

HPQ – SILICON  
R E S O U R C E S



# **SILICON METAL:** The Future of Energy Storage



## DISCLAIMERS

This presentation includes certain

### “FORWARD-LOOKING STATEMENTS”

All statements, other than statements of historical fact, included herein, including, without limitation, statements regarding future plans and objectives of the company, are forward-looking statements that involve various risks, assumptions, estimates and uncertainties, and any or all of these future plans and objectives may not be achieved.

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The Corporation’s is focus on developing the *PUREVAP™ processes*. The *PUREVAP™ Quartz Reduction Reactor (QRR)*, a new carbothermic process to transform Quartz and Carbons into Silicon Metal, and the *PUREVAP™ Silicon Metal (Si) Nano Reactor (SiNR)*, a new process to transform Silicon Metal into Spherical Nano powders and Nano wires for Lithium-ion batteries. The terms 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 produce by the equipment, projected capital or operating cost and savings associated with the development of process should not be construed as being related to the establishing of 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.

## THE OPPORTUNITY!

**Energy Storage Dominance in the 21st century is akin to:**

- Control of Coal in the 19th century
- Control of Oil in the 20<sup>th</sup>

**Silicon Metal: The Future of Energy Storage!**

**Needed to Break Li-ion Batteries Limitations!**

*“Silicon anodes are projected to replace graphite anodes in Li-ion batteries with a huge impact on the amount of energy stored. 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**

*“With returns from improvements in battery cathode performance beginning to taper, Berdichevsky began to consider the next bottleneck—the poor energy density of the traditional graphite anode.”*

**Gene Berdichevsky, Engineer, Employee #7 at Tesla and founder of Sila Nano technologies**

*“Scientists at the University of California Riverside have been focused on nano silicon for a while, but it's been degrading too quickly and is tough to produce in large quantities”*

**Max Langridge and Luke Edwards - January 3, 2020**

# HPQ - A Silicon Metal Focus Renewable Energy Company!

In collaboration with world class technology partners:








- HPQ is in the final phase of demonstrating its unique capacity to be the lowest cost producer of the advance Silicon Metal (Si) materials needed for the next generations of Lithium-ion battery
- HPQ is developing:
  - *The PUREVAP<sup>TM</sup> Quartz Reduction Reactor (QRR)* (Patent Pending)
    - A New Scalable, Versatile and Low Capex and Opex Carbothermic Process to meet high purity Silicon Metal (Si) demand generated by Renewable Energy
  - *The PUREVAP<sup>TM</sup> Silicon Metal Nano Reactor (SiNR)* (Provisional Patent Filed)
    - A New Scalable, Versatile and Low Cost Plasma base Process that can transform Silicon Metal (Si) into the Spherical Nano powders and Nanowires of Si Next Generation Lithium-ion batteries makers are looking for

## THE IMPLEMENTATION PLAN

# HPQ - Fast Tracking Silicon Metal Innovation!

- Lab scale and proof of concept tests already completed
- Fully funded pilot plant and testing program
- ***PUREVAP™ QRR pilot plant & PUREVAP™ SiNR test plant about to go live and produce***
  - Nanoscale Spherical Si Powders and Nano Si Wires for next Gen Li-ion Batteries
  - Porous Silicon Metal Wafers for solid state Li-ion Batteries
  - ✓ *Results to date have already generated NDA discussions with a solid state Lithium-ion battery manufacturer*
  - High Purity Porous Silicon Metal Powders for Li-ion Batteries
  - Metallurgical Grade Silicon Metal (1N ) and Chemical Grade Silicon Metal (2N)

# CORPORATE OVERVIEW (February 2020)

 <b>Project</b>	<ul style="list-style-type: none"> <li>HPQ, working with PyroGenesis Canada Inc (TSX-V: PYR), is developing the <b>PUREVAP™ QRR</b> and the <b>PUREVAP™ SiNR</b>, two new innovative plasma base processes which will permit the low cost manufacturing of High Purity Silicon Metal, Spherical Nano-powders and Nanowires for Next Generation Lithium-ion Batteries</li> </ul>
 <b>PUREVAP™ Pilot Plant - SiNR Test Plant H1 2020 Start</b>	<ul style="list-style-type: none"> <li>HPQ is about to start its 50 TPA <b>PUREVAP™ QRR</b> pilot plant &amp; <b>PUREVAP™ SiNR Test Plant</b> that will: <ul style="list-style-type: none"> <li>➤ Demonstrate our ability to be a low Opex and Capex producer of high purity Silicon Metal (Si)</li> <li>➤ Demonstrate our ability to be a low cost producer of Spherical Nano-powders and Nanowires</li> <li>➤ Qualifying and selling products to potential customers (Batteries and Others)</li> </ul> </li> </ul>
 <b>Unique Capability of PUREVAP™ Process</b>	<ul style="list-style-type: none"> <li><b>PUREVAP™ QRR &amp; SiNR</b> <ul style="list-style-type: none"> <li>➤ QRR - reduce raw material cost by 50%, representing a direct 20% reduction in OPEX</li> <li>➤ QRR - reduce HPQ Manufacturing CAPEX by 90% or more versus all other new Silicon Metal plants</li> <li>➤ QRR - process allows HPQ to Produce any Purity Silicon (Si) up to 4N Si in one step</li> <li>➤ SiNR - lowering the cost of making Spherical Nano-powders and Nanowires needed for Li-Ion Batteries</li> </ul> </li> </ul>
 <b>Advancing Silicon Innovations</b>	<ul style="list-style-type: none"> <li>Silicon Metal (Si) is a key material for the ongoing renewable energy revolution</li> <li>HPQ to maximize the <b>PUREVAP™ QRR</b> Capability of converting low quality inputs in the high purity Si needed for Advance Materials Innovations, and maximize the <b>PUREVAP™ SiNR Unique Proprietary Capability</b> of transforming Si into Spherical Nano-powders and Nanowires</li> </ul>
 <b>PUREVAP™ Silicon Metal addressable markets</b>	<ul style="list-style-type: none"> <li>Present market (2018) US\$ 15B (US\$ 7.5B Standard Si, Batteries Si US \$400M &amp; US\$ 7.1B Solar Si)</li> <li>Expected to reach US\$ 24B over the coming years (US\$ 12B for Standard Si by 2023; US\$ 1B for batteries Si by 2022; and US\$ 11.8B for Solar Si by 2028)</li> </ul>
 <b>HPQ implementing a multi prong development approach</b>	<ul style="list-style-type: none"> <li>Near term: Focus on generating cash flow by using the <b>PUREVAP™ QRR</b> and <b>SiNR</b> for high value niche market silicon applications (Si for batteries (Nanopowders, Nanowires and Wafers, 2N+Si...)</li> <li>Medium term: Focus on High Purity silicon for advanced PV applications, developing in partnership with Apollon Solar, a new <b>PUREVAP™ QRR</b> metallurgical pathway for Solar Grade Si</li> </ul>
 <b>Strong support from key stakeholders</b>	<ul style="list-style-type: none"> <li>HPQ-Silicon has strong support from PyroGenesis Canada Inc, which holds on a fully diluted basis about 12.5% of the capital of the Corporation PLUS the Government of Québec which holds on a fully diluted basis about 9.9% of HPQ-Silicon. Apollon Solar is also a shareholder</li> </ul>



