

# PyroGenesis Canada Inc.

## Management's Discussion and Analysis

For the three and six month periods ended June 30, 2022 and 2021

(Unaudited)

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This management's discussion and analysis ("MD&A") is intended to assist readers in understanding the business environment, strategies, performance and risk factors of PyroGenesis Canada Inc. ("PyroGenesis", or the "Company"). The MD&A provides the reader with a view and analysis, from the perspective of management, of the Company's financial results for the three and six months ended June 30, 2022. The MD&A has been prepared in accordance with National Instrument 51-102, Continuous Disclosure Requirements, and should be read in conjunction with the audited consolidated financial statements and related notes thereto of the Company for the year ended December 31, 2021.

The condensed consolidated interim financial statements and MD&A have been reviewed by PyroGenesis' Audit Committee and were approved by its Board of Directors on August 15, 2022. The Board of Directors is responsible for ensuring that the Company fulfills its responsibilities for financial reporting and is ultimately responsible for reviewing and approving the MD&A. The Board of Directors carries out this responsibility principally through its Audit Committee. The Audit Committee is appointed by the Board of Directors and is comprised of independent directors. The Audit Committee reports its findings to the Board of Directors for its consideration when it approves the MD&A and financial statements for issuance to shareholders.

The following information takes into account all material events that took place up until August 15, 2022, the date on which the Company's Board of Directors approved this MD&A. Unless otherwise indicated, all amounts are presented in Canadian dollars. The Company's functional and reporting currency is the Canadian dollar.

Additional information regarding PyroGenesis is available on the System for Electronic Document Analysis and Retrieval ("SEDAR") at [www.sedar.com](http://www.sedar.com), the Electronic Data Gathering, Analysis, and Retrieval system ("EDGAR") at [www.sec.gov](http://www.sec.gov), and on the Company's website at [www.pyrogenesis.com](http://www.pyrogenesis.com).

### FORWARD-LOOKING STATEMENTS

This MD&A contains forward-looking statements and forward-looking information (collectively, "forward-looking statements") within the meaning of applicable securities legislation. All statements other than statements of historical fact contained in this MD&A are forward-looking statements, including, without limitation, the Company's statements regarding its products and services; relations with suppliers and clients; future financial position; business strategies; potential acquisitions; potential business partnering; litigation; and plans and objectives. In certain cases, forward-looking statements can be identified by the use of words such as "plans", "expects" or "does not expect", "is expected", "budget", "scheduled", "estimates", "forecasts", "intends", "anticipates" or "does not anticipate", or "believes", or variations of such words and phrases or state that certain actions, events or results "may", "could", "would", "might" or "will be taken", "occur" or "be achieved" and similar words or the negative thereof. Although management of the Company believes that the expectations represented in such forward-looking statements are reasonable, there can be no assurance that such expectations will prove to be correct.

In particular, this MD&A contains forward-looking statements that relate, but are not limited, to:

- the Company's business strategies, strategic objectives and growth strategy;
- the Company's current and future capital resources and the need for additional financing;
- the Company's ability to increase sales, including the results of the successful completion of the Company's current projects;
- management's expectation that the Company will achieve sustained annual growth and profitability, and that gross margins will increase resulting in a decrease in cost of sales as a percentage of revenue; and
- the Company's overall financial performance.

By their nature, forward-looking statements require assumptions and are subject to inherent risks and uncertainties including those discussed herein. In particular, forward-looking statements relating to future sales, growth and profitability are based on the assumption that current projects will be completed, and the Company will be awarded certain anticipated contracts pursuant to recent negotiations with, and statements made by, third parties. There is significant risk that predictions and other forward-looking statements will not prove to be accurate. Readers are cautioned to not place undue reliance on

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forward-looking statements made herein because a number of factors could cause actual future results, conditions, actions or events to differ materially from the targets, expectations, estimates or intentions expressed in the forward-looking statements.

