BGS

# BIO GRAPHENE SOLUTIONS INC.

## THE CLEANTECH ALTERNATIVE TO TRADITIONAL GRAPHENE PRODUCTION

CORPORATE PRESENTATION

CONFIDENTIAL - NOT FOR DISTRIBUTION

AUGUST 2023

BGS

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This presentation contains forward-looking statements. Any statements contained herein that are not historical facts may be deemed to be forward looking statements. There are a number of important factors that could cause actual results to differ materially from those indicated by such forward-looking statements. Such factors include - but may not be limited to - adverse changes in general economic conditions, adverse changes in the specific markets for the Company's products, adverse business conditions, increased competition, lack of acceptance of new products, lack of success in technology advancements and the ability of the Company to continue to attract skilled technology staff.


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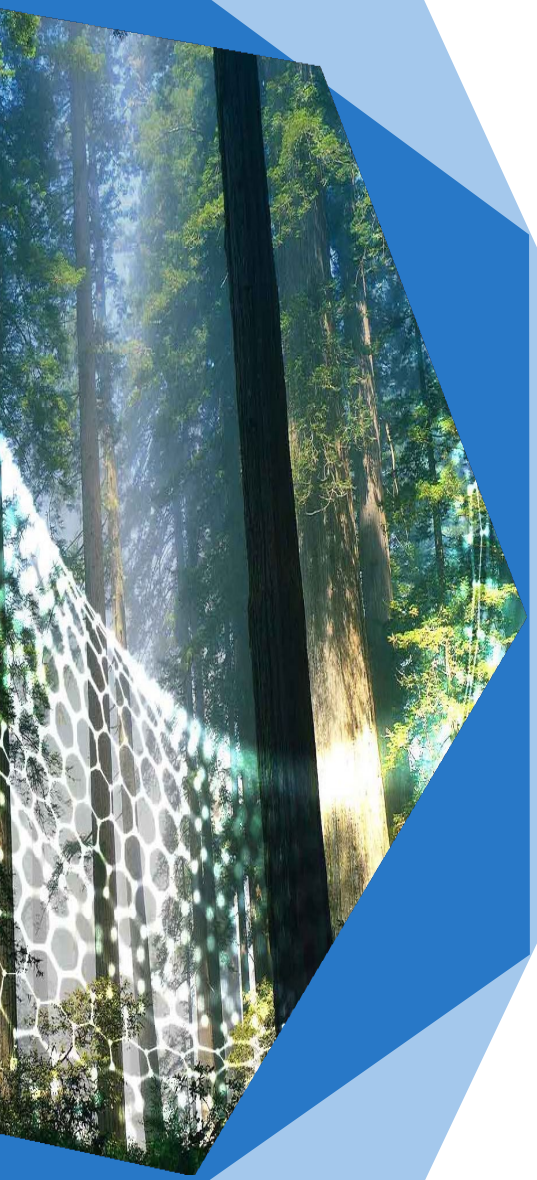


# BGS: AN INNOVATIVE CANADIAN CLEANTECH COMPANY

## OUR SUSTAINABLE VALUE PROPOSITION:

### Technology Advantage:

- Graphene is becoming the “go-to” carbon technology for performance in various industries and applications with a projected global market of $3.5B USD by 2030
- BGS is one of the only companies globally that has the capability of converting 100% organic source materials into high-quality graphene via a patented clean-tech process – a true “green” performance solution
- A licensable production platform that’s easy-to-scale with minimal CAPEX

### Go-to-Market Strategy:

- Concrete Market: Ability to add value to existing and new product groups cost-effectively across different market segments (ready-mix, pre-cast, and construction materials)
- Distinct competitive advantage - we’ve validated our value proposition with other global admixture players and large concrete producers

### Product Capabilities:

- Our graphene-enhanced admixture enables 15%+ cement removal; 20%+ strength improvement; and a 30%+ $CO_2$ impact in concrete mix designs
- Immediate marketability factor – **our graphene enables lower embodied carbon numbers** in concrete structures

### Significant ROI Potential:

- Ability to create a sustained competitive advantage quickly while maintaining capital efficiency
- Immediate carbon credit eligibility - our graphene products have the potential to generate $10M+ in carbon credits
- Our market capitalization is currently a fraction of our competitors that lack revenue visibility & strategic investment

A sound ESG (Environmental, Social & Corporate Governance) investment choice

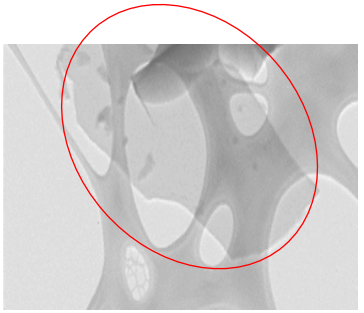
## Graphene is the next big investment frontier…

"Global graphene market was valued at USD $865M in 2022 and is projected to reach $3.55B by 2030 at a CAGR of 19.3%."*

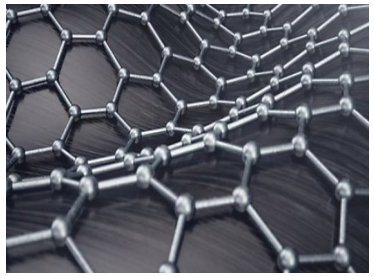
# WHAT IS GRAPHENE?

