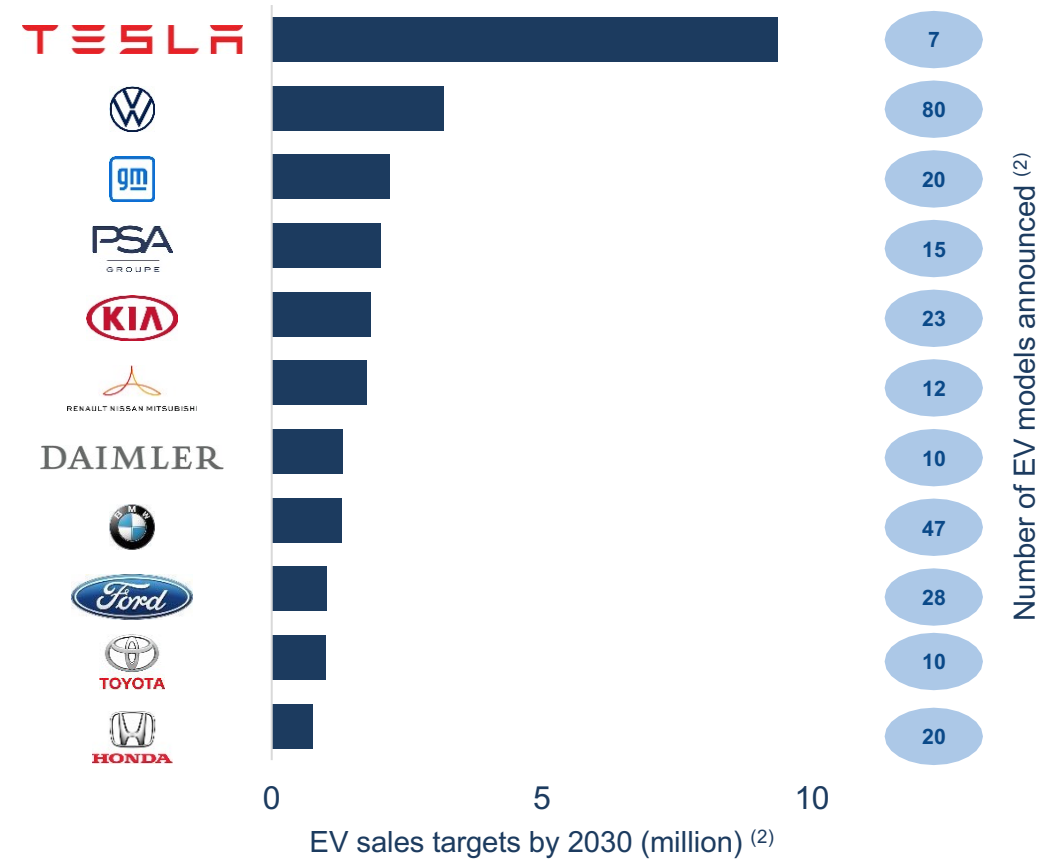
Yayoi Sekine, energy storage analyst for BNEF

+ THE LONG-TERM EV MEGATREND IS ONLY STARTING

EV adoption and vehicle sales (1)



Leading EV manufacturer plans – over \$300 billion committed



The World is going “all-in” on electric vehicles

(1) Source: Benchmark Mineral Intelligence, Rho Motion
 (2) Broker research, Bloomberg New Energy Finance, NOU websites and presentation

BUT THERE IS A “BATTERY BOTTLENECK”

BATTERY PERFORMANCE HAS EVOLVED MUCH MORE SLOWLY THAN ELECTRONICS AND COMPUTERS

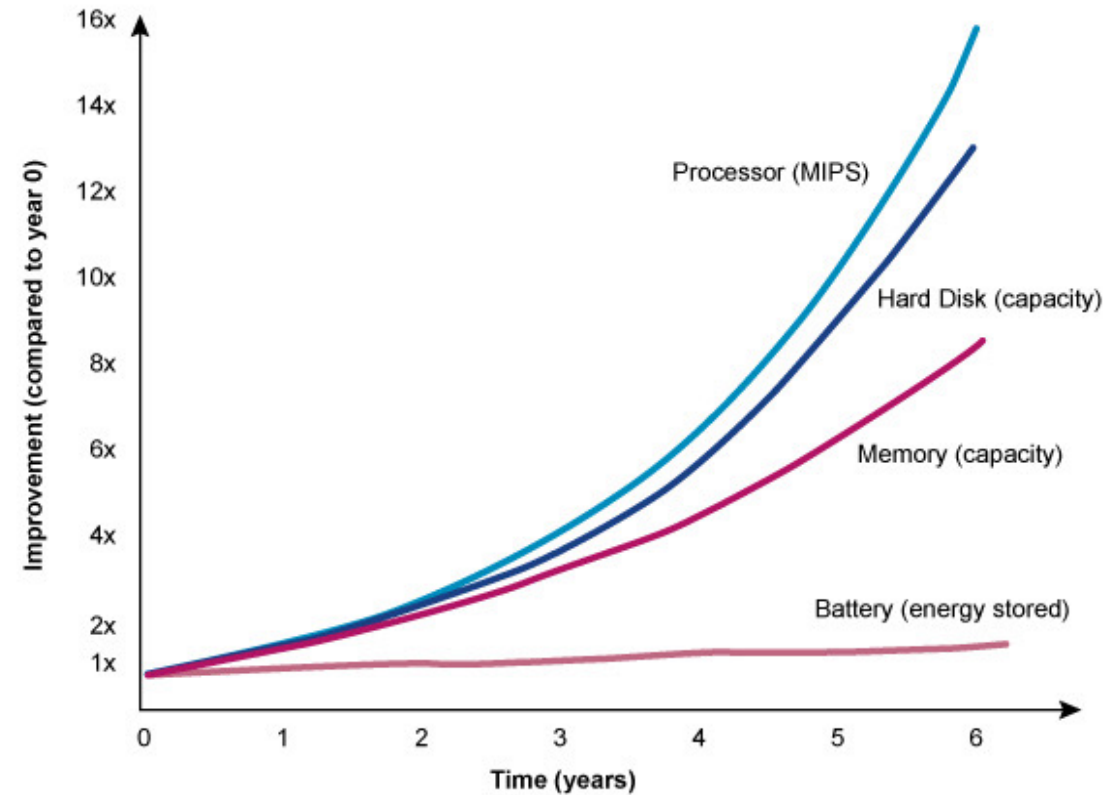
Improvements have been made in battery technology, but they have not kept pace

WHY IS BATTERY TECHNOLOGY EVOLVING SO SLOWLY?

Batteries have evolved differently than electronics:

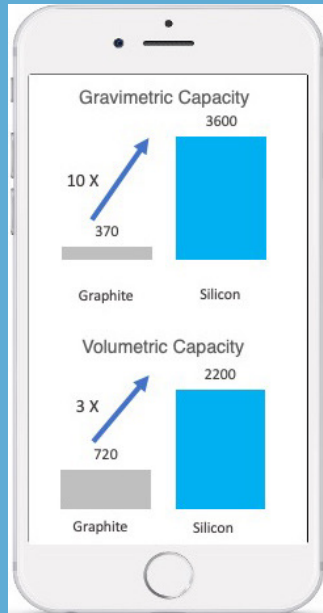
- **Electronics improve by shrinking physical circuits** enabling manufacturing technology to evolve rapidly.
- **Batteries improve by advances in CHEMISTRY & MATERIALS SCIENCE.**
- Many of the chemical processes used in modern batteries have reached their limits

IMPROVEMENTS IN MATERIALS SCIENCE ARE REQUIRED



BREAKTHROUGHS NEEDED IN BATTERY MATERIAL SCIENCE

AUTO MANUFACTURERS ARE PIVOTING TO SILICON



LITHIUM-ION BATTERIES CAPACITIES ARE LIMITED BY GRAPHITE

- In conventional batteries, the negative electrode or anode is made of carbon in the form of graphite.
- **Graphite** is batteries limiting factor.
- Silicon allows for faster charging and higher storage capacity than graphite.