# SILICON METAL (Si)

- One of today's **key strategic minerals** (EU Commission - US DOJ)
- Needed for **Renewable Energy Transition**
- **Does not exist naturally in its pure state**
  - Expensive Carbothermic process needed to extract it from Quartz ( $\text{SiO}_2$ )
  - Quartz is one of the most abundant minerals in the earth's crust

## Usages



## Global Megatrends

Megatrends	Implications	End Customer Product
Population Growth	Growing middle class China and India: consumption economy	<ul style="list-style-type: none"> <li>• Silicones: healthcare, cosmetics, packaging</li> </ul>
Urbanization	India, Brazil and other emerging markets: infrastructure build	<ul style="list-style-type: none"> <li>• Silicon: aluminum for cars, housing growth</li> <li>• Silicon: Silicone sealants for construction</li> </ul>
Energy Efficiency	Reduce weight of vehicles and Electric vehicles	<ul style="list-style-type: none"> <li>• Silicon as alloying agent for aluminum to replace steel in vehicles</li> <li>• Prospects for silicon alloys in batteries</li> </ul>
Alternative Energy & Sustainability	Growing demand for solar and other sources of renewable energy	<ul style="list-style-type: none"> <li>• Silicone sealants for wind turbine and solar</li> <li>• Higher consumption of silicon for polysilicon used to make solar cells</li> <li>• Prospects for silicon Base Energy Storage</li> </ul>

# SILICON METAL DEMAND OUTLOOK

## Standard Silicon Metal Demand (98.5 to 99.5% Si purity) going from:

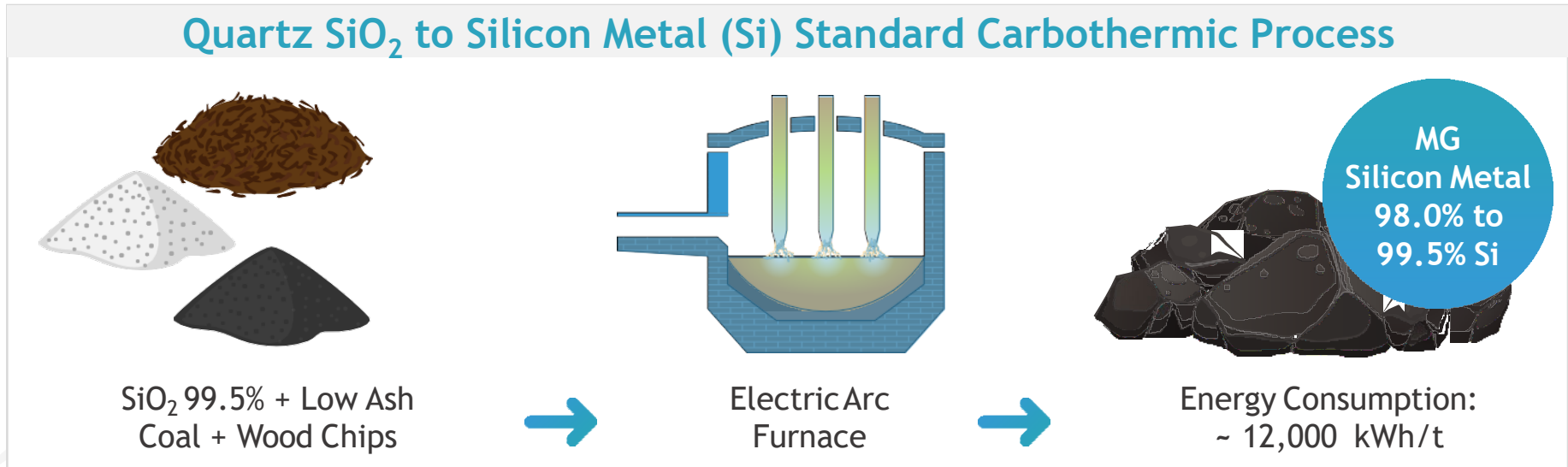
- 2.8 Million MT Demand worth US\$ 7.5 Billion in 2018
- To ~ 3.8 Million MT Demand worth US\$ 12 Billion in 2023
- Projected Increase Driven by Chemical Sector (2N+ Si) and EV Growth

(Source CRU - Silicon Market Outlook - November 14, 2018)

## CHALLENGES TO MEET ANTICIPATED DEMAND

- ✓ Conventional process limitation caps 2N+ Si output at ~ 40% of Plant Capacity

### Quartz $\text{SiO}_2$ to Silicon Metal (Si) Standard Carbothermic Process





# CHALLENGES TO MEET ANTICIPATED DEMAND

## ✓ New plants will be needed (Source CRU - Silicon Market Outlook - November 14, 2018)

### Greenfield plants will provide the majority of new capacity

Contribution to the expected growth in annual production capacity outside China and the CIS between 2010 and 2020 &



Creep:	6%
Conversions:	16%
Brownfield:	20%
Greenfield:	58%

### NEW CONVENTIONAL PLANTS HAVE:

- Minimum Size Requirement > 30,000 MTY

### REQUIRE SIGNIFICANT INVESTMENTS:

#### (Capex from most recent new plants)

- PCC BakkiSilicon hf 2018 turnkey plant in Húsavík (Iceland) cost US\$ 300M
  - US\$ 9.38 Capex per Kg of annual capacity
- Mississippi Silicon (Rima Subsidiary) 2015 plant in Burnsville Mississippi (USA) cost US\$ 220M
  - US\$ 6.11 Capex per Kg of annual capacity

## CONVENTIONAL PROCESS:

- ✓ Capital intensive mature technology with relatively flat opex curve and limited cost control options
  - 90% of conventional process cost range bound between US\$ 1,450/MT to US\$ 2,000/MT
  - Requires 6+ MT of raw material to make 1 MT of Standard Si
  - Raw Materials, Electricity and Depreciation(Capex) make up bulk of cost (~ 80%)
- ✓ Strategic Risk with the largest single cost raw material: Low Ash Coal
  - ~ 50% of the world supply of low Ash Coal controlled by largest Si producer in the world