- Graphene (a fine powder) is a nanotechnology derived from pure carbon: defined as 10 carbon-layers or less
- At it's simplest form, graphene is 200x stronger than steel by weight, 1,000x lighter than paper, and conducts electricity better than other material at room temperature
- Discovered in 2004, this "supermaterial's" versatility and performance attributes can be harnessed to drive meaningful benefits in various end-products
- The greatest challenge with traditional graphene companies is their ability to produce large volumes of graphene cost-efficiently and consistently while minimizing their environmental impact

Visible Powder



Graphene Flake:
Nanometer Level



Carbon Lattice:
Molecular Level

## GRAPHENE'S PROPERTIES:

- Strength
- Toughness & Elasticity
- Thermal & Electrical Conductivity
- Water Impermeability
- Weight Reduction

* Vantage Market Research 2022

# GRAPHENE'S CURRENT DRAWBACKS

- Traditionally, graphite has been used as a source material to make graphene
- Environmentally taxing process - Graphite-based technologies require a significant amount of harsh chemicals, acids, and solvents that produce a lot of by-product waste
- CAPEX intensive: requires a large operating footprint to achieve cost economies & commercial production
- The quality of the graphene is highly dependent on the quality (level of impurities) of the graphite itself
- Constrained raw material supply-chain - high-quality graphite is becoming increasingly difficult to find due to the EV movement (mostly sourced from South America, Africa, and China)
- Cost prohibitive – graphene produced in this manner simply can't support commodity-based markets cost-effectively