Many factors could cause the Company's actual results, performance or achievements to be materially different from any future results, performance or achievements that may be expressed or implied by forward-looking statements, including, without limitation, risks and uncertainties relating to: the strength of the Canadian, US and Asian economies; operational, funding, and liquidity risks; unforeseen engineering and environmental problems; delays or inability to obtain required financing and/or anticipated contracts; risks associated with licenses, permits and regulatory approvals; supply interruptions or labour disputes; the impact of the Coronavirus (COVID-19) outbreak on our business and our operations; foreign exchange fluctuations and collection risk; competition from other suppliers, or alternative, less capital intensive, energy solutions; and risk factors described elsewhere under the heading "Risk Factors" in this MD&A and the Annual Information Form, and elsewhere in this MD&A and other filings that the Company has made and may make in the future with applicable securities regulatory authorities. We caution that the foregoing list of factors is not exhaustive, and that, when relying on forward-looking statements to make decisions with respect to the Company, investors and others should carefully consider these factors, as well as other uncertainties and potential events, and the inherent uncertainty of forward-looking statements.

Although the Company has attempted to identify significant factors that could cause actions, events or results to differ materially from those described in forward-looking statements, there may be other factors that cause actions, events or results not to be as anticipated, estimated or intended. There can be no assurance that forward-looking statements will prove to be accurate, as actual results and future events could differ materially from those anticipated in such statements. Accordingly, readers should not place undue reliance on forward-looking statements. Forward-looking statements are provided as of the date of this MD&A, and the Company assumes no obligation to update or revise such forward-looking statements to reflect new events or circumstances except as required under applicable securities laws.

The forward-looking statements contained herein are expressly qualified in their entirety by this cautionary statement. The forward-looking statements included in this MD&A are made as of the date of this MD&A or such other date specified herein.

### **BASIS OF PRESENTATION**

For reporting purposes, we prepared the 2022 Q2 condensed consolidated interim Financial Statements in accordance with International Financial Reporting Standards ("IFRS") as issued by the International Accounting Standards Board. The financial information contained in this MD&A was derived from the 2021 Consolidated Financial Statements. Unless otherwise indicated, all references to "\$" are to Canadian dollars. Unless otherwise indicated, all references to a specific "note" refer to the notes to the 2022 Q2 condensed consolidated interim Financial Statements. Certain totals, subtotals and percentages throughout this MD&A may not reconcile due to rounding.

### **NON-IFRS MEASURES**

This MD&A makes reference to certain non-IFRS measures. These measures are not recognized measures under IFRS and do not have a standardized meaning prescribed by IFRS and are therefore unlikely to be comparable to similar measures presented by other companies. Rather, these measures are provided as additional information to complement those IFRS measures by providing further understanding of our results of operations from management's perspective. Accordingly, these measures should not be considered in isolation nor as a substitute for analysis of our financial information reported under IFRS.

We use non-IFRS measures, including EBITDA, Adjusted EBITDA and Modified EBITDA. EBITDA, Adjusted EBITDA and Modified EBITDA are not considered an alternative to income or loss from operations, or to net earnings or loss, in the context of measuring a company's performance. These non-IFRS measures are used to provide investors with supplemental measures of operating performance and thus highlight trends in our business that may not otherwise be apparent when relying solely on IFRS measures. We also believe that securities analysts, investors and other interested parties frequently use non-IFRS measures in the evaluation of issuers. Our management also uses non-IFRS measures in order to facilitate operating performance comparisons from period to period, to prepare annual operating budgets and forecasts and to determine components of management compensation. Management believes that EBITDA, Adjusted EBITDA and Modified EBITDA are important measures of operating performance because it allows management, investors and others to evaluate

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and compare the Company's operating results, including its return on capital and operating efficiencies, from period-to-period by removing the impact of the Company's capital structure consequences, and other non-operating items not requiring cash outlays including the adjustment to the fair value of investments and share-based compensation.

### EBITDA

We define EBITDA as Net Earnings before Net Financing Charges, Taxes, Depreciation and Amortization. See "Results of Operations - Reconciliation of Non-IFRS measures (EBITDA, Adjusted EBITDA and Modified EBITDA)".

### Adjusted EBITDA

We define Adjusted EBITDA as Net Earnings before Net Financing Charges, Taxes, Depreciation, Amortization and other non-cash items including share-based payment costs, inventory and equipment write-offs, and the tax assessment. See "Results of Operations - Reconciliation of Non-IFRS measures (EBITDA, Adjusted EBITDA and Modified EBITDA)".

### Modified EBITDA

We defined Modified EBITDA as Adjusted EBITDA before the change in fair value of investments. See "Results of Operations - Reconciliation of Non-IFRS measures (EBITDA, Adjusted EBITDA and Modified EBITDA)".