# HPQ PROPRIETARY SOLUTION!

## PUREVAP™ A SCALABLE - VERSATILE - ADAPTABLE PROCESS TO MEET NEW SILICON METAL DEMAND

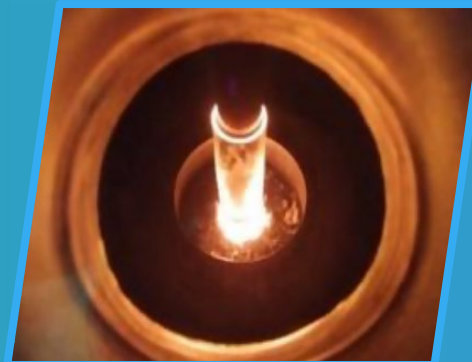
- Scalable by increments of 2,500 MTY - The maximum size of one PUREVAP™ Reactor

### Quartz $\text{SiO}_2$ to MG Si (2N+)

The PUREVAP™ QRR, a proprietary (patent pending) 2.0 carbothermic process:



$\text{SiO}_2$  98.8%  
92.1% Total Carbon



A one Step  
Process



2N+ Si @ 17.9% Conversion Yield  
- 4N+ Si @ 90.0% Conversion Yield

## LOW CAPEX (Kg OF ANNUAL CAPACITY MATRIX) - Very Competitive Versus Traditional Process

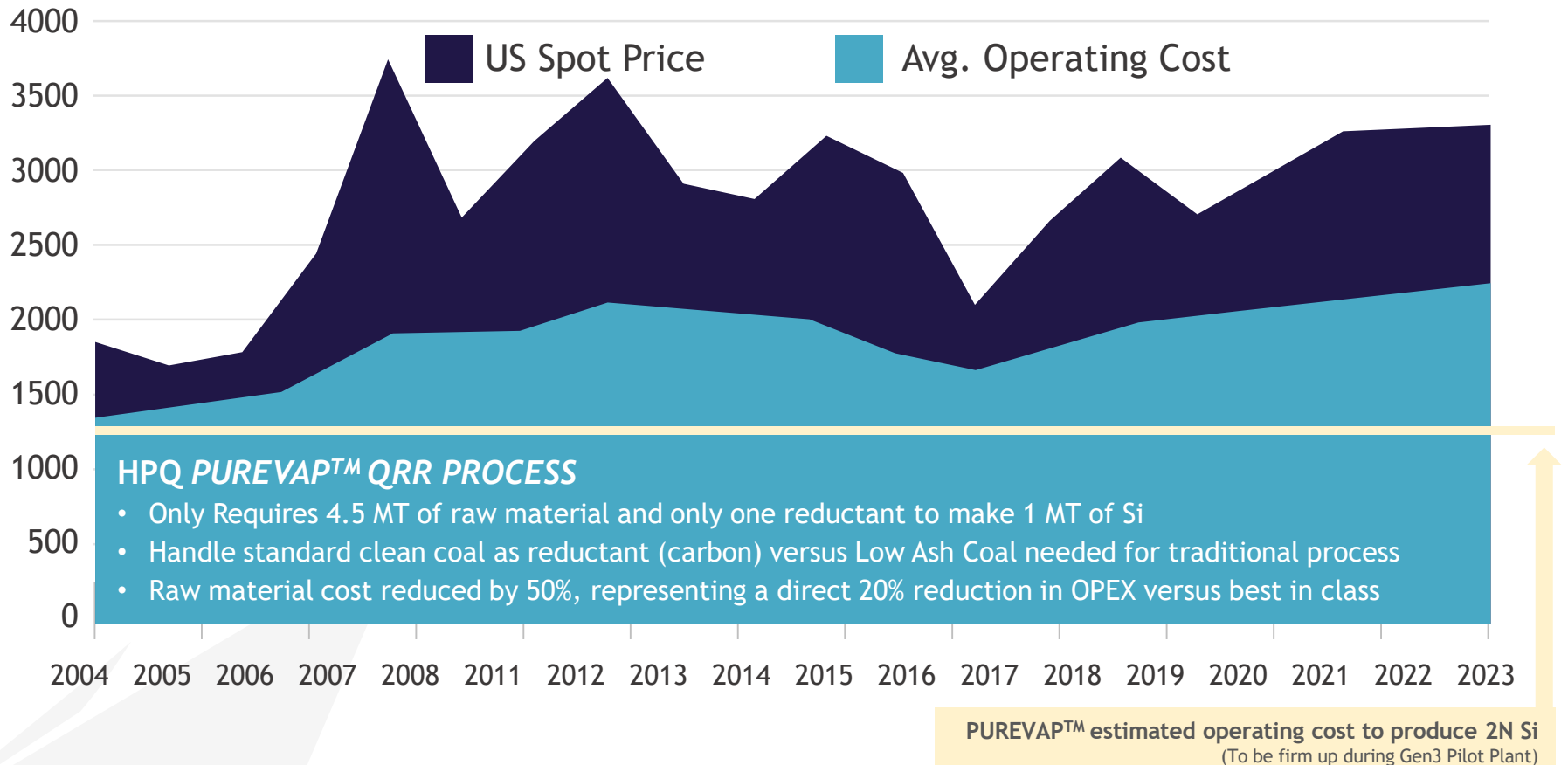
- Matches the scale costs of Tier 1 producers for a fraction of the investment (85% - 90% less)
  - US\$ 6.22 Capex per Kg of annual capacity with (2) 2,500 MTY PUREVAP™ Reactor Plant

# HPQ VERSUS CONVENTIONAL Si PRODUCERS

Silicon Market Outlook (Source CRU - Silicon Market Outlook - November 14, 2018)

## Silicon prices support new investment after 2019

US spot price 5.5.3 grade (Metallurgical) silicon vs avg. operating cost at plants outside China and CIS, \$/t

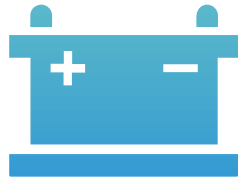


# SILICON METAL PART OF EV SUPPLY CHAIN

- ✓ The aluminum alloy chassis of Tesla cars is 10% Si!