Mined Graphite Ore

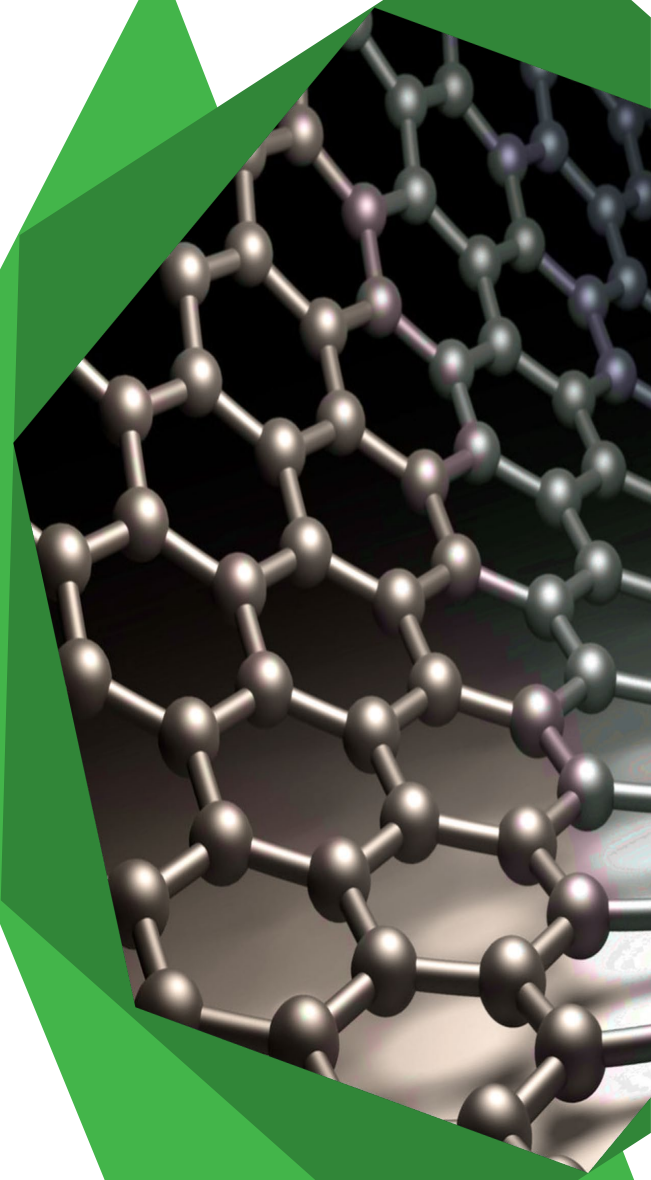
Addition of Water

Acids & Solvents

Milling Activity

Graphene Powder

Liquid Waste



# OUR GRAPHENE PRODUCTION TECHNOLOGY

- Unique patented IP that enables the conversion of readily available 100% organic materials into high-quality graphene via a thermal-mechanical process
- **Clean-technology production methodology** – we do not rely on harsh chemicals, acids, or solvents during our production process (no by-product waste)
- Compact & efficient production design – can scale to commercial volumes with minimal CAPEX
- Highly controllable process –ability to calibrate our graphene to achieve desired performance attributes for different applications
- Price leadership – the quality and consistency of our graphene materials enable much lower graphene loading concentrations to achieve superior performance results
- The versatility of our graphene allows BGS to enter any relevant graphene market (e.g. concrete, asphalt, batteries, energy storage, coatings, water-treatment, and plastics)

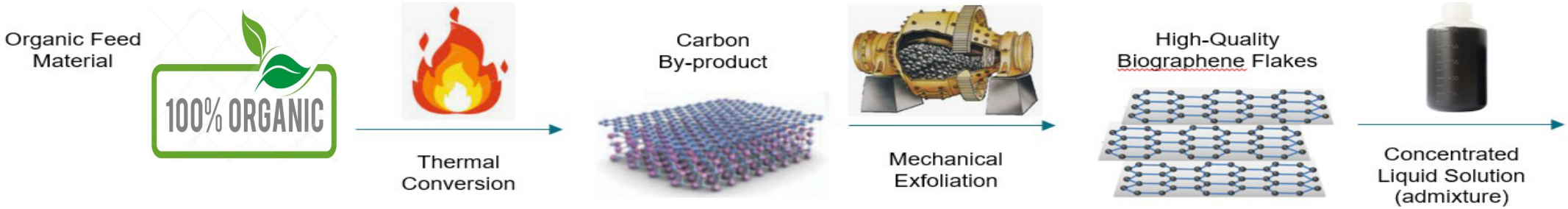
## WHY OUR TECHNOLOGY MATTERS

**Chemical Consumption to Produce 1 Ton of Graphene Material****

| Chemical | Graphene oxide (Hummer's method) | BGS (Thermal Mechanical) |
|---|---|---|
| H3PO4 (Phosphoric Acid) | 5,333 L | 0 |
| H2SO4 (Sulfuric Acid) | 48,000 L | 0 |
| KMnO4 (Potassium Permanganate) | 80 ton | 0 |
| NaNO3 (Sodium Nitrate) | 1.1 ton | 0 |
| H2O* (Water) | 168,889 L | 0 |
| H2O2 (Hydrogen Hydroxide) | 6,667 L | 0 |
| HCl 5%*** (Hydrochloric Acid) | 44,444 L | 0 |

** https://www.hindawi.com/journals/jnm/2014/276143/
*** Considering 100mL of HCL 5% initially

*BGS' graphene production protocol IP has been filed and is currently patent pending: USPTO # 63/365,739



# MARKET POSITIONING: HOW BGS IS DIFFERENT

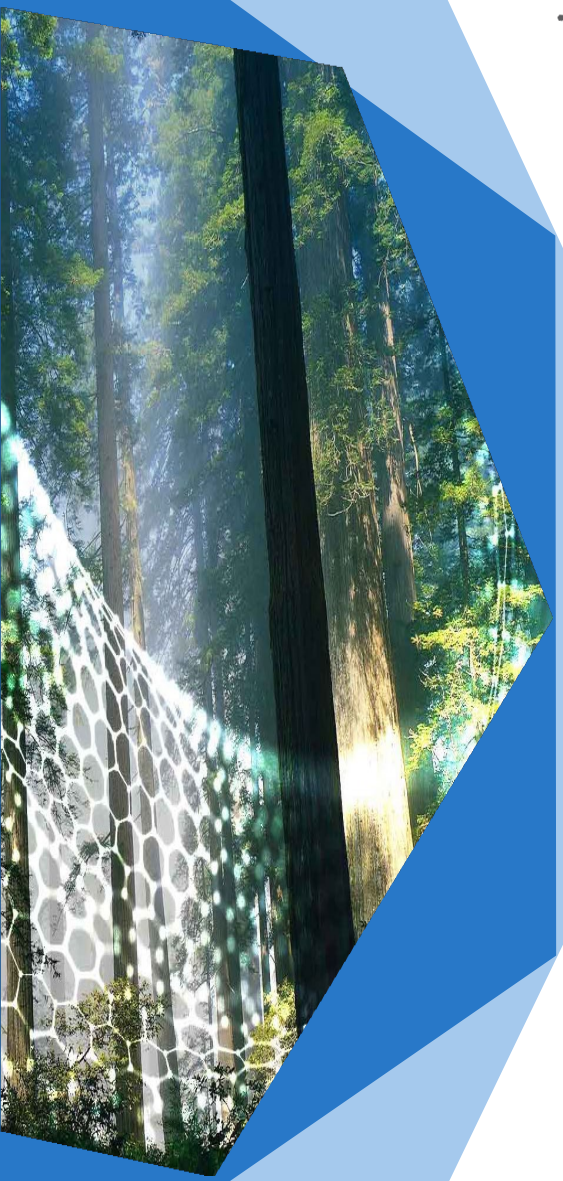
**Selling graphene powder is not at the core of our business revenue model –**
**we sell *graphene-enhanced solutions***