THIS IS WHY SILICON (Si) IS NEEDED TO BREAK LI-ION BATTERIES' LIMITATIONS

"Silicon anodes are generally viewed as the next development in lithium-ion battery technology ... Silicon's ability to absorb more charge translates to longer battery life and smaller batteries."

(Yury Gogotsi, Director, A.J. Drexel Nanomaterials Institute, Drexel University)



Tesla's latest battery day presentation confirmed that the future of battery anodes will include Silicon. Tesla "...plans on removing graphite from the anode."
(NBCFM September 23, 2020 Research Flash)



PORSCHE

Porsche is researching high-performance batteries with silicon instead of graphite anodes in order to achieve an even higher energy density and better fast-charging capability.

"The battery cell is the combustion chamber of tomorrow," says Oliver Blume, Chairman of the Executive Board of Porsche AG. "Our electrified high-performance sports and racing cars place the highest demands on battery technology. To meet these demands, Porsche needs special high-performance cells. Silicon has big potential."



The company made this announcement at the first Volkswagen Power Day, held on March 15 2021



General Motors Co, President Mark Reuss said at an investor conference held Wednesday April 7 2021, that GM is experimenting with **silicon-rich** and lithium metal anodes, solid state and high voltage electrolytes, and dry processing of electrodes for its next generation of Ultium batteries, due around 2025. (Reuters April 08, 2021)

DEPLOYING SILICON IN BATTERIES REQUIRES INNOVATIVE SOLUTIONS!



SINCE 2015 HPQ IS IMPLEMENTING A SILICON INNOVATION AND TECHNOLOGY DEVELOPMENT STRATEGY PROVIDING SILICON MATERIALS FOR BATTERIES & MORE

- Currently advancing development of numerous silicon products
- Creating silicon products to resolve Material Science issues
- Breakthrough imminent with Nano Silicon for battery anodes
- Cost effective silicon solution for EV and battery manufacture
- HPQ is the only vertically integrated advanced Silicon solution provider that is public

DEPLOYING A REVOLUTIONARY AND BREAKTHROUGH GREEN HYDROGEN EXTRACTION TECHNOLOGY VENTURE

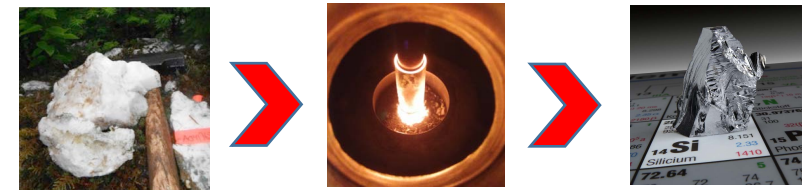
- Working to reduce the cost and environmental footprint of making Silicon

PROJECTS

DEVELOPING A MULTITUDE OF GAME CHANGING TECHNOLOGIES

PUREVAP™ QRR

From Quartz to High Purity Silicon in one step



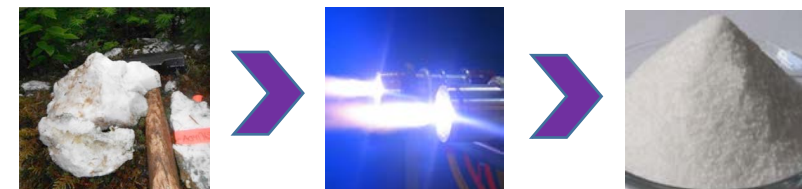
PUREVAP™ NSiR

From Silicon to Nano Materials in one step



FUMED SILICA REACTOR

From Quartz to fumed silica in one step



OTHERS

Using Nano Silicon for others high value applications



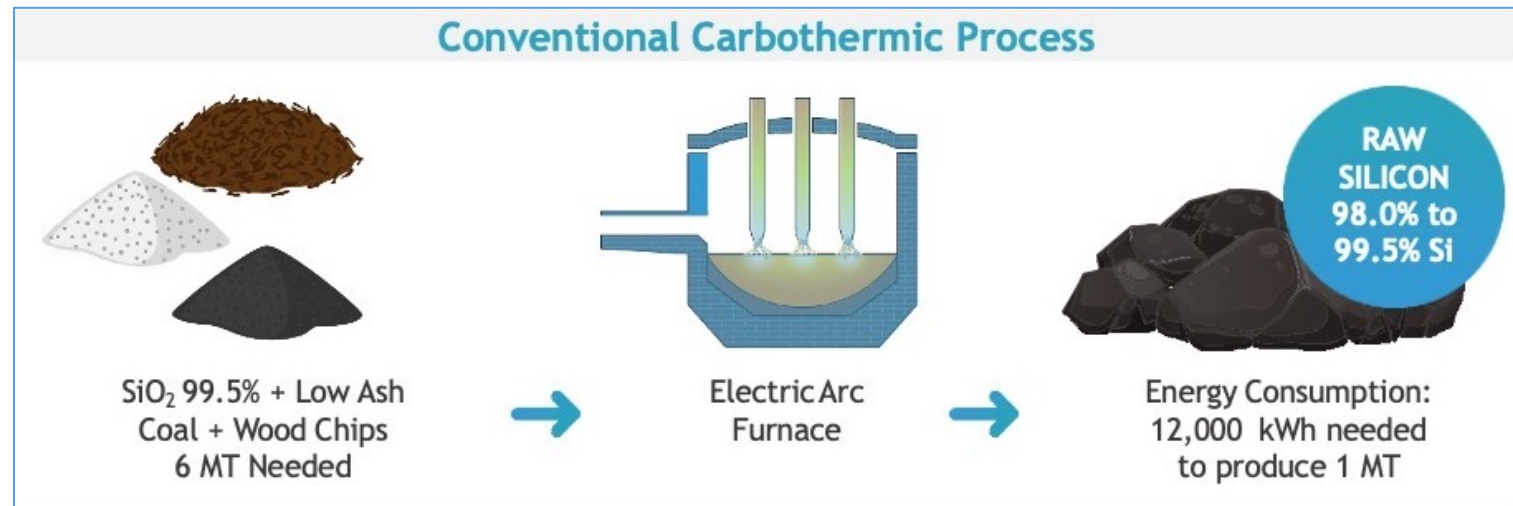


SILICON 101

YES, SILICON IS AWESOME, BUT INEXPENSIVE? NOT REALLY

Silicon may be the most abundant element in earth's crust after oxygen, but like all other energy metals (lithium, graphite, cobalt, nickel and others):