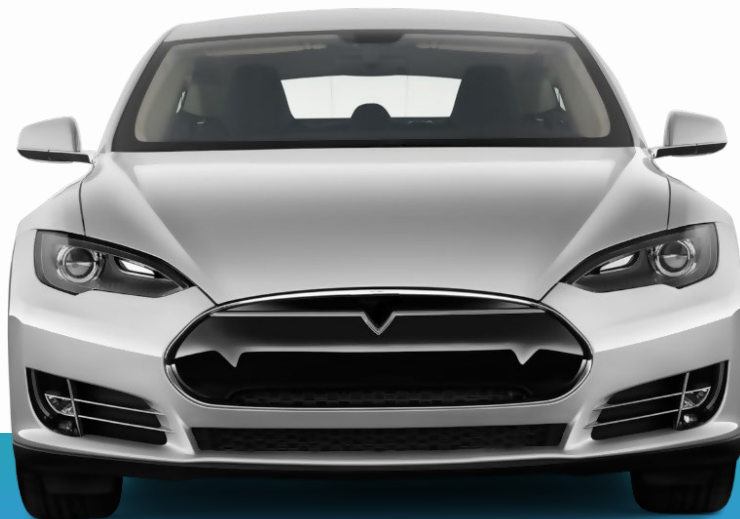
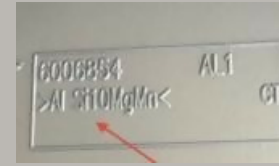
Aluminum silicon alloy makes the aluminum lighter and stronger



Small quantities of Silicon powder are already used in Tesla batteries



Silicon in the windshield



PLUG - IN EV SALES  
(annual)

566,000

2015

54,000,000

2030E

## HIGH VALUE MARKET - ENERGY STORAGE

### An unexpected positive for HPQ *PUREVAP™*: Silicon Metal for Lithium-ion Batteries

- ✓ **Working on a low cost process to make Silicon Metal Nano Powders and Nanowires**
  - In Partnership with PyroGenesis, we are developing the *PUREVAP™* Silicon Metal (Si) Nano Reactor (*SiNR*) to produce the Spherical Nano Si powders and Si Nanowires for next Gen Li-ion Batteries
- ✓ **Porous Silicon Metal Wafers and Powders for Li-Ion Batteries**
  - Combining HPQ *PUREVAP™* QRR unique capacity with Apollon Solar SAS patented low cost approach of Making Porous Si Wafers allow HPQ to focus on commercializing Porous Si Wafers for solid state Li-ion batteries and Porous Si powders Li-ion Batteries earlier then other early stage R&D competitors



# MASSIVE ENERGY STORAGE DEMAND COMING

## SILICON METAL: “THE GRAPHITE KILLER FOR LITHIUM-ION BATTERIES”

Silicon Metal Allows greater energy storage capabilities



Allows for smaller size batteries for electronic devices and electric cars



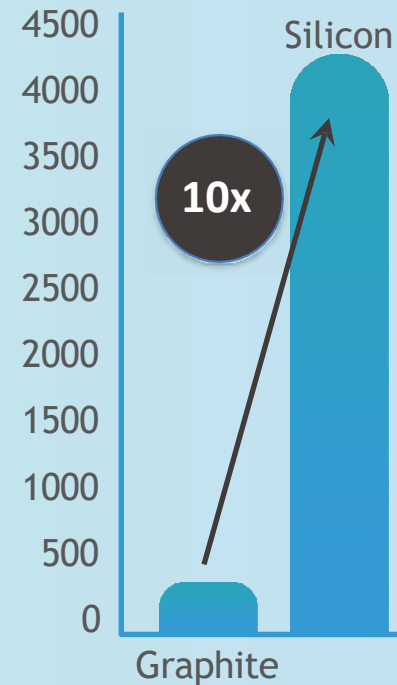
Energy storage potential for renewable energy could reshape the global economy



Silicon Metal can increase battery charge 10X and energy density of batteries by 40%



### Anode Chemistry Option Theoretical Capacity



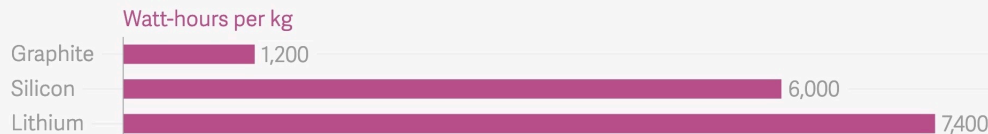


# MASSIVE ENERGY STORAGE DEMAND COMING

## ✓ Billions pouring into R&D and Gigafactories

- Impact on raw Battery Materials demand massive
- Presently Graphite, a low energy density material is the principal ingredient in Lithium-ion Batteries

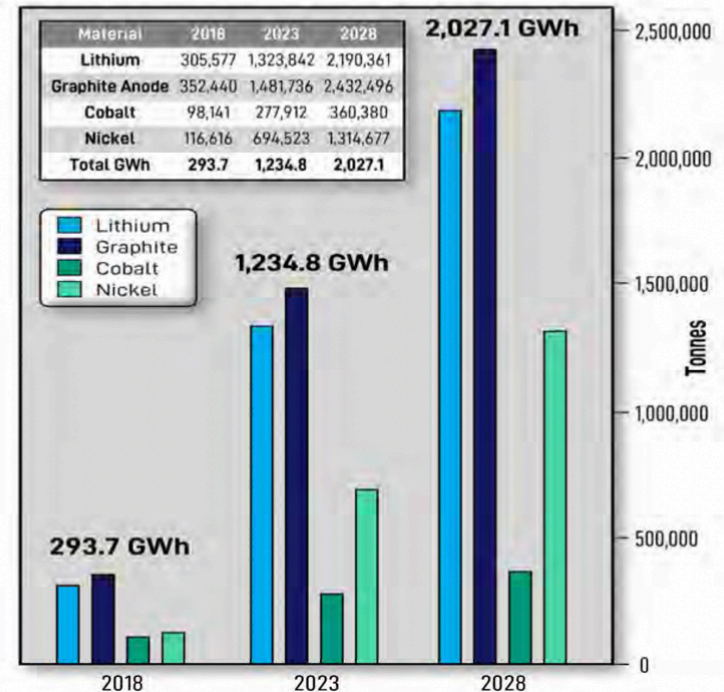
### The energy density of anode materials



- Graphite use in Li-ion anodes sell for ~ US\$ 10/Kg
- Energy storage and EV demand cannot be met until Silicon Metal anodes replace Graphite one!
- Substituting Graphite anode with Silicon Metal ones represents a massive demand opportunity
- Graphite addressable market in 2018 ~ US\$ 3.4B; projected to increase to ~ US\$ 14B in 2023 and ~ US\$ 24B in 2028
- Spherically Si Nano Powders and Si Nanowire identified as Key materials that could replace Graphite anode!
- Manufacturing Nano Powders not yet commercially feasible with US\$ 30,000/kg selling prices

### Megafactory Impact on Raw Materials

#### Raw Materials Demand vs Global Lithium Ion Cell/Megafactory Capacity



Source: Benchmark Minerals Intelligence



## HPQ & PYROGENESIS SOLUTION!

### THE *PUREVAP*<sup>TM</sup> Si NANO REACTOR (SiNR) A SCALABLE - VERSATILE - PROCESS

A new proprietary process to make the Spherical Nanopowders and Nanowires of Silicon Metal needed for Next Generation Li-ion Batteries