## Traditional BULK GRAPHENE Producers

- Selling graphene powder in bulk as a commodity (graphite as input source)
- Capital intensive models to achieve scale
- Quality control issues
- Product integration barriers – relies on the customer
- Requires large scale production to drive profitability
- Lower customer value proposition, drives lower commodity pricing

## BGS's GRAPHENE-ENHANCED SOLUTIONS

- Production technology enables scale in a cost-effective way
- Selling a graphene-enhanced product not graphene powder
- Low capital requirements to achieve economic results
- We focus on graphene integration to a customer's end product
- Work with customers to achieve superior results
- Higher customer value proposition
- Higher margin business



# OUR PRIMARY MARKET FOCUS

**BGS** has initially focused on internal product development initiatives within the concrete & construction products market:

- Large, addressable target markets locally that are growing due to infrastructure growth in the US and Canada
- Propensity to adopt a new material is high - regulatory and government push for more sustainable materials is currently being mandated in the industry
    - Currently, cement contributes to 8% of the world's $CO_2$ emissions - our biographene can significantly help reduce this impact!
- **No regulatory barriers in using graphene as an admixture in commercial concrete products**
- BGS has strong relationships with global concrete players and has been able get them actively involved in product development/verification programs
- Most graphene companies cannot produce consistent graphene quality at a cost that makes sense for commercial adoption in these markets

# UTILIZING OUR GRAPHENE IN CONSTRUCTION PRODUCT GROUPS

Liquid-Based Products ← **Significant Sustainable Product Diversity and Value-Add** → Dry-Based Products

## Ready Mix

- Graphene-enhanced liquid admixtures
- Less cement needed - 15%+ reduced in the mix
- 20%+ Improved compression strength & durability
- 30%+ reduction in embodied carbon within concrete structures
- Complementary with full SCM replacement levels (slag, silica, fly-ash)

## Pre-Cast

- Graphene-enhanced liquid admixtures
- Less cement needed – 10-15% reduced in the mix
- Reduced permeability by as much as 20%
- Complementary with other colour pigments

## Asphalt

- Graphene-enhanced aggregates for use in the binder material
- BGS has a unique technology that enables the “growth” of graphene on sand/gravel/stone
- Improved mechanical and physical properties
- Reduces the age of the asphalt and extends the surface lifetime

## Aggregates

- Graphene-enhanced aggregates
- Improved compression strength & durability
- Reduced permeability
- Easy-to-use and safe to handle
- Applicable to a wide range of applications across the construction & infrastructure spectrum

## Recycled Concrete

- Graphene-enhanced recycled concrete
- Improved strength and durability of the recycled concrete aggregate
- Enables maximum recycled replacement levels without sacrificing new product performance
- Maximizes the embodies carbon impact

*All tests have been completed by third-party accredited labs: Englobe & CVD

# OUR GRAPHENE ADMIXTURE PRODUCT

**BGS** has created a graphene-enhanced concrete admixture that allows customers to easily introduce graphene into their existing plant facilities and processes for cement-based products.

- Admixtures are additives (generally liquid) that are added to the concrete mixture to enhance specific properties of the concrete mix design
- BGS has created a unique graphene-enhanced admixture product that can significantly improve strength so that the cement material (the binding agent that provides concrete its strength) can be significantly reduced in the mix design
- We have acquired equipment, in-house concrete expertise, and invested in 3rd party testing programs to ensure that our graphene admixture adheres to commercial standards and can be adopted easily as a commercial product
- We've performed over 500 trials with our admixture in full concrete mix designs – no one has more data/intelligence with graphene in concrete like we do
- We believe our graphene admixture is the only admixture product in the market that can facilitate the removal of cement and still provide significant cost and $CO_2$ savings to its potential customers in non-specialized commercial concrete mix designs (30MPa to 50MPa mixtures)