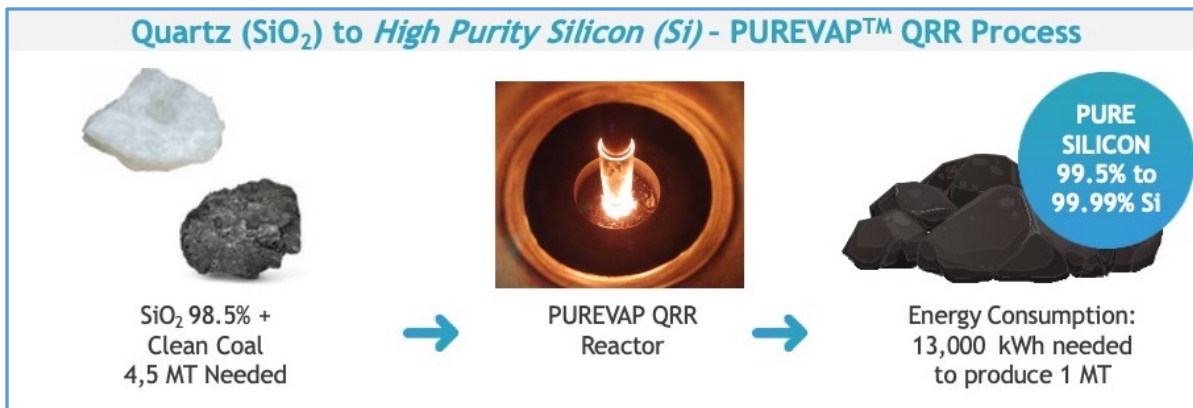
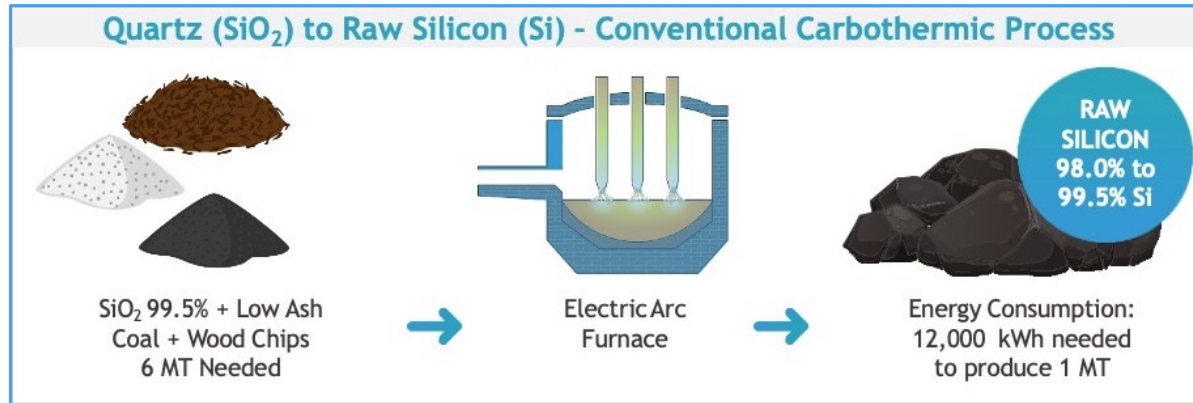
- It does not exist in its pure state!
- Expensive carbothermic process needed to extract it from Quartz



+ RAW SILICON MUST BE ENGINEERED BEFORE IT CAN BE USED FOR BATTERY APPLICATIONS

PUREVAP™ QRR – HPQ DISRUPTIVE TECHNOLOGY

THE PUREVAP™ QRR: GAME CHANGING VERSATILITY VERSUS CONVENTIONAL PROCESS



SCALABILITY AND CAPEX ADVANTAGES:

- New conventional plants are scalable by minimum increments of 30,000 MTY
 - Conventional plants 2N+ Si production limited at 40% of plant output
 - Requires additional purification steps
- PUREVAP™ QRR process is scalable by increments of 2,500 MTY, allowing flexible customer solutions
- PUREVAP™ QRR CAPEX per Kg of annual capacity matches that of a Tier 1 producer for (85% - 90%) less investment
 - PUREVAP™ QRR CAPEX per Kg of annual capacity is estimated at US\$ 6.22 for a (2) 2,500 MTY Plant
 - Rima Subsidiary, Mississippi Silicon, paid US\$ 6.11 per Kg of annual capacity in 2015 to build a 36,000 MT annual capacity Raw Silicon plant. (a > US\$ 200M investment)

➤ **PUREVAP™ QRR: THE BEST OPTION FOR NEW PLANTS NEEDED TO MEET SILICON DEMAND**

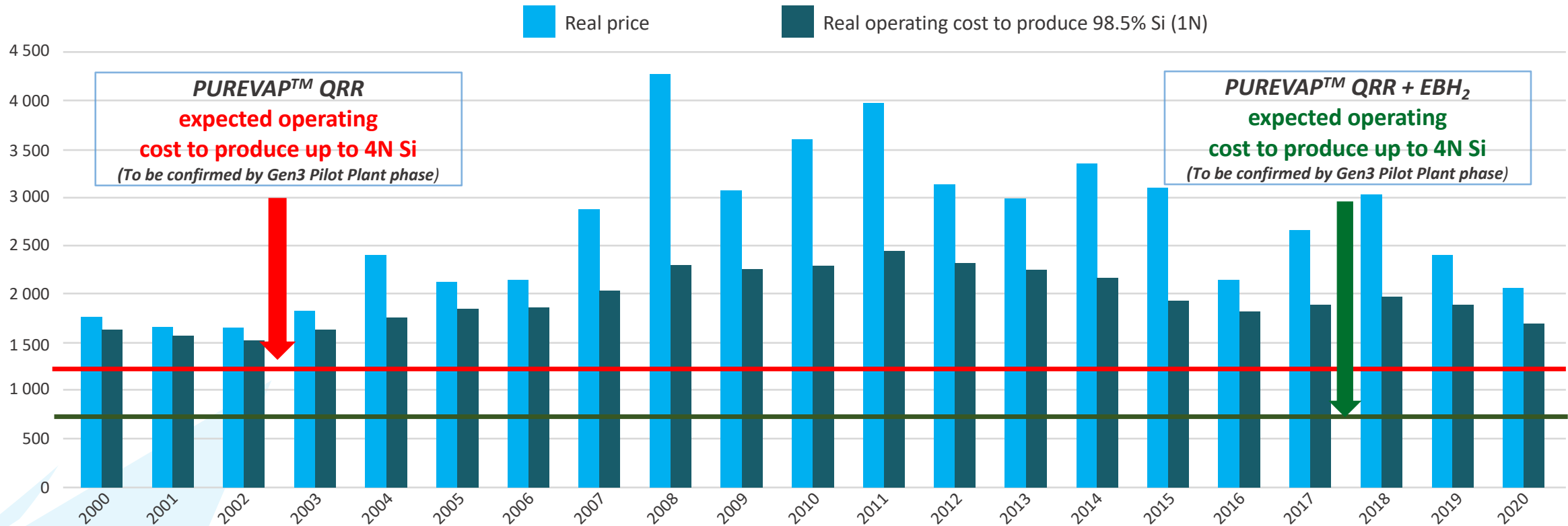
PUREVAP™ QRR – LOW COST, LOW EMISSIONS

PUREVAP™ QRR OPEX VERSUS CONVENTIONAL Si PRODUCERS

Silicon in the 2020s

Inflation-adjusted prices are higher than they were in the early 2000s

US spot price of 5.5.3 grade silicon vs. avg. operating cost at plants outside China and the CIS in real terms, \$/t