During the coming months, our Gen2 *PUREVAP*<sup>TM</sup> QRR will be converted into Proof of Commercial Scalability *PUREVAP*<sup>TM</sup> Si NANO REACTOR (SiNR)

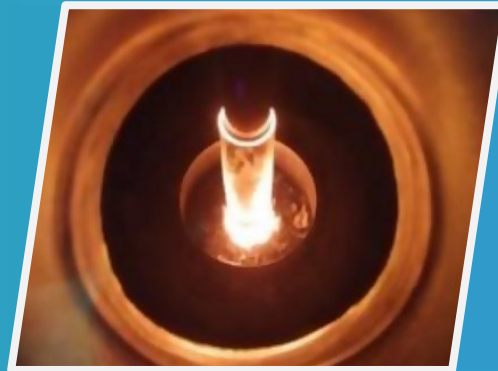
- Tests will be done to prove the scalability, low-cost and feedstock flexibility of process
- Spherical Silicon Metal Nano-Powders and Nanowires samples will be produced for Research centers and potential end users

### Silicon Metal (Si) to Spherical Nanopowders and Nanowires of Si

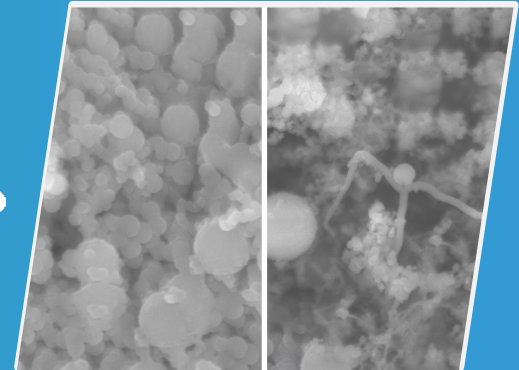


FEEDSTOCK:

*PUREVAP*<sup>TM</sup> QRR Si or  
MG Si or potentially  
Recycled Solar Cells



*PUREVAP*<sup>TM</sup> SiNR



END PRODUCT:

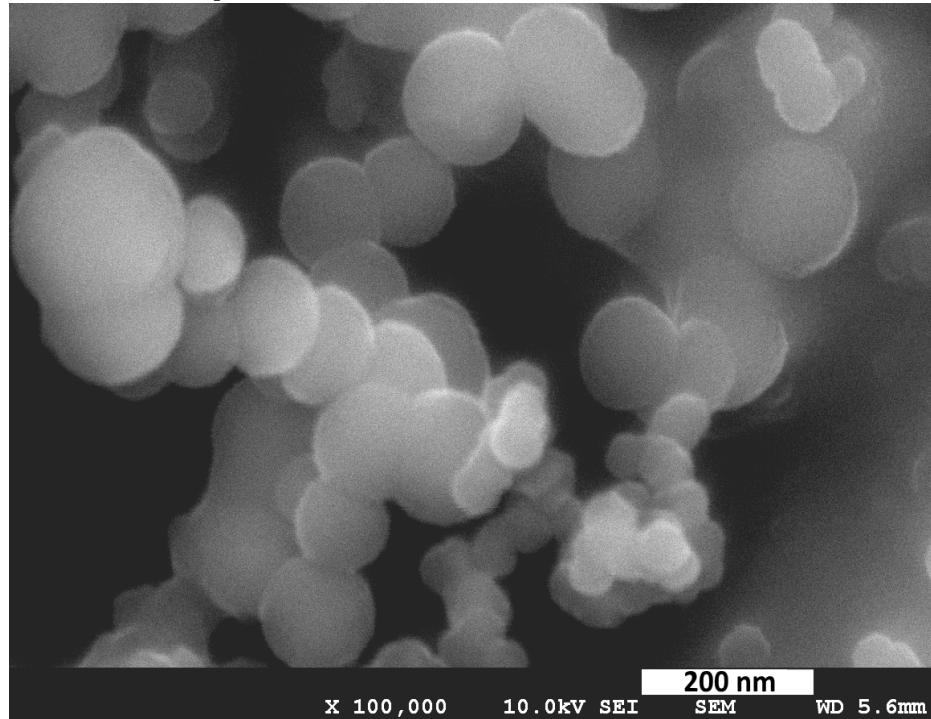
SPHERICAL NANOPOWDERS  
& NANOWIRES  
OF SILICON METAL

# HPQ & PYROGENESIS SOLUTION!

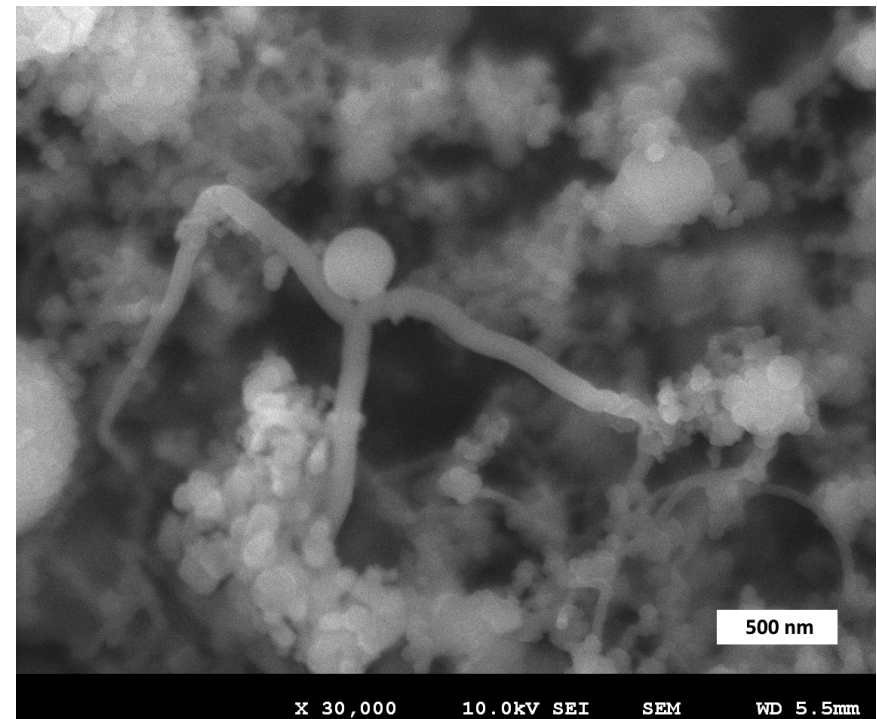
## PROOF OF CONCEPT TEST VALIDATED POTENTIAL OF *PUREVAP™ SI NANO REACTOR*

- ✓ Gen2 PUREVAP™ QRR successfully used to synthesize:
  - Spherical Nano Powders (size  $<0.5 \mu$ ) from Silicon Metal (Si)
  - Nanowires (size  $<0.2 \mu$ ) from Silicon Metal (Si)