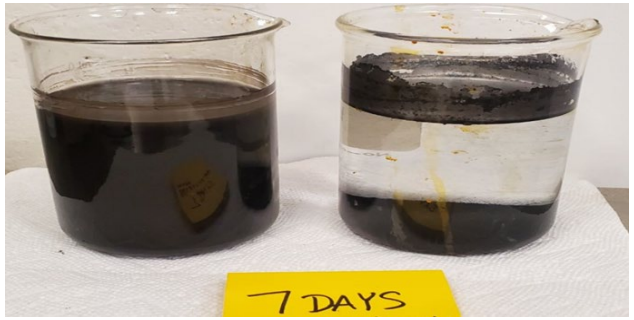
Graphene admixture in totes

Easy integration to existing concrete plant facilities

# CASE STUDY: OUR GRAPHENE ADMIXTURE FOR READY-MIX

## UNMATCHED PRODUCT STABILITY

BGS Admix Solution | Competing Graphene Product




## STRENGTH PERFORMANCE

20%+

| Test ID | Trial Description | Slump (mm) | Average Strength % (40MPa) 3-day | 7-day | 14-day | 28-day |
|---|---|---|---|---|---|---|
| Control 1 | 40MPa, 15% slag, water reducer, plasticizer – no graphene | 80 | 67.8% | 93.1% | 105% | 115.9% |
| BGS-036-251 | 40MPa, 15% cement reduction, 25% slag, graphene admixture, plasticizer, NO water reducer needed | 80 | **80.3%*** | **98.4%** | **125.3%** | **146.9%** |
| Control 2 | 40MPa, water reducer, plasticizer – no graphene | 75 | 81.9% | 98.5% | 105.0% | 116.0% |
| BGS-036-292 | 40MPa, 15% cement reduction, graphene admixture, plasticizer, NO water reducer needed | 160 | **109.8%*** | **125.1%** | **132.4%** | **158.8%** |

*5-day break

Trial data provided by Englobe & CVD

## $ COST BENEFIT


15%+

- Ability to remove at least 15% of the cement in mix designs below 50Mpa (without sacrificing workability or maximum SCM replacement levels)
- Material cost savings of $12-15 per cubic meter of concrete** - equivalent to ~60kg-75kg of cement in 1 cubic meter of concrete
- Graphene possesses unique material benefits that's both compatible and/or reduces the need for other admixtures (built-in solutions)
- Significant marketability factor associated with lower embodied carbon in concrete products

## $CO_2$ SAVINGS

30%+

| Quantifying the CO2 Impact with Our Graphene-Enhanced Admixture | Volume | Unit of Measurement |
|---|---|---|
| Total mass of 1 cubic meter of concrete in a typical 40Mpa mix design | 2,400 | kg |
| Total mass of the cement component in 1 cubic meter of concrete in a typical 40Mpa mix design | 395 | kg |
| Amount of material by removing 15% of the cement (at a minimum) | 59 | kg |
| Equivalent CO2 removal calculation* | 53 | kg |

*According to the Portland CementAssociation, removing 1lbs of cement is equivalent to removing 0.90lbs of $CO_2$

**At $200/ton cost of cement. $12/m$^3$ and $15/m$^3$ referring to 40Mpa and 50Mpa mix designs respectively

# THE EFFICIENCY OF OUR BUSINESS MODEL IN CONCRETE

***Putting sense to the numbers: how we will drive profitability in the concrete market**

| Planned Graphene Production (Metric Tons per Year) | CAPEX to Build Facility | Product Format | Product Conversion Ratio (per 1T of Graphene) | Target Selling Price | Revenue per Metric Ton of Graphene | Total Revenue Potential @ 20T Graphene | Gross Margin | Graphene Breakeven (metric tons) | Time to Achieve Scale |
|---|---|---|---|---|---|---|---|---|---|
| 20Ts | $1M (CAD) | Liquid Admixture | 1T Graphene = 125,000Ls of Admixture Product | $4/L (CAD) | $500,000 (CAD) | $10M | 75%+ | < 5 | < 6 months |

- In every cubic meter of concrete (~2400Kg of material), we use less than 50 grams of our graphene material!!
- Our product efficiency drastically changes our business model versus other traditional graphene producers (graphitic source materials)
- We can scale methodically as we gain revenue visibility – we don't require large CAPEX to achieve economies of scale
- Our technology is licensable – providing an additional revenue channel & enabling the company to scale quickly
- At 20Ts of annual biographene production, our operations has the capability to support $10M+ in potential carbon credit eligibility

*Numbers for BGS based on internal pre-feasibility estimates. Actual numbers may differ materially.

# MOVING FORWARD:
## OUR SECONDARY MARKET APPROACH

BGS has begun strategic product development initiatives in other key markets with notable industry partners in graphene-enhanced battery, plastic, coating, polymer, water-treatment, and asphalt products.