PUREVAP™ QRR GEN3 READY FOR Q4 START

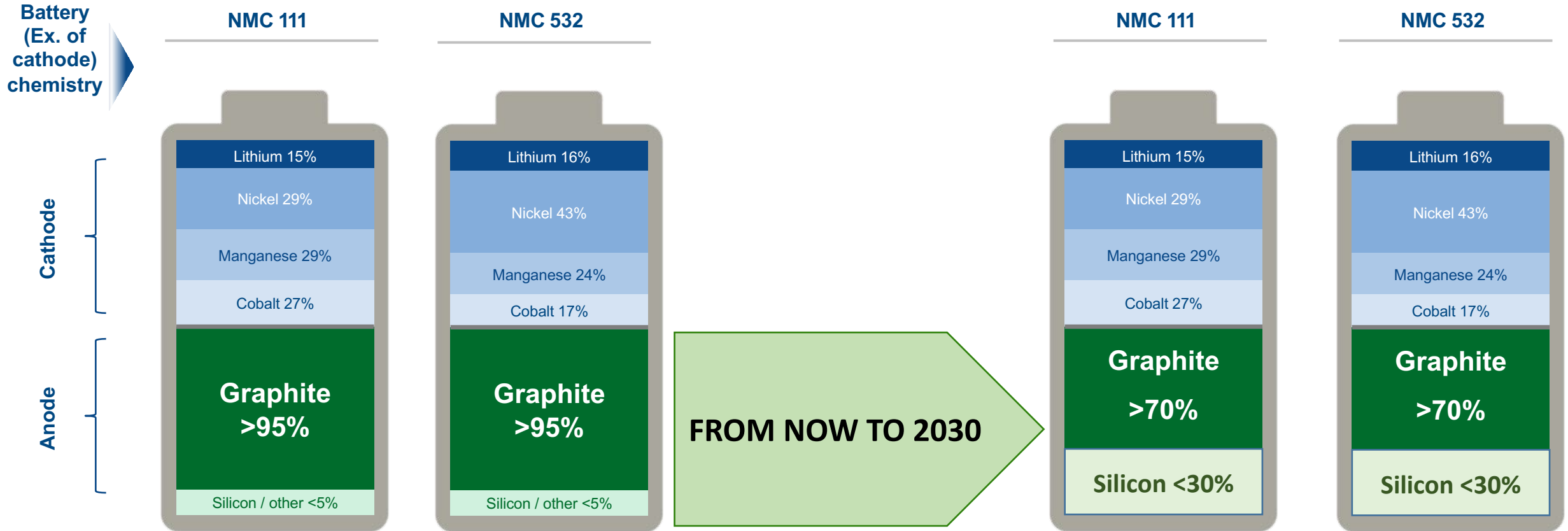


June 2021 pictures of Mr. P. Peter Pascali, President and CEO of PyroGenesis & Bernard Tourillon, President and CEO of HPQ Silicon next to the Gen3 PUREVAP™ QRR Pilot Plant (middle image blurred for confidentiality)

“We have always believed that our PUREVAP™ QRR process would completely revolutionize the transformation of quartz (SiO_2) into silicon, and yet we continue to be amazed by the truly unique capabilities of the system, especially as it pertains to producing a low-cost battery-grade silicon feedstock that can be used to make the nano silicon materials needed for Lithium-ion batteries.”

Bernard Tourillon President and CEO HPQ Silicon Resources Inc

TODAY: GRAPHITE IS FUNDAMENTAL TO RECHARGEABLE BATTERY ANODES

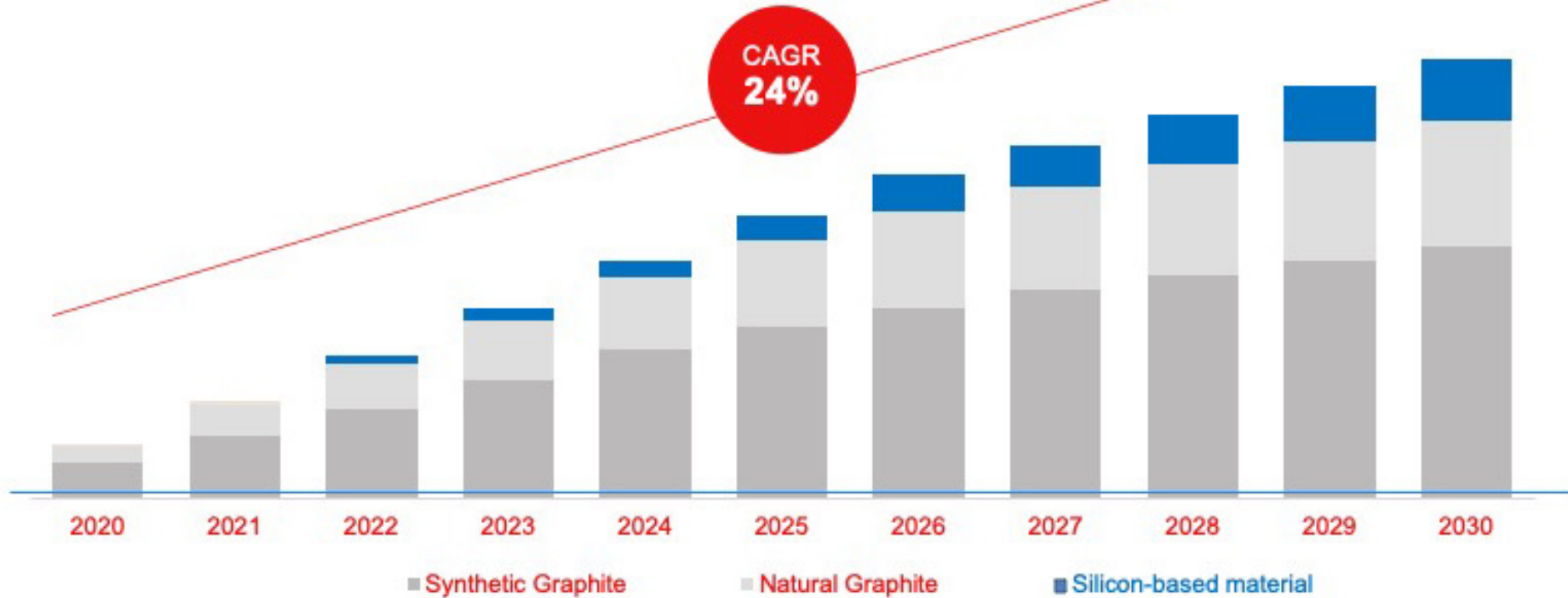


**BY 2030, BATTERY ANODES MAY CONTAIN UP TO 30% SILICON¹
THIS WILL CREATE MASSIVE DEMAND FOR BATTERY GRADE SILICON**

Source: Pallinghurst-Traxys battery analysis. %s represent the proportions of cathode and anode in each battery respectively, NOU websites and presentation. 1) ROSKILL

SILICON SHARE OF ANODE MATERIAL DEMAND IS STARTING

Anode material demand (Europe and North America)



WITH A POTENTIAL DEMAND > 200K MT BY 2030, WHO WILL BE IN POSITION TO PRODUCE, AT A PRICE THAT BATTERY MANUFACTURERS WILL BE WILLING TO PAY, THE SILICON MATERIAL NEEDED?

BREAKTHROUGHS NEEDED IN BATTERY MATERIAL SCIENCE

DEPLOYING SILICON IN BATTERIES HAS CHALLENGES

DEPLOYMENT OF SILICON (Si) IN BATTERIES FACES CHALLENGES



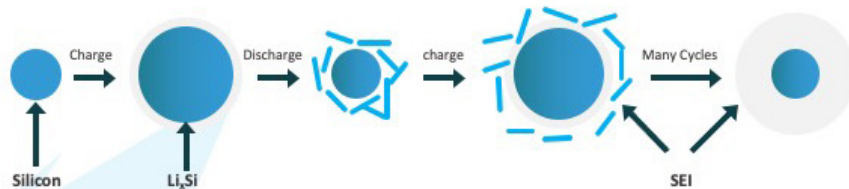
THE BIG ONE

- The volumetric fluctuations (>300 %) of Silicon (Si) during charge/discharge cycles leads to irreversible energy storage capacity loss.