## OVERVIEW

PyroGenesis Canada Inc. is a leader in the design, development, manufacture and commercialization of advanced plasma processes. We provide engineering and manufacturing expertise, cutting-edge contract research, as well as turnkey process equipment packages to the defense, metallurgical, mining, additive manufacturing (including 3D printing), oil & gas, and environmental industries. With a team of experienced engineers, scientists and technicians working out of our Montreal office and our 40,902 sq. ft. (3,800 m<sup>2</sup>) and 31,632 sq. ft. (2,940 m<sup>2</sup>) manufacturing facilities, PyroGenesis maintains its competitive advantage by remaining at the forefront of technology development and commercialization. Our core competencies allow PyroGenesis to lead the way in providing innovative plasma torches, plasma waste processes, high-temperature metallurgical processes, and engineering services to the global marketplace. Our operations are ISO 9001:2015 and AS9100D certified, having been ISO certified since 1997. Since our acquisition of Pyro Green-Gas (formerly AirScience Technologies Inc), we now offer technologies, equipment, and expertise in the area of biogas upgrading, and air pollution control. As a result, we have extended our presence to Italy and India, and this acquisition provides potential synergies with our current land-based waste destruction offerings. Our common shares are listed on the Toronto Stock Exchange (TSX) (Ticker Symbol: PYR), NASDAQ (Ticker Symbol: PYR) and the Frankfurt Stock Exchange (FSX) (Ticker symbol: 8PY).

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### SELECTED FINANCIAL INFORMATION

	Three months ended June 30,		% Change	Six months ended June 30,		% Change
	2022	2021	2022 vs 2021	2022	2021	2022 vs 2021
<b>Revenues</b>	\$ 5,847,180	\$ 8,280,572	-29%	\$ 10,053,942	\$ 14,545,075	-31%
Cost of sales and services	3,347,907	3,347,091	0.02%	6,502,947	7,468,584	-13%
Gross margin	2,499,273	4,933,481	-49%	3,550,995	7,076,491	-50%
<b>Expenses</b>						
Selling, general and administrative (not including share-based expenses)	5,470,495	3,371,888	62%	9,413,233	6,174,984	52%
Research and development, net	804,564	710,734	13%	1,286,996	997,041	29%
Total expenses (not including share-based expenses)	6,275,059	4,082,622	54%	10,700,229	7,172,025	49%
Net (loss) income from operations (not including share-based expenses)	(3,775,786)	850,859	-544%	(7,149,234)	(95,534)	7383%
Share-based expenses	(1,621,040)	(3,288,685)	-51%	(3,290,670)	(4,211,025)	-22%
Net (loss) income from operations	(5,396,826)	(2,437,826)	121%	(10,439,904)	(4,306,559)	142%
Changes in fair market value of strategic investments and financial expenses	(7,633,978)	(17,924,379)	57%	(6,641,123)	(12,342,743)	46%
Income taxes	19,542	–	100%	76,095	–	100%
<b>Net earnings (loss)</b>	\$ (13,050,346)	\$ (20,362,205)	-36%	\$ (17,157,122)	\$ (16,649,302)	3%
Foreign currency translation gain on investments in foreign operations	10,815	–	100%	48,471	–	100%
<b>Comprehensive income (loss)</b>	\$ (13,039,531)	(20,362,205)	-36%	\$ (17,108,651)	(16,649,302)	3%
<b>Earnings (loss) per share</b>						
Basic	\$ (0.08)	\$ (0.12)		\$ (0.10)	\$ (0.10)	
Diluted	\$ (0.08)	\$ (0.11)		\$ (0.10)	\$ (0.09)	
<b>Modified EBITDA <sup>(1)</sup></b>	\$ (3,242,402)	\$ 1,090,915	-397%	\$ (6,050,221)	\$ 329,416	-1937%

<sup>1</sup>. See "Non-IFRS Measures"

### Extract from Statement of Financial Position at:

	June 30, 2022	Dec 31, 2021
Current assets	30,206,728	38,758,984
Non-current assets	24,270,742	31,011,693
<b>Total assets</b>	\$ 54,477,470	\$ 69,770,677
Current liabilities	22,388,968	24,752,199
Non-current liabilities	5,137,729	4,249,724
<b>Total liabilities</b>	\$ 27,526,697	\$ 29,001,923
<b>Shareholders' equity</b>	\$ 26,950,773	\$ 40,768,754

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### RESULTS OF OPERATIONS

#### Revenues

PyroGenesis recorded revenue of \$5,847,180 in the second quarter of 2022 ("Q2, 2022"), representing a decrease of 29% compared with \$8,280,572 (which includes 3.3M sale of intellectual properties) recorded in the second quarter of 2021 ("Q2, 2021"), Revenue for the six months of fiscal 2022 was \$10,053,942 a decrease of 31% over revenue of \$14,545,075 during the same period in 2021.