**BGS has recently initiated a 2-year asphalt development program with the University of Waterloo and Green Infrastructure Partners (a subsidiary of GFL) supported by Mitacs and NSERC**

# SUPPORTED BY OUR INNOVATION CENTRE

The BGS Innovation Centre is a 6,000+ sq. ft. facility located in Cambridge, Ontario. The Centre currently houses our graphene lab facility (today, ~one metric ton of biographene production) and acts as a hub for our Research and Development team.

We've been able to attract and attain a group of world class scientists that continues to uncover unique and exciting ways of getting the most out of our product in the markets we serve.

Our facility has the capacity to support up to 20 metric tons of biographene production with minimal capital and auxiliary investment to support this build-out (~$1M CAD). The Centre serves as a platform to collaborate and support the integration of our biographene with new customers & industries.

# BGS TIMELINE & MILESTONES

## OUR METHODICAL GROWTH STRATEGY

NEW MEMBER OF THE GRAPHENE COUNCIL (SPRING 2021)

SEEDROUND:FUNDING FOR R&D INNOVATION CENTRE (SUMMER 2021)

$2M SERIES A FINANCING: LAB-SCALE PRODUCTION FACILITY & PRODUCT TESTING (DEC 2021)

TESTING BIOGRAPHENE WITH GLOBAL CONCRETE & ASPHALT COMPANIES (FEB 2022)

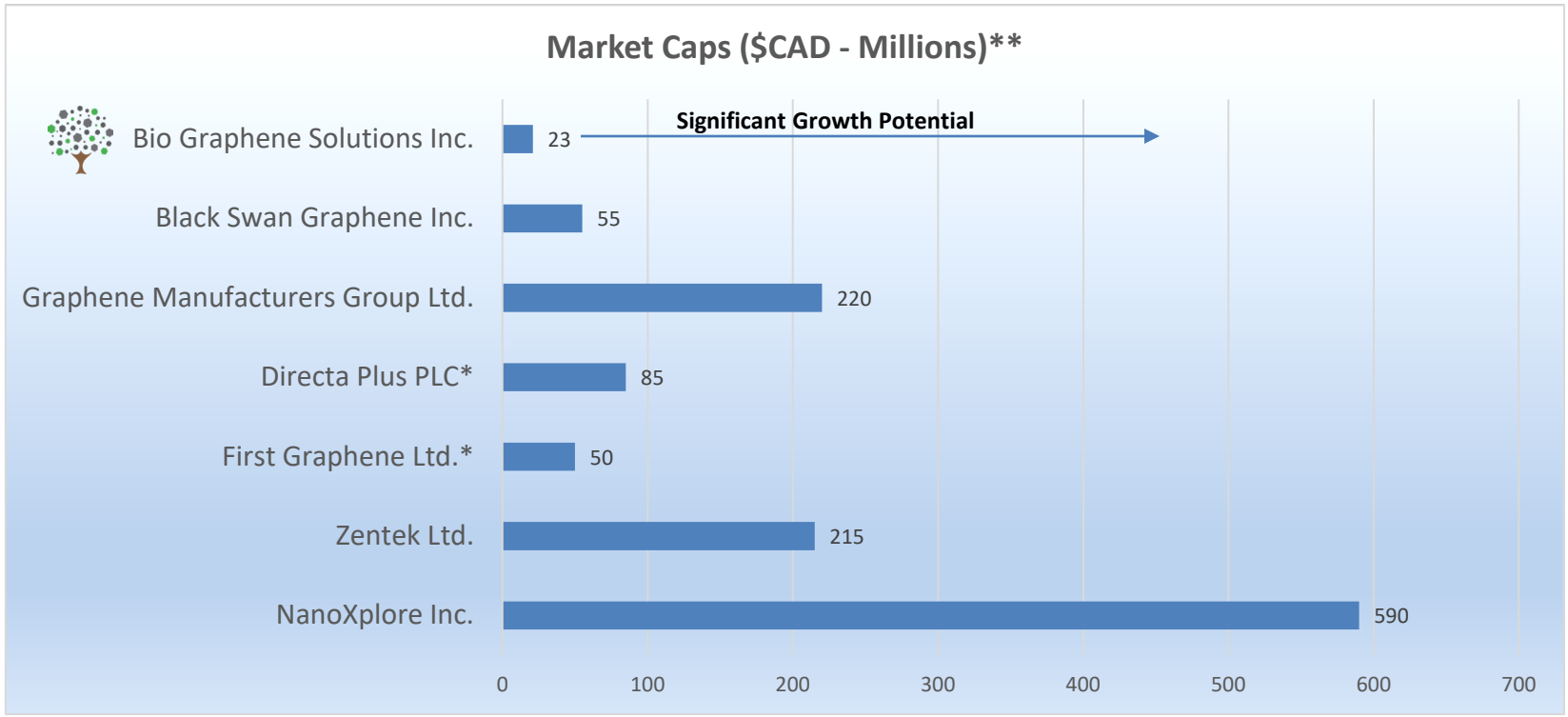
COMPLETION OF GRAPHENE PRODUCTION PATENT (MAY 2022)