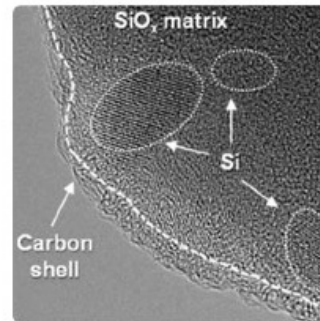
WHY

- Repeated exposure of the fresh silicon surface to battery electrolyte leads to a continual reformation of the Solid electrolyte interphase (SEI);
- Basically, the SEI grows thicker with each charge/discharge cycle.

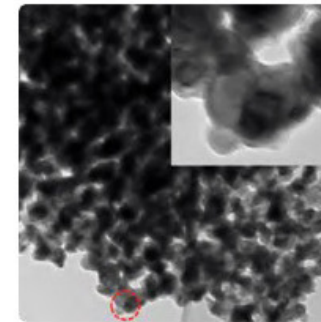


RESULTING IN POOR BATTERY LIFE CYCLE

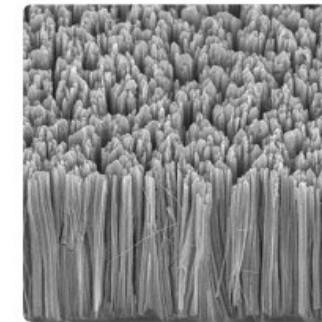
CURRENT APPROACHES TO SILICON USE HIGHLY ENGINEERED AND EXPENSIVE MATERIALS



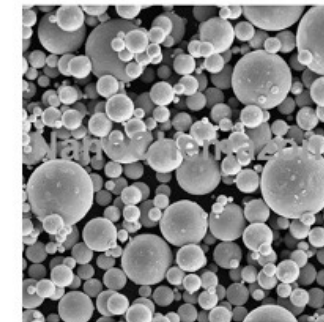
SILICON STRUCTURED
IN SiO₂ GLASS
> 2,000 US\$ / Kg



SILICON STRUCTURED
IN GRAPHITE
> 3,000 US\$ / Kg



SILICON
NANOWIRES
> 30,000 US\$ / Kg



SILICON
NANOPOWDERS
> 20,000 US\$ / Kg

SILICON NANOPOWDERS OR NANOWIRES COULD REPLACE GRAPHITE NOW

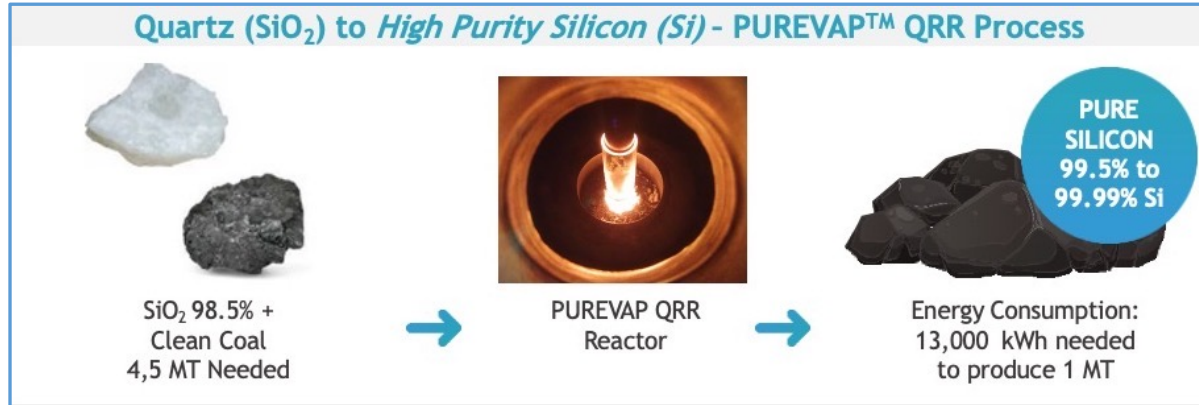
- New manufacturing process must be developed to allow Si Nano material to reach cost parity with graphite...
- Graphite for anode cost between US\$10 to US\$20 per Kg

ECONOMICALLY VIABLE SOLUTION DO NOT EXIST NOW!

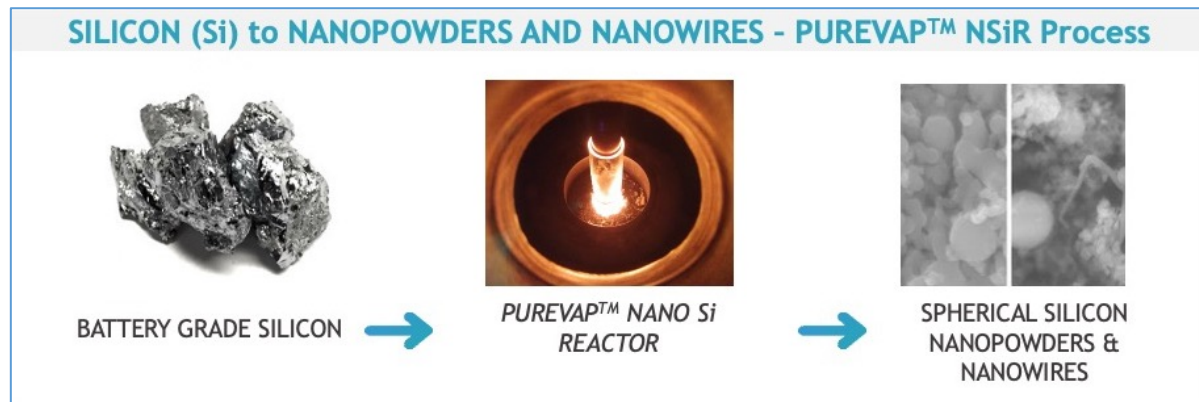
HPQ - DEVELOPING LOW-COST SOLUTIONS

STARTING COMMERCIAL VALIDATION OF LOW-COST PROCESSES TO MAKE AND TRANSFORM SILICON

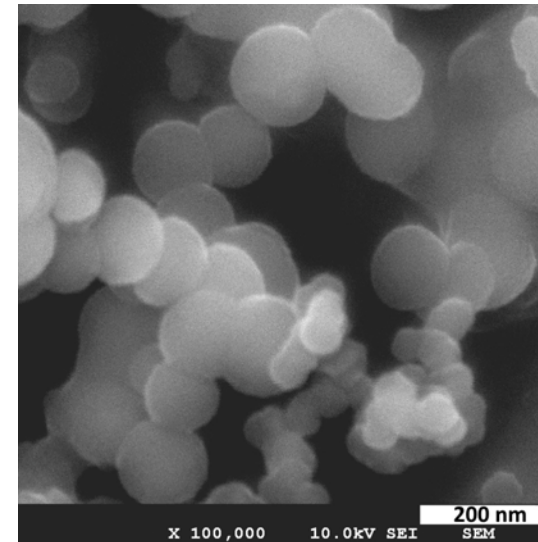
HPQ is developing:



A new scalable, versatile, low CAPEX & OPEX carbothermic process



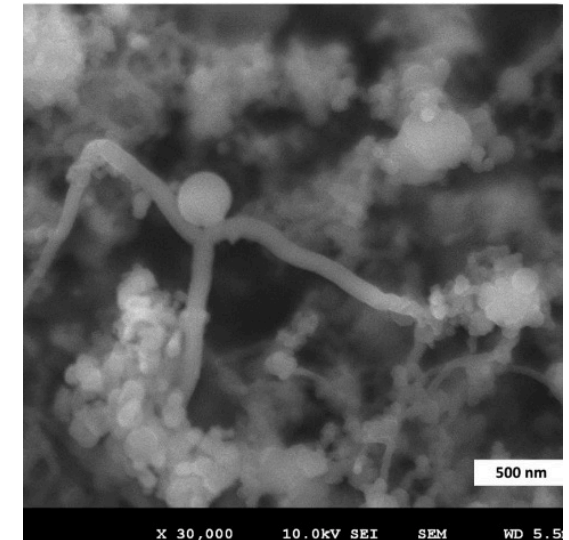
A new scalable, versatile, low-cost plasma process with a capability to produce tailor made spherical Si materials from $< 0.10 \mu\text{m}$ up to $5 \mu\text{m}$



SILICON

NANOPOWDERS

Material produced by PyroGenesis during proof of concept test



SILICON

NANOWIRES

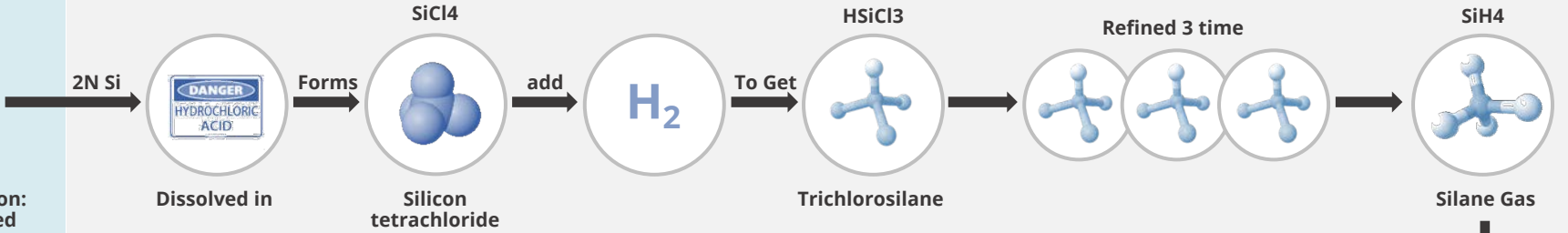
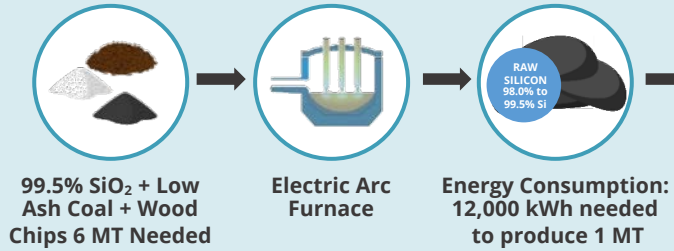
HPQ TO BE IN A POSITION TO PRODUCE THE MATERIAL:

- Because the *PUREVAP™ NSiR* is a game-changing low-cost plasma-based process that can transform battery grade Si made by HPQ *PUREVAP™ QRR* into the customized nano Si materials that Batteries and Electrical Vehicle manufacturers are looking for