Revenues recorded in the three and six months ended June 30, 2022, were generated from:

- (i) DROSRITE™ related sales of \$436,538, \$1,336,617 (2021 Q2 - \$1,648,882, \$4,389,606)
- (ii) PUREVAP™ related sales of \$727,378, \$1,168,983 (2021 Q2 - \$3,896,453, \$4,521,539)
- (iii) torch related sales of \$1,550,201, \$2,591,909 (2021 Q2 - \$557,613, \$752,835)
- (iv) development and support related to systems supplied to the U.S. Navy of \$591,099, \$1,336,359 (2021 Q2 - \$2,133,187, \$4,719,208)
- (v) biogas upgrading and pollution controls of \$2,181,107, \$3,171,152 (2021 Q2 - \$Nil, \$Nil)
- (vi) other sales and services of \$360,858, \$448,922 (2021 Q2 - \$44,437, \$161,887)

As of August 15, 2022, revenue expected to be recognized in the future related to performance obligations that are unsatisfied (or partially satisfied) is \$35,282,425. Revenue will be recognized as the Company satisfies its performance obligations under long-term contracts, which is expected to occur over a maximum period of approximately 3 years.

#### Cost of Sales and Services

	Three months ended June 30,		% Change	Six months ended June 30,		% Change
	2022	2021	2022 vs 2021	2022	2021	2022 vs 2021
Employee compensation	\$ 901,826	\$ 544,725	66%	\$ 1,704,455	\$ 1,131,868	51%
Subcontracting	360,140	38,241	842%	1,031,416	600,498	72%
Direct materials	1,612,969	2,547,913	-37%	2,695,752	5,366,323	-50%
Manufacturing overhead & other	725,145	246,770	194%	884,764	455,207	94%
Foreign exchange charge on materials	(447,968)	(1,022)	43732%	(226,165)	(61,373)	269%
Investment tax credits	(22,964)	(36,315)	-37%	(24,793)	(37,498)	-34%
<b>Cost of Sales and Services before Amortization of Intangible Assets</b>	<b>\$ 3,129,148</b>	<b>\$ 3,340,312</b>	<b>-6%</b>	<b>\$ 6,065,429</b>	<b>\$ 7,455,025</b>	<b>-19%</b>
Amortization of intangible assets	218,759	6,779	3127%	437,518	13,559	3127%
<b>Total Cost of Sales and Services</b>	<b>\$ 3,347,907</b>	<b>\$ 3,347,091</b>	<b>0.02%</b>	<b>\$ 6,502,947</b>	<b>\$ 7,468,584</b>	<b>-13%</b>

#### Gross Margin

	Three months ended June 30,		Six months ended June 30,	
	2022	2021	2022	2021
Revenues	\$ 5,847,180	\$ 8,280,572	\$ 10,053,942	\$ 14,545,075
Cost of Sales and Services	3,347,907	3,347,091	6,502,947	7,468,584
Gross Margin	\$ 2,499,273	\$ 4,933,481	\$ 3,550,995	\$ 7,076,491
Gross Margin %	43%	60%	35%	49%

Cost of sales and services before amortization of intangible assets is not a performance measure defined under IFRS and it is not considered an alternative to gross margin in the context of measuring the Company's performance. Management believes that providing certain non-GAAP performance measures, in addition to IFRS measures, provides users of the Company's financial statements with an enhanced understanding of its results and related trends, and increases transparency and clarity. Gross margin before amortization of intangible assets is an important measure of operating performance because it allows management, investors and others to evaluate and compare the Company's core operating results, including its return on capital and operating efficiencies, from period to period, by removing the impact of non-operating items not requiring cash outlays. Securities regulations require that companies caution readers that earnings and other measures adjusted to a basis other than IFRS do not have standardized meanings and are unlikely to be comparable to similar measures used by other companies. Accordingly, they should not be considered in isolation or a substitute for financial measures prepared in accordance with IFRS.