FILING OF IN-SITU GRAPHENE SYNTHESIS PATENT (AUGUST 2022)

$5M FUNDING: COMMERCIAL PILOT FACILITY(MID/LATE 2023)

POTENTIAL GO-PUBLIC LISTING AND SUBSEUENT FINANCING FOR COMMERCIAL BUILDOUT (TARGETED 2024)

# SERIES B FINANCING – VALUATION COMPARISON (POST-MONEY)




## FUNDING TERMS:

- Series B Private Placement
- Pre-Money Value: $17,750,000
- $5M CAD Raise
- Price per Share: $0.55/sh

## PRE-MONEY CAPITAL STRUCTURE:

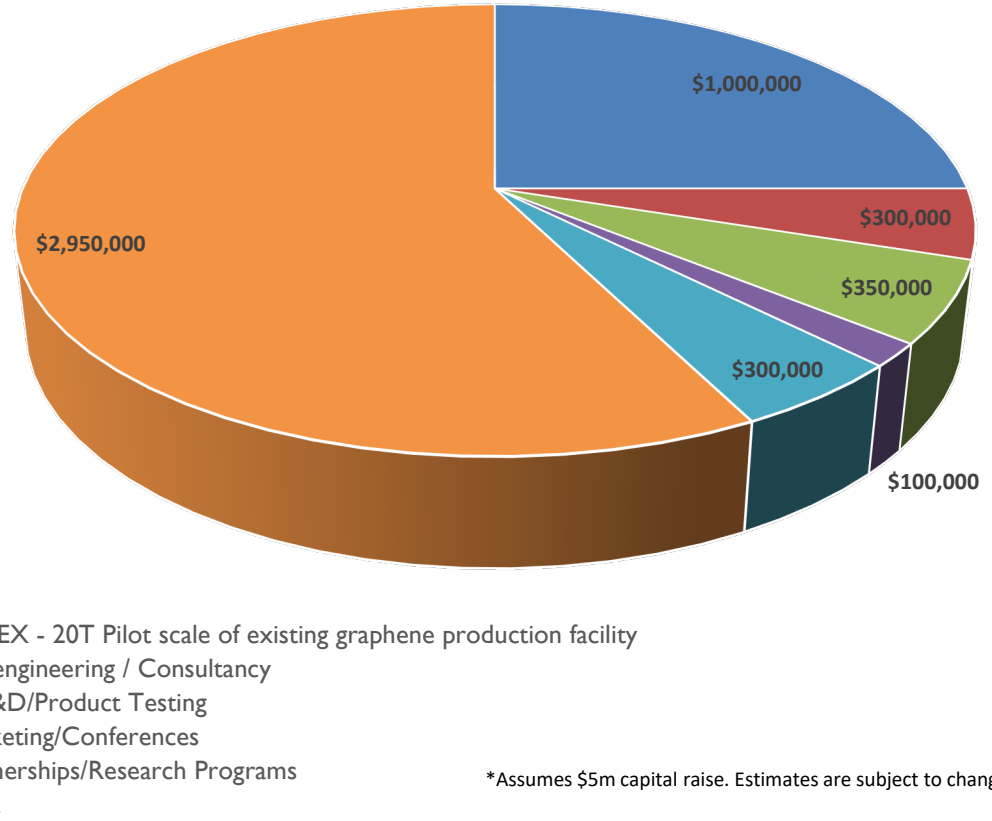
- Shares Outstanding: 27,211,418
- Options: 5,067,978
- Warrants: Nil
- Fully Diluted: 32,279,396

*Directa Plus market caps were converted @ 1.68 CAD/GBP as of June 13th 2023. First Graphene's market cap was converted @ 0.91 AUD/CAD as of June 13th, 2023.

**All market cap data was provided by Yahoo Finance as of June 13th 2023. Assumes $5M raised on BGS post-financing valuation.

# SERIES B – USE OF PROCEEDS*

- Within our existing facility, able to scale from 1T of graphene production per year to 20Ts for $1M in CAPEX
- 20Ts of graphene has the capability of supporting up to 2,000,000-3,000,000Ls of admixture product
- $2M+ in working capital for 12-18 months – adding head count, bolstering IP, and R&D/product development initiatives in other key market segments
- Demonstrated execution: BGS has raised ~$2.7M since incorporation (2019) further demonstrating our commitment to running a cost-efficient business




*Assumes $5m capital raise. Estimates are subject to change.

*Numbers for BGS based on internal pre-feasibility estimates. Actual numbers may differ materially.