### Spherical Nano Powders



### Nanowires



# HPQ GLOBALLY RENOWNED TECHNICAL PARTNERS

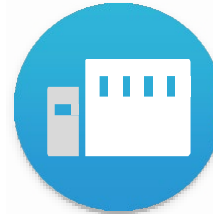
**PYROGENESIS** Plasma Expertise: One of the largest in the World



+25 years  
of experience &  
> 70 employees



>60 Patents  
worldwide (issued  
or pending)



40,900 ft<sup>2</sup>  
Manufacturing  
facility



The inventors of  
Plasma Atomization  
(Gold Standard)



World Leader In  
Advanced Plasma  
Processes



Technology Sold To US  
Navy For Use On  
Aircraft Carriers



Technology Tested  
and Validated By  
DARPA



Leaders in High  
Purity Spherical  
Metal Powders for  
Industrial 3D printing



Developer of PUREVAP  
One-Step Process To  
Produce High Purity Low  
Boron Silicon Metal



Developer of  
DROSRITE™: a Green  
Aluminum Recovery  
from Dross process



Agreements With Global  
Manufacturers and Trading  
Houses



Contract backlog  
worth \$29.5MM at  
the end of Q3 2019

# HPQ GLOBALLY RENOWNED TECHNICAL PARTNERS



**A French Engineering and R&D Company fully dedicated to the field of renewable energy and energy transition**



Created in 2001 by a team of engineers and scientists with longstanding expertise in Silicon Purification and Crystallization - Solar Silicon - Photovoltaic Cells - Photovoltaic Modules



Part of Elixens Group, active in Fine Chemistry, Aromatic and Renewable Energies



23 Patents to their name, Including one for the manufacturing of Porous Silicon Wafers from Metallurgical Grade Silicon Metal



Obtained, an independently confirmed, world record conversion efficiency of 22.6% with ANU University of Australia, using monocrystalline ingots, for a solar cell made with 100% “SoG Si UMG”



## HPQ GLOBALLY RENOWNED TECHNICAL PARTNERS

- Apollon Solar has a Strong background in **silicon processes**
- Diversification strategy: **from photovoltaics to new applications**

Photovoltaics - Cost reduction

New markets - High value



Patent for porous Si  
production (2012)

Patent on plasma  
purification (2001)

**2005-2016**

PHOTOSIL project  
**SoG production pilot**

**2011 - 2015**

**Low-cost porous  
silicon from  
metallurgical Silicon**

**2017 - today**

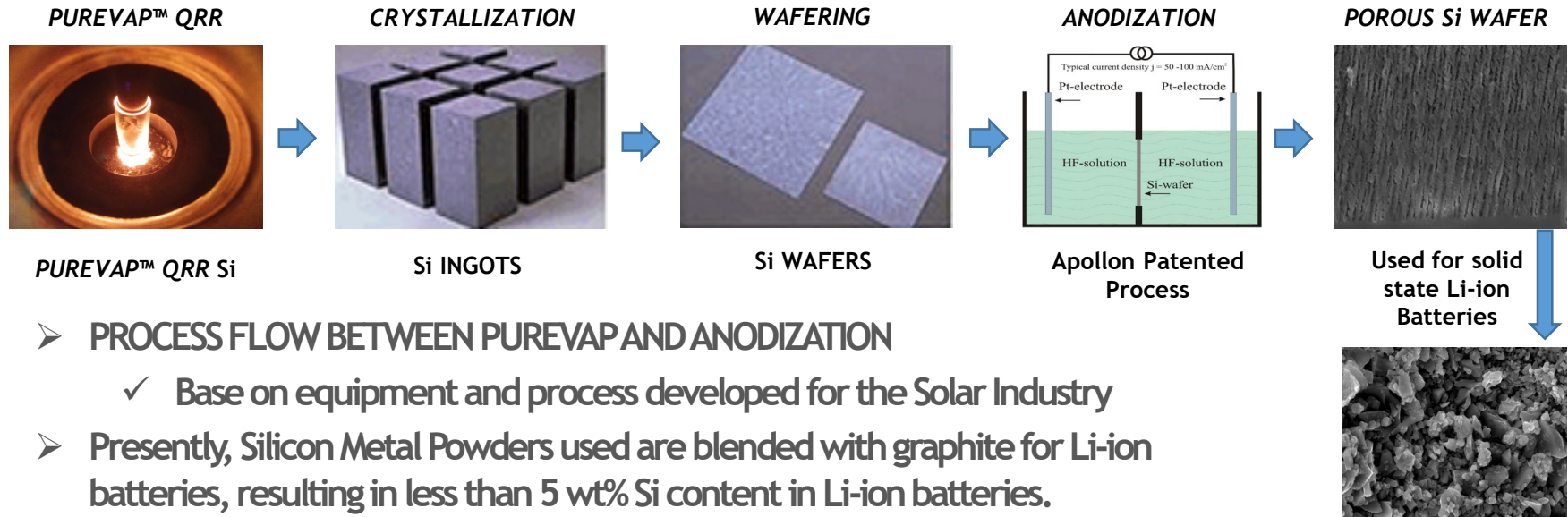
**Collaboration with HPQ:  
Silicon for PV and Porous  
Silicon for storage**

HPQ SILICON



# LOW COST POROUS SILICON METAL FOR BATTERIES

- Combining HPQ *PUREVAP™* QRR with Apollon Solar patented low cost approach of Making Porous Si

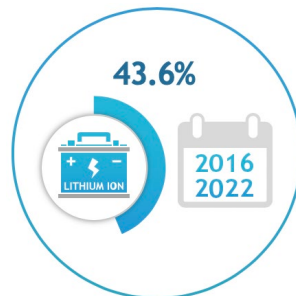


- PROCESS FLOW BETWEEN PUREVAP AND ANODIZATION

- ✓ Base on equipment and process developed for the Solar Industry
- Presently, Silicon Metal Powders used are blended with graphite for Li-ion batteries, resulting in less than 5 wt% Si content in Li-ion batteries.