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Cost of sales and services before amortization of intangible assets was \$3,129,148 in Q2 2022, representing a decrease of 6% compared with \$3,340,312 in Q2 2021, primarily due to a decrease in direct materials of \$1,612,969 (Q2 2022 - \$2,547,913) and increases in employee compensation, subcontracting, manufacturing overhead & other of \$1,987,111 (Q2 2022 - \$829,736), offset by the increase in foreign exchange charge on materials of (\$447,968) (Q2 2022 - (\$1,022)).

The gross margin for the Q2 2022 three-month period was \$2,499,273 or 43% of revenue compared to a gross margin of \$4,933,481 or 60% of revenue for Q2 2021.

As a result of the type of contracts being executed, the nature of the project activity, as well as the composition of the cost of sales and services, as the mix between labour, materials and subcontracts may be significantly different. In addition, due to the nature of these long-term contracts, the Company has not necessarily passed on to the customer, the increased cost of sales which was attributable to inflation, if any.

Investment tax credits related to qualifying projects from the provincial government in Q2 2022 were \$22,964 (Q2 2021 - \$36,315). The Company also recorded for the six months ended June 30, 2022, \$24,793 (2021 - \$37,498) of the investment tax credits against cost of sales and services, \$31,641 (2021 - \$23,880) against research and development expenses and \$15,000 (2021 - \$15,979) against selling general and administrative expenses.

The amortization of intangible assets of \$218,759 in Q2 2022 compared to \$6,779 for Q2 2021 relates mainly to the intangible assets in connection with the Pyro Green-Gas acquisition, patents and deferred development costs. These expenses are non-cash items and will be amortized over the duration of their expected lives.

### Selling, General and Administrative Expenses

	Three months ended June 30,		% Change	Six months ended June 30,		% Change
	2022	2021	2022 vs 2021	2022	2021	2022 vs 2021
Employee compensation	\$ 1,870,165	\$ 1,291,580	45%	\$ 3,541,954	\$ 2,508,052	41%
Professional fees	1,740,978	918,964	89%	2,402,957	1,908,171	26%
Office and general	223,629	106,921	109%	457,089	265,674	72%
Travel	80,453	5,727	1305%	107,662	13,142	719%
Depreciation of property and equipment	148,412	84,061	77%	291,402	160,378	82%
Depreciation of ROU assets	155,398	149,217	4%	321,622	251,011	28%
Investment tax credits	(7,500)	(8,479)	-12%	(15,000)	(15,979)	-6%
Government grants	(55,077)	(17,234)	220%	(94,511)	(17,234)	448%
Other expenses	1,314,037	841,131	56%	2,400,058	1,101,769	118%
<b>Sub-total not including share-based expenses</b>	<b>\$ 5,470,495</b>	<b>\$ 3,371,888</b>	<b>62%</b>	<b>\$ 9,413,233</b>	<b>\$ 6,174,984</b>	<b>52%</b>
Share-based expenses	1,621,040	3,288,685	-51%	3,290,670	4,211,025	-22%
<b>Total selling, general and administrative</b>	<b>\$ 7,091,535</b>	<b>\$ 6,660,573</b>	<b>6%</b>	<b>\$ 12,703,903</b>	<b>\$ 10,386,009</b>	<b>22%</b>

Included within Selling, General and Administrative expenses ("SG&A") are costs associated with corporate administration, business development, project proposals, operations administration, investor relations and employee training.

SG&A expenses for Q2 2022 excluding the costs associated with share-based compensation (a non-cash item in which options vest principally over a four-year period), were \$5,470,495 representing an increase of 62% compared with \$3,371,888 reported for Q2 2021.

The increase in SG&A expenses in Q2 2022 over the same period in 2021 is mainly attributable to the Pyro Green-Gas acquisition and the net effect of:

- (i) an increase of 45% in employee compensation due primarily to additional head count,
- (ii) an increase of 89% for professional fees, primarily due to an increase in accounting fees and legal fees,
- (iii) an increase of 109% in office and general expenses, is due to an increase in computer and internet expenses, security expenses and stationary and office related expenses,

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- (iv) travel costs increased by 1,305%, due to an increase in travel abroad,
- (v) depreciation on property and equipment increased by 77% due to higher amounts of property and equipment being depreciated,
- (vi) depreciation on right of use assets increased by 4% due to higher amounts of right of use assets being depreciated,
- (vii) Investment tax credits decreased by 12%, due to a decrease in qualifying projects,
- (viii) government grants increased by 220% due to higher levels of activities supported by such grants,
- (ix) other expenses increased by 56%, primarily due to an increase in couriers & freight,

Separately, share based payments decreased by 51% in Q2 2022 over the same period in 2021.