# PARTNERING WITH BGS: THE ROI POTENTIAL

## Capitalizing on Our Product & Technology Advantage:

- Our IP – a unique graphene admixture that's been developed, extensively tested, and validated by large concrete & admixture producers – first graphene company to achieve this
- Production efficiency - our 20T graphene production expansion can support basic levels of admixture commercialization quickly & cost-effectively - minimalizing shareholder dilution
- The ability to redefine existing and new product groups – leveraging a true "green" innovative technology to drive measurable performance and sustainability change
- A distinct competitive advantage – no one has the focus, strategy, product capabilities, and in-house expertise than BGS

## Capitalizing on a Our Growth Potential:

- Ability to generate growth quickly via licensing & strategic partnerships that provide immediate revenue visibility and product validation
- De-risked investment – BGS has been able to attract strategic investment partners within the materials and construction space that are already championing our products
- Significant revenue upside with potential carbon credit eligibility ($10M+)
- A "call-option" on other upside commercial opportunities – BGS is also creating graphene-enabled solutions within other commodity-based markets that will add further value to the company overtime (e.g. batteries and energy storage applications)

*Numbers for BGS based on internal pre-feasibility estimates. Actual numbers may differ materially.

# OUR TEAM

## FOUNDERS

**DAVID FISHER**
CEO

30 years in marketing & management in mining, oil & gas, commodity markets, public and private companies with key positions in private and public companies

**GARY VAN DUSEN,** BSC-CHEM
CTO

35 years of manufacturing and recovery of metals and minerals in complex chemistries. Experienced in scaling production processes with key management positions in public and private companies

## ADVISORS

**TONY IACOCCA**

25+ years senior management experience with large multinational organizations within concrete and construction materials. Respected by industry peers as a leader and progressive thinker through active involvement in several industry associations at the Board level.

# EXECUTIVE & MANAGEMENT

**LIAM FARRELL,** CFA
COO

Operational experience within the graphene industry as the prior Commercial Officer for publicly-listed NanoXplore, responsible for all graphene-related sales, operations, marketing, and business development initiatives

**SCOTT CAMERON,** CPA, CA
CFO

More than 20 years executive experience at Home Equity Bank as the company's VP of Finance. Skilled in financial and regulatory reporting, strategic planning, budgeting and forecasting, tax, securitization financing and risk management.

**PETER TUOVI,** BSC (Chem-Eng), LLB, LLM
CLO

More than 30 years law experience with private and public companies. Currently a partner at McPhadden Samac Tuovi LLP, Lawyers acting as general counsel or as special counsel to businesses and their senior management.

**MIKE STEIN**
VP Business Development

Entrepreneur, business-owner and seasoned veteran in relationship management and business development. Previous executive experience in growing small companies from inception.

**RAFAELLA NASCIMENTO,** PhD
Head of R&D

Dr. Nascimento is a talented chemist with expertise in nanomaterials, surface modification, and eco-friendly processes. She is the inventor of many patents related to carbon nanomaterials (e.g. graphene and carbon nanotubes), nanoparticles, and chalcogenides. Her expertise has led to successful industry partnerships in the development of nanomaterials and technologies designed for bio imaging, pollutant sensors, water decontamination, additive manufacturing, and quantum computing. Dr. Nascimento has recently been recognized by the Graphene Council as a leader in the graphene industry

**LAURA MAMMOLITI,** PhD, P.Eng
Product Development Manager - Concrete

Dr. Mammoliti has over 25 years experience dealing with concrete durability, admixtures, cement & concrete chemistry, measurement, and quality control. She has extensive experience within the concrete industry holding previous senior management roles within quality control & testing with Armtec, Lafarge Holcim, Hanson, and Dufferin Concrete.

# APPENDIX: BGS IN BATTERIES & ENERGY APPLICATIONS


**BIO GRAPHENE SOLUTIONS**

25 ADELAIDE STREET EAST, SUITE 1711 TORONTO, ONTARIO M5C 3A1

E-mail: info@biographenesolutions.com

# BGS IN CAPACITORS & SUPERCAPICITORS

BGS is working with TEIU Energy in Brazil that provides characterization in different types of battery materials and the feasibility of these materials in devices such as lithium-ion batteries, sodium-ion batteries, and supercapacitors

- Graphite is a strategic material in battery applications – can account for 50% of a battery's composition
- Without calibration, initial results suggest that BGS's graphene material could be a full replacement technology for graphite in certain battery applications
- Tests suggest our graphene powder demonstrates good capacitance retention efficiency over long cycle periods (exceeding graphite or "activated carbon")
- BGS plans to do further tests to improve these results with TEIU via further calibration of our graphene materials & begin to explore lithium-ion batteries