✓ Still:

Silicon Metal Powder demand for Li-ion batteries CAGR ↑



Silicon Metal Powder market for Li-ion batteries to exceed



# A LONG-TERM POTENTIAL MARKET FOR HPQ : SOLAR

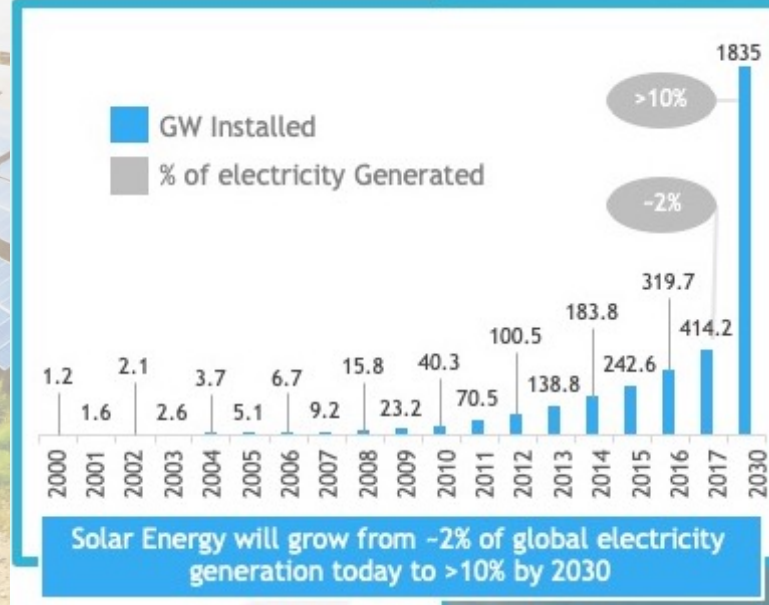
## Solar Grade Silicon: A Large & Growing Market, A High Volume & Low Margin Industry

### Renewable Solar Energies:

Solar Grade Si market:  
US\$ 7.1 B in 2018



### DEMAND READY TO EXPLODE!



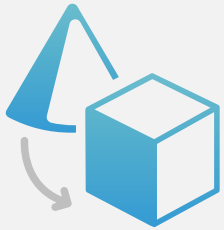
(Source: Deutsche Bank, Future Market Insights report titled, "Polysilicon Market: Global Industry Analysis 2013-2017 and Opportunity Assessment 2018-2028".)



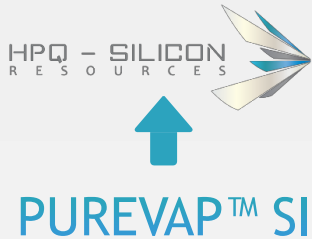
# HPQ TECHNOLOGICAL SOLUTION

## FROM QUARTZ TO SOLAR WAFERS

How HPQ will implement its technological solution  
By Combined Expertise In Three Critical Steps:



The PUREVAP™ technology of PyroGenesis transforms Quartz ( $\text{SiO}_2$ ) to High Purity Silicon ( $4\text{N}+ \text{Si} < 1 \text{ ppm B}$ ) in one step - “PUREVAP™ Si”



PyroGenesis and Apollon Solar experts are developing a streamlined metallurgical pathway (UMG) for upgrading the “PUREVAP™ Si” to HPQ Solar Grade Silicon (SoG Si)



Apollon Solar has the expertise to transform HPQ SoG Si into high performance multi-crystalline and monocrystalline solar cells: “wafers”