HPQ LOW-COST SOLUTIONS VS COMPETITION

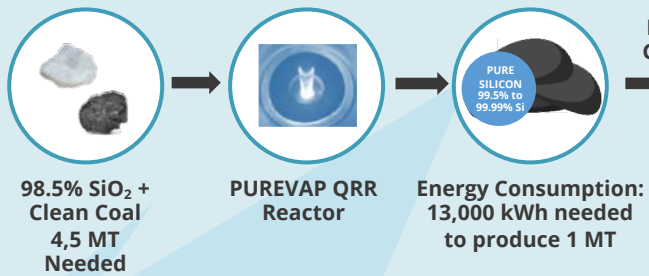
CONVENTIONAL CARBOTHERMIC PROCESS

QUARTZ TO SILICON



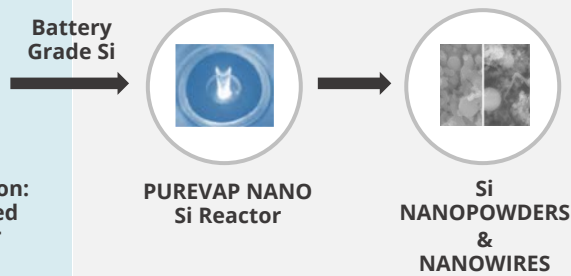
PUREVAP™ QRR PROCESS

QUARTZ TO SILICON



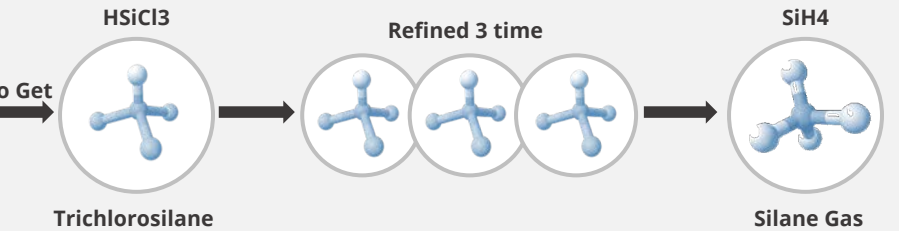
PUREVAP™ NSIR PROCESS

SI TO NANO SI



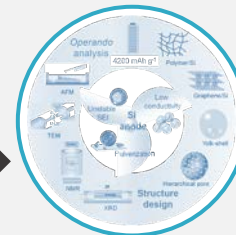
SILICON TO SILANE GAS PROCESS

REC SILICON



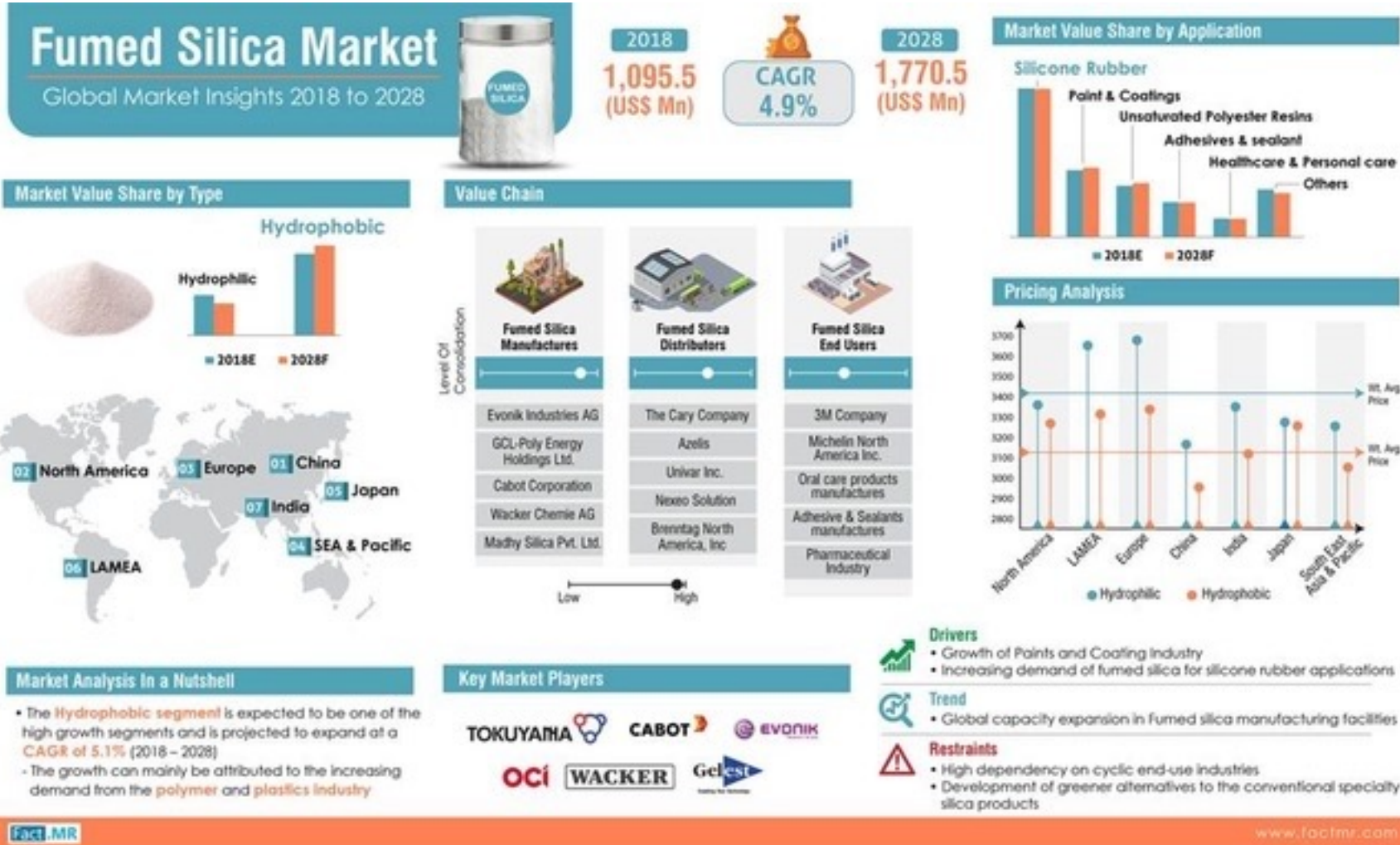
Next Generation Silicon Anode Manufacturing (Group14 Technologies)

Si Anode Materials



Cell / Battery manufacturing

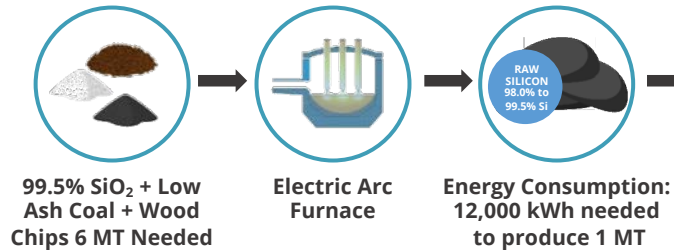
HPQ – PYROGENESIS FUMED SILICA PROJECT



TRADITIONAL PROCESS VS NEW PROCESS

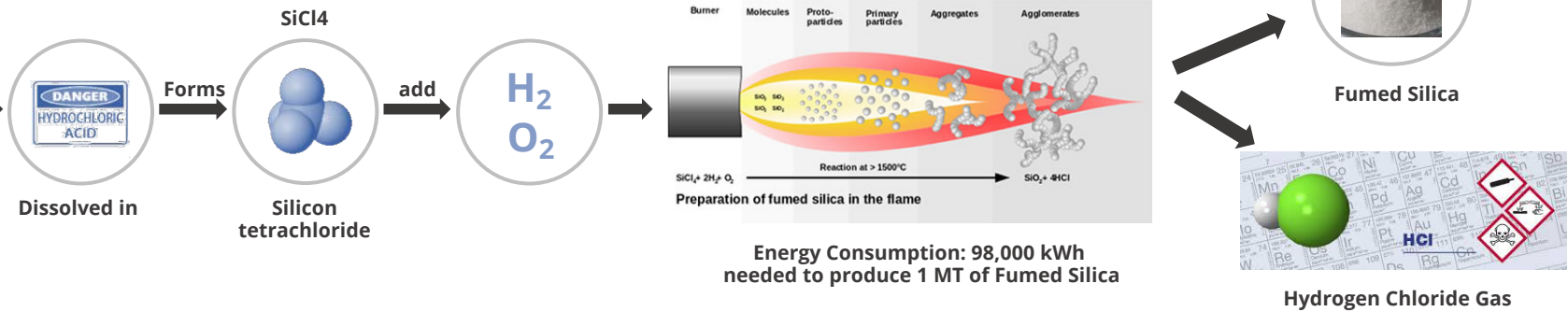
QUARTZ (SiO₂) TO SILICON (Si)

CONVENTIONAL PROCESS TO MAKE SILICON



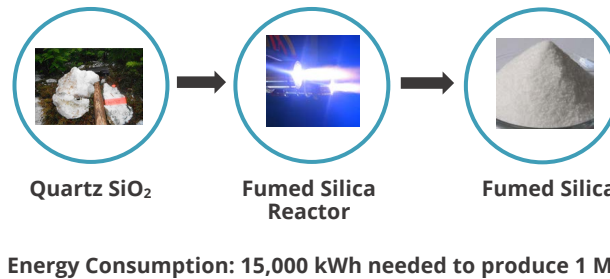
SILICON (Si) TO FUMED SILICA (SiO₂)

CONVENTIONAL PROCESS TO MAKE FUMED SILICA



QUARTZ (SiO₂) TO FUMED SILICA

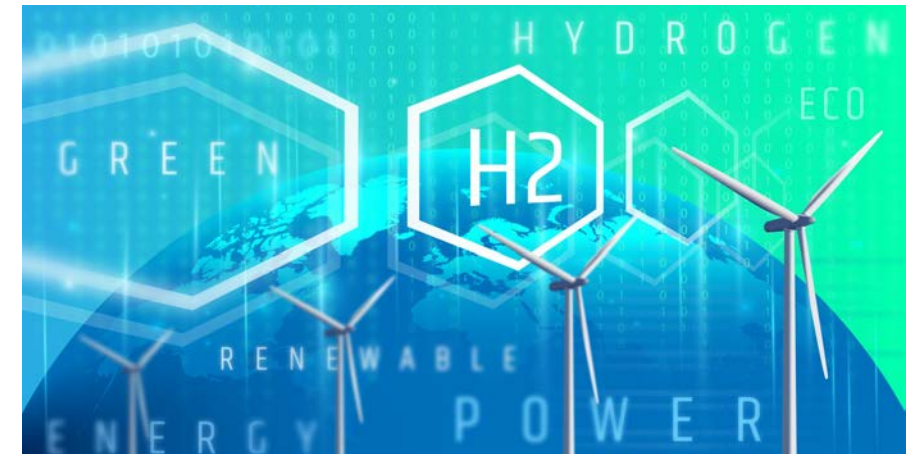
FUMED SILICA REACTOR





HPQ LAUNCHES REVOLUTIONARY AND BREAKTHROUGH GREEN HYDROGEN EXTRACTION TECHNOLOGY VENTURE

- August 24, 2021, HPQ announces the signature of an agreement with EBH₂ Systems SA, (“EBH₂”) a Swiss company that possesses a proprietary electrolysis technology that can efficiently extract, from virtually any water source including salt water, a Clean Hydrogen also called Green Hydrogen that can be used to create low-cost electricity with no environmental impact.
- **WORKING TOGETHER TO DEVELOP AN INDUSTRIAL SCALE EBH2 SYSTEM TO PRODUCE GREEN SILICON**
- **COMBINING FORCES TO ESTABLISH A NORTH AMERICAN EBH2 GENERATOR SALES CAPABILITY**