### Depreciation on Property and Equipment

	Three months ended June 30,		% Change	Six months ended June 30,		% Change
	2022	2021	2022 vs 2021	2022	2021	2022 vs 2021
Depreciation of property and equipment	\$ 148,412	\$ 84,061	77%	\$ 291,402	\$ 160,378	82%

The depreciation on property and equipment increased to \$148,412 in Q2 2022, compared with \$84,061 in Q2 2021. The 77% increase is primarily due to higher amounts of property and equipment being depreciated.

### Research and Development ("R&D") Costs

	Three months ended June 30,		% Change	Six months ended June 30,		% Change
	2022	2021	2022 vs 2021	2022	2021	2022 vs 2021
Employee compensation	\$ 219,232	\$ 213,209	3%	\$ 455,683	\$ 381,156	20%
Investment tax credits	(30,473)	(5,913)	415%	(31,641)	(23,880)	33%
Subcontracting	51,973	43,701	19%	84,027	86,291	-3%
Materials and equipment	470,574	463,509	2%	614,994	581,640	6%
Other expenses	93,258	66,559	40%	163,933	101,344	62%
<b>Sub-total before government grants</b>	<b>\$ 804,564</b>	<b>\$ 781,065</b>	<b>3%</b>	<b>\$ 1,286,996</b>	<b>\$ 1,126,551</b>	<b>14%</b>
Government grants	-	(70,331)	-100%	-	(129,510)	-100%
<b>Total net R&amp;D expenses</b>	<b>\$ 804,564</b>	<b>\$ 710,734</b>	<b>13%</b>	<b>\$ 1,286,996</b>	<b>\$ 997,041</b>	<b>29%</b>

The Company incurred \$804,564 of R&D costs, net of government grants, on internal projects in Q2 2022, an increase of 13% as compared with \$710,734 in Q2 2021. The increase in Q2 2022 is primarily related to an increase in employee compensation, investment tax credits, subcontracting, materials and equipment, and other expenses and a decrease in government grants recognized. During the first six months of fiscal 2022, net spending on internal R&D was \$1,286,996 as compared to \$997,041 in 2021, primarily due to an increase in R&D activities performed.

In addition to internally funded R&D projects, the Company also incurred R&D expenditures during the execution of client funded projects. These expenses are eligible for Scientific Research and experimental Development ("SR&ED") tax credits. SR&ED tax credits on client funded projects are applied against cost of sales and services (see "Cost of Sales" above).

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### Financial Expenses

	Three months ended June 30,		% Change	Six months ended June 30,		% Change
	2022	2021	2022 vs 2021	2022	2021	2022 vs 2021
<b>Financial expenses</b>						
Interest on term loans	12,226	2,988	309%	13,077	9,438	39%
Interest on lease liabilities	111,993	90,947	23%	189,458	136,928	38%
Interest accretion on balance due on business combination	44,115	–	100%	127,088	–	100%
Penalties and other interest expenses	25,328	10,480	142%	49,303	11,135	343%
	193,662	104,415	85%	378,926	157,501	141%
<b>Financial income</b>						
Accretion interest on royalty receivable	(37,549)	(64,329)	-42%	(38,913)	(64,329)	-40%
<b>Financial expenses</b>	<b>\$ 156,113</b>	<b>\$ 40,086</b>	<b>289%</b>	<b>\$ 340,013</b>	<b>\$ 93,172</b>	<b>265%</b>

Finance expenses for Q2 2022 totaled \$156,113 as compared with \$40,086 for Q2 2021, representing an increase of 289% year-over-year. The increase in finance expenses in Q2 2022, is primarily attributable to higher interest and accretion due on the business combination.