HPQ  
QUARTZ

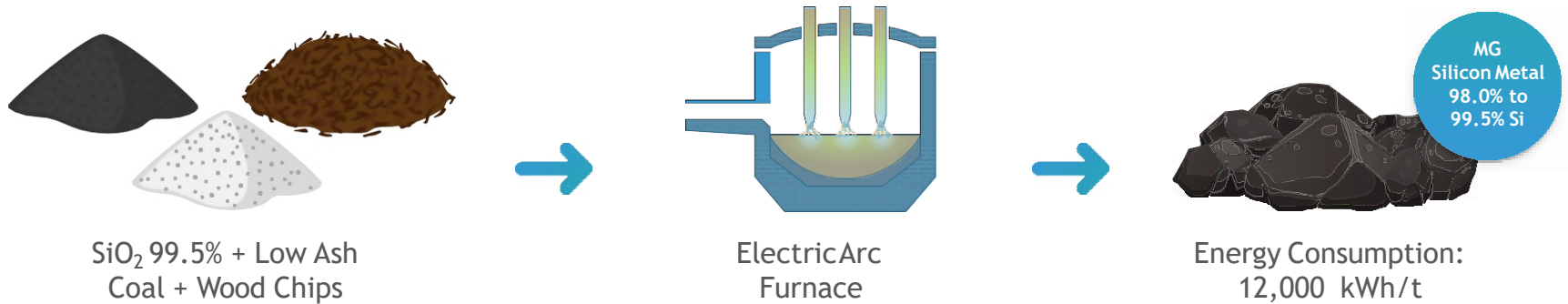


PYROGENESIS'  
PUREVAP™ PROCESS

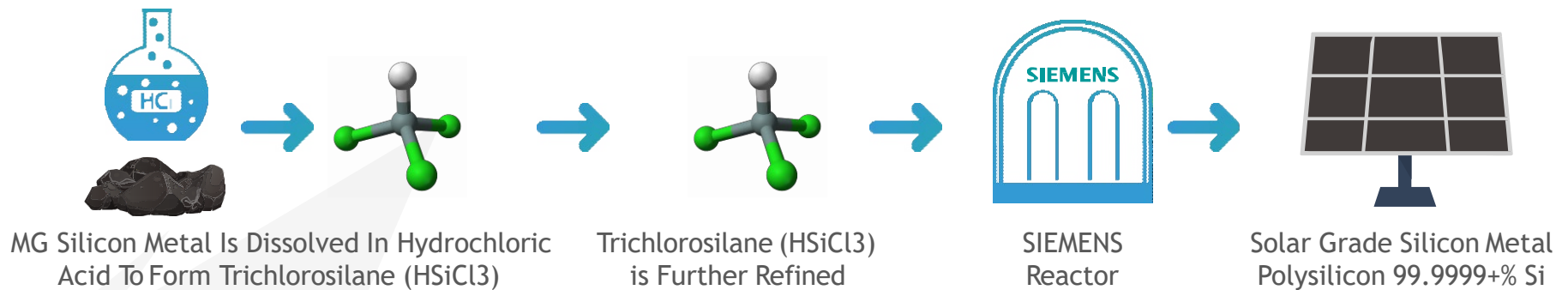


SoG Si TO WAFER WITH APOLLON

## Present Carbothermic process Quartz to silicon metal (Si)



## Present Chemical process MG-Si to SoG-Si



Energy Consumption: between 72,000 to 120,000 kWh/t

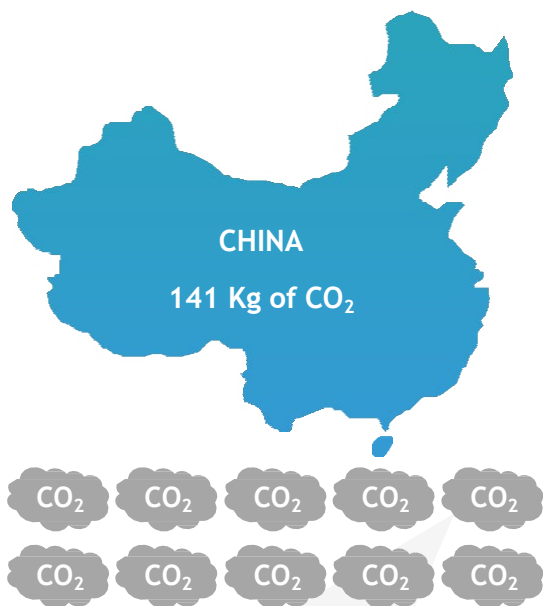
# PUREVAP™ UMG GREEN DISRUPTIVE POTENTIAL



70% of the GHG generated by any solar project comes from the production of SoG Si

(source: [Energy Policy](#), February 2014, Pages 229-244)

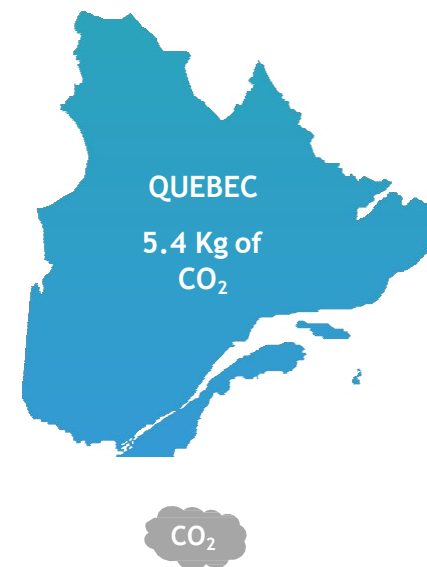
HPQ's SoG Si is poised to produce the lowest carbon footprint



SoG Si in **CHINA**, world's largest producer, generates 141 Kg of CO<sub>2</sub> per Kg of SoG Si



SoG Si in **GERMANY** using the same process, generates 87 Kg of CO<sub>2</sub> per Kg of SoG Si



SoG Si in **QUEBEC** with the PUREVAP™ expected to produce 5.4 Kg of CO<sub>2</sub> per Kg of SoG Si

\* Estimates will be firm up after Pilot plant phase

## PUREVAP™ POTENTIAL AND MILESTONES

Successful Gen1 &  
Gen2 Bench Tests  
(2016-2019)  
Validated the  
Processes

Gen3 QRR Pilot  
Plant and GEN 2  
SINR platforms  
Operational 2020

Sales and potential  
offtake agreements  
anticipated in 2020  
Commercial Sales  
2021

## ATTRACTED INTEREST FROM KEY INVESTORS

### *August 2018 \$5,250,000 Financing*

- The Quebec government agreed to finance 20% of the Gen3 project total cost
  - Investissement Québec (IQ) funded a \$1,800,000, 5 years, 5% unsecured Convertible Debenture
    - ✓ Convertible into common shares at \$0.12<sup>1</sup> per HPQ share and interest payments are accruable
    - ✓ IQ received 15,000,000 Warrants, (Terms one for one, exercise price \$ 0.17<sup>2</sup>, duration 36 months)
- PyroGenesis Canada Inc invested \$1,950,000 to finance remaining Gen3 project total cost
  - PyroGenesis acquired 16,250,000 Units of HPQ at \$0.12 per Unit (representing a 30 % premium to market)
    - ✓ Each Unit comprised one share and one warrant, (warrant exercise price \$ 0.17<sup>2</sup>, duration 36 months)
- PyroGenesis also granted HPQ a \$1,500,000 Equity Line Credit to cover un-expected cost overruns that could potentially occur during the Gen3 project

## WHY INVEST IN HPQ?

UBS estimates that over the next ten years the energy storage market in the United States could grow to as much as \$426 billion, *and there are many ways to buy into the surge* (CNBC Dec 30 2019 : [The battery decade: How energy storage could revolutionize industries in the next 10 years](#))

- **HPQ - Silicon:** An investment opportunity to participate in the Surge!
- **PUREVAP™ QRR** pilot plant & **PUREVAP™ SiNR** test plant about to go live
- Ready to start commercializing the following **PUREVAP™** Products:
  - Nanoscale Spherical Si Powders and Nano Si Wires for next Gen Li-ion Batteries
  - Porous Silicon Metal Wafers for solid state Li-ion Batteries
    - ✓ *Already under NDA with a solid state Lithium-ion battery manufacturer*
  - High Purity Porous Silicon Metal Powders for Li-ion Batteries
- In 2020 samples will be sent to research centers for independent validation and to potential end users for product qualification and sales
- Supported by two (2) world class technology partners

# MANAGEMENT, BOARD AND CAPITAL SUMMARY



## 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	≅ 9.7%	≅ 10.5% (FD)
PyroGenesis	≅ 9.7%	≅ 12.5% (FD)
Investissement Quebec		≅ 9.9% (FD)
Strategic Investors	≅ 2.8%	≅ 6.2% (FD)
Key Investors	≅ 18.8%	≅ 21.2% (FD)



## Capital

Shares Outstanding	230,537,866
Warrants	62,628,000
Options	11,400,000
Debenture	<u>16,653,361</u>
Fully Diluted	321,219,227



## Independent Director

**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/ Technical Advisors

**Marcel Drapeau, BA, BSC. Comm, LLL**  
**PyroGenesis Canada Inc**  
**Apollon Solar Sa**



## Transfer Agent

**Computershare**



## Auditors

**Raymond Chabot Grant Thornton**

## CONTACT



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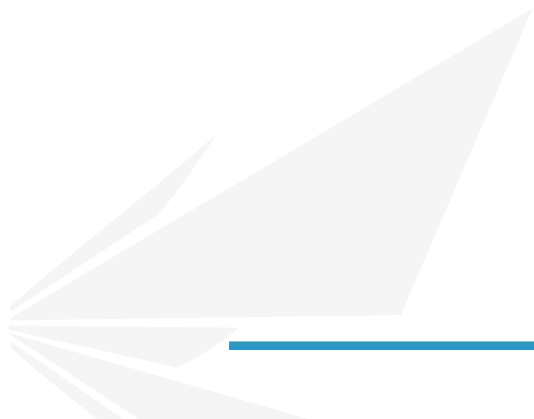
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[www.HPQSilicon.com](http://www.HPQSilicon.com)



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