HPQ CAPITAL STRUCTURE

Share Price (August 23, 2021)	\$0.730	Cash and Cash equivalent in hand				\$ 9,180,000
		Dedicated Cash for PUREVAP™ QRR Pilot Plant				\$ 1,950,000
52 Week Low	\$0.305	In the money warrants and options				\$ 5,997,932
52 Week High	\$1.680	TOTAL CASH POSITION				\$ 17,127,932
Warrants Breakdown						
Shares Outstanding:	331,752,267	Expiration	Warrant	Exercise	Potential	In the money
		Date	Outstanding	Price	Cash to HPQ	Cash value
Warrants:	24,441,012	Jan-22	4,152,000	0.155	\$ 643,560	\$ 643,560
Options:	5,650,000	Jul-22	1,779,412	0.150	\$ 266,912	\$ 266,912
		Aug-22	200,000	0.150	\$ 30,000	\$ 30,000
Fully Diluted:	361,843,279	Dec-22	1,375,000	0.100	\$ 137,500	\$ 137,500
		Apr-23	8,540,000	0.100	\$ 854,000	\$ 854,000
Market Capitalization:	\$242,179,155	Jun-23	4,394,600	0.100	\$ 439,460	\$ 439,460
		Sep-23	4,000,000	0.610	\$ 2,440,000	\$ 2,440,000
Market Capitalization (FD):	\$264,145,594	TOTAL	24,441,012	0.197	\$ 4,811,432	\$ 4,811,432

HPQ TRADING (last 12 months)



WHY INVEST IN HPQ SILICON?



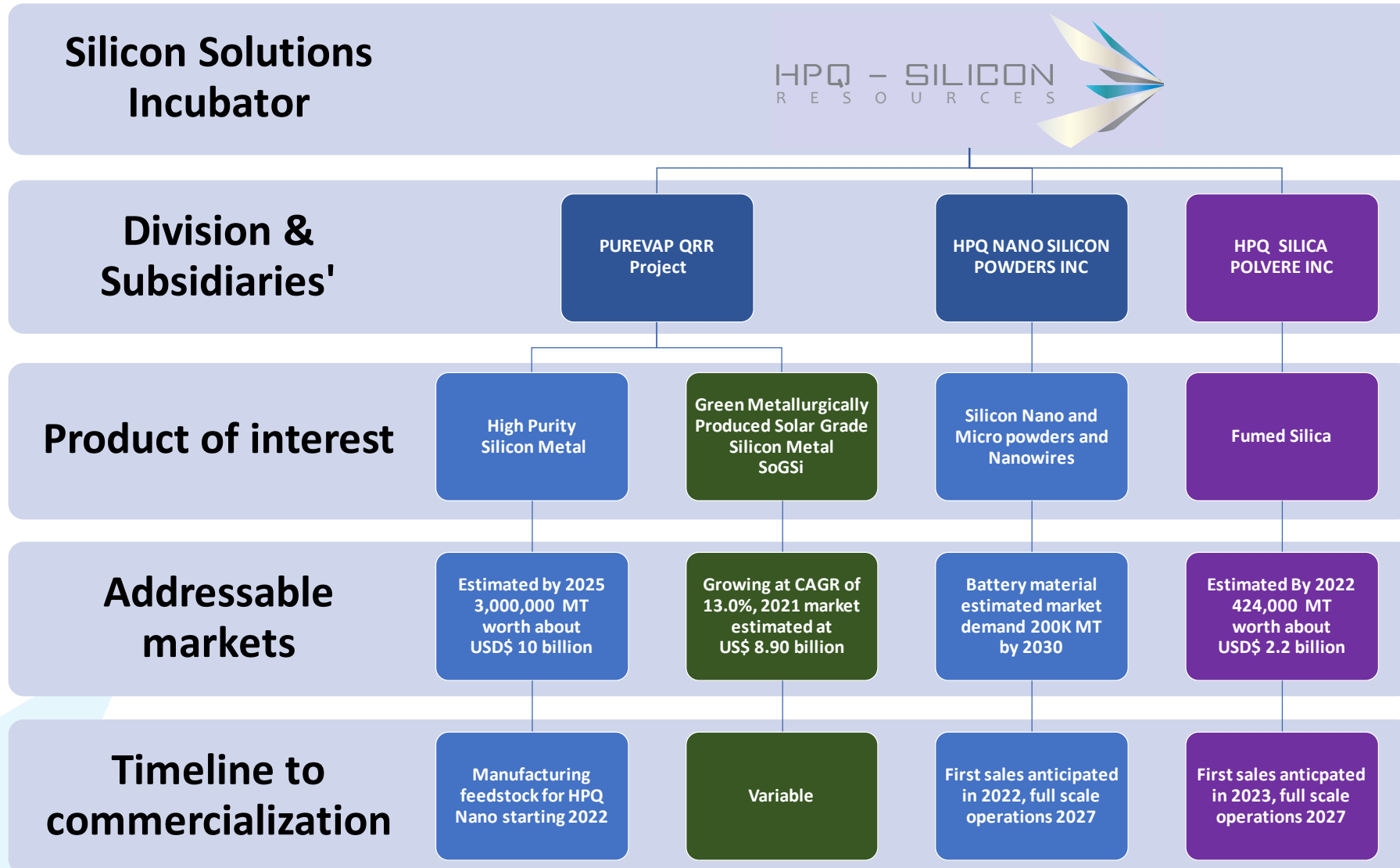
UBS estimates that over the next ten years, the energy storage market in the United States alone could grow to as much as \$426 billion, and there are many ways to buy into the surge! (CNBC Dec 30, 2019)

HPQ – SILICON: AN INVESTMENT OPPORTUNITY TO PARTICIPATE IN THE SURGE!

- Ready to become the lowest cost producer of the nanomaterials needed for the renewable energy revolution:
 - Spherical Silicon Nano & Micron powders for Li-ion Batteries
 - ✓ Material potential already generated NDA's with battery manufacturers and advance material companies
 - ✓ Received a firm order for Si Nanopowders from major car manufacturer
 - Silicon Nanowires for Li-ion Batteries
 - Pure Silicon (99.5% Si up to 99.99% Si) for specialty applications
- Partnership to advance commercialization of a low-cost (<\$1.00 per Kg), game changing process of manufacturing Green Hydrogen (H2)
- Supported by world class technology partners



VALUE PROPOSITION: COMMERCIALIZE AND MONETIZE



MANAGEMENT, BOARD & KEY INVESTORS



Management

Bernard J Tourillon, BAA, MBA
Chairman, President, CEO and Director

Patrick Levasseur
Vice-President, COO and Director

Noelle Drapeau, LLL, MBA, PMP
Corporate Secretary and Director

Francois Rivard
CFO



Major Investors

Management & Board	≅ 6.7%	≅ 7.7% (FD)
PyroGenesis	≅ 8.0%	≅ 11.0% (FD)
Investissement Québec		≅ 8.7% (FD)
Strategic Investors	≅ 4.3%	≅ 3.4% (FD)
Key Investors	≅ 6.6%	≅ 8.1% (FD)



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



CONSULTANTS, TRANSFER AGENT AND AUDITORS



Consultants/ Technical Advisors

Marcel Drapeau, BA, BSC. Comm, LLL

PyroGenesis Canada Inc

Apollon Solar Sa



Transfer Agent

Computershare



Auditors

KPMG S.E.C.N.R.L.

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