### Strategic Investments

	Three months ended June 30,		% Change	Six months ended June 30,		% Change
	2022	2021	2022 vs 2021	2022	2021	2022 vs 2021
Changes to fair value of strategic investments	\$ (7,477,865)	\$ (17,884,293)	58%	\$ (6,301,110)	\$ (12,249,571)	49%

The adjustment to fair market value of strategic investments for Q2 2022 resulted in a loss of \$7,477,865 compared to a loss in the amount of \$17,884,293 in Q2 2021. The loss is attributable to the decreased market share value of common shares and warrants owned by the Company of HPQ Silicon Resources Inc.

### Comprehensive (loss) Income

	Three months ended June 30,		% Change	Six months ended June 30,		% Change
	2022	2021	2022 vs 2021	2022	2021	2022 vs 2021
<b>Comprehensive (loss) income</b>	<b>\$ (13,039,531)</b>	<b>\$ (20,362,205)</b>	<b>-36%</b>	<b>\$ (17,108,651)</b>	<b>\$ (16,649,302)</b>	<b>3%</b>

The comprehensive loss for Q2 2022 of \$13,039,531 compared to a loss of \$20,362,205, in Q2 2021, represents a decrease of 36% year-over-year. The decrease of \$7,322,674 in the comprehensive loss in Q2 2022 is primarily attributable to the factors described above, which have been summarized as follows:

- (i) a decrease in product and service-related revenue of \$2,433,392 arising in Q2 2022,
- (ii) an increase in cost of sales and services of \$816, primarily due to increase in foreign exchange charge on materials and the decrease in direct materials, offset by the increase in employee compensation, subcontracting, manufacturing overhead & other, investment tax credits, and amortization of intangible assets,
- (iii) an increase in SG&A expenses of \$430,962 arising in Q2 2022 primarily due to an increase in employee compensation, professional fees, office and general, travel, depreciation in property and equipment, depreciation ROU assets, government grants, and other expenses which is offset by a decrease in share-based expenses,
- (iv) an increase in R&D expenses of \$93,830 primarily due to an increase in subcontracting, material and equipment and other expenses and a decrease in government grants,
- (v) an increase in financial expenses of \$116,027 in Q2 2022 primarily due to interest on lease liabilities, interest accretion on balance due on business combination and other interest expenses,
- (vi) an increase in fair value adjustment of strategic investments of \$10,406,428 in Q2 2022,
- (vii) an increase in income taxes of \$19,542 in Q2 2022.

# PyroGenesis Canada Inc.

## Management's Discussion and Analysis

For the three and six month periods ended June 30, 2022 and 2021

(Unaudited)

### Reconciliation of Non-IFRS measures (EBITDA, Adjusted and Modified)

	Three months ended June 30,			% Change 2022 vs 2021	Six months ended June 30,			% Change 2022 vs 2021
	2022	2021			2022	2021		
Comprehensive income (loss)	\$ (13,039,531)	\$ (20,362,205)		-36%	\$ (17,108,651)	\$ (16,649,302)		3%
Depreciation of property and equipment	148,412	84,061		77%	291,402	160,378		82%
Depreciation of ROU assets	155,398	149,217		4%	321,622	251,011		28%
Amortization of intangible assets	218,759	6,779		3127%	437,518	13,559		3127%
Financial expenses	156,113	40,085		289%	340,013	93,172		265%
Income taxes	19,542	-		100%	76,095	-		100%
<b>EBITDA</b>	<b>\$ (12,341,307)</b>	<b>\$ (20,082,063)</b>		<b>-39%</b>	<b>\$ (15,642,001)</b>	<b>\$ (16,131,182)</b>		<b>-3%</b>
Other non-cash items:								
Share-based expenses	1,621,040	3,288,685		-51%	3,290,670	4,211,025		-22%
<b>Adjusted EBITDA</b>	<b>\$ (10,720,267)</b>	<b>\$ (16,793,378)</b>		<b>-36%</b>	<b>\$ (12,351,331)</b>	<b>\$ (11,920,157)</b>		<b>4%</b>
Change in fair value of strategic investments	7,477,865	17,884,293		58%	6,301,110	12,249,571		49%
<b>Modified EBITDA <sup>(1)</sup></b>	<b>\$ (3,242,402)</b>	<b>\$ 1,090,915</b>		<b>-397%</b>	<b>\$ (6,050,221)</b>	<b>\$ 329,416</b>		<b>-1937%</b>

<sup>1</sup> See "Non-IFRS Measures"

The EBITDA in Q2 2022 was \$12,341,307 loss compared with an EBITDA loss of \$20,082,063 for Q2 2021, representing a decrease of 39% year-over-year. The \$7,740,756 decrease in the EBITDA loss in Q2 2022 compared with Q2 2021 is due to the decrease in comprehensive loss of \$7,322,673, an increase in depreciation on property and equipment of \$64,351, an increase in depreciation ROU assets of \$6,181, an increase in amortization of intangible assets of \$211,980, an increase in financial expenses of \$116,028, and an increase in income taxes of \$19,542.

Adjusted EBITDA loss in Q2 2022 was \$10,720,267 compared with an Adjusted EBITDA loss of \$16,793,378 for Q2 2021. The decrease of \$6,073,111 in the Adjusted EBITDA loss in Q2 2022 is attributable to a decrease in EBITDA loss of \$7,740,756, and by a decrease of \$1,667,646 in share-based payments.

The Modified EBITDA loss in Q2 2022 was \$3,242,402 compared with a Modified EBITDA gain of \$1,090,915 for Q2 2021, representing a decrease of 397%. The decrease of \$4,333,318 in the Modified EBITDA loss in Q2 2022 is attributable to the decrease as mentioned above in the Adjusted EBITDA of \$6,073,111 and a decrease in the change of fair value of strategic investments of \$10,406,428.

### SUMMARY OF QUARTERLY RESULTS

	2022		2021				2020	
	Q2	Q1	Q4	Q3	Q2	Q1	Q4	Q3
Revenues	5,847,180	4,206,762	7,205,349	9,317,926	8,280,572	6,264,503	6,778,240	8,149,427
Gross margin	2,499,273	1,051,723	1,302,789	4,052,531	4,933,481	2,143,010	3,236,136	5,532,526
Gross margin %	42.7%	25.0%	18%	44%	60%	34%	48%	68%
Net income (loss) and comprehensive income (loss)	(13,039,531)	(4,069,119)	(22,402,857)	623,664	(20,362,205)	3,712,903	22,971,415	15,325,996
Earnings (loss) per share								
Basic	(0.08)	(0.02)	(0.13)	-	(0.12)	0.02	0.15	0.1
Diluted	(0.08)	(0.02)	(0.13)	-	(0.11)	0.02	0.15	0.09

The majority of PyroGenesis' revenue is recognised over the time of the contract and is dependent on the timing of project initiation and execution, including project engineering, manufacturing, and testing.

# PyroGenesis Canada Inc.

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### LIQUIDITY AND CAPITAL RESOURCES

As at June 30, 2022, the Company has cash and cash equivalents of \$1,291,508. In addition, the accounts payable and accrued liabilities of \$9,404,542 are payable within 12 months.

	Carrying value	Total contractual amount	< 1 year	2-3 years	4-5 years	Over 5 years
	\$	\$	\$	\$	\$	\$
Bank indebtedness	941,180	941,180	941,180	–	–	–
Accounts payable and accrued liabilities	9,404,542	9,404,542	9,404,542	–	–	–
Term loans	390,755	538,123	81,805	142,377	180,000	133,941
Balance due on business combination	3,861,513	4,137,820	2,177,800	1,960,020	–	–
Lease liabilities	6,201,797	7,414,446	3,361,053	1,187,589	859,149	2,006,655
	<b>20,799,787</b>	<b>22,436,111</b>	<b>15,966,380</b>	<b>3,289,986</b>	<b>1,039,149</b>	<b>2,140,596</b>

### SUMMARY OF CASH FLOWS

	Three months ended June 30,		Six months ended June 30,	
	2022	2021	2022	2021
Cash provided by (used in) operating activities	\$ (2,752,116)	\$ (7,282,329)	\$ (10,489,744)	\$ (13,917,452)
Cash provided by (used in) investing activities	(2,152,488)	(5,000,280)	(906,347)	1,848,594
Cash provided by (used in) financing activities	(419,500)	4,084,805	478,839	12,040,498
Effect of exchange rate changes on cash denominated in foreign currency	2,988	–	6,247	–
Increase (decrease) in cash	(5,321,116)	(8,197,805)	(10,911,005)	(28,360)
Cash and cash equivalents - end of period	1,291,508	18,076,539	1,291,508	18,076,539

During the three months ended June 30, 2022, cash flows used by operating activities was \$2,752,116 compared to cash flows used of \$7,282,329 for the same period in the prior year. The use of cash by operating activities during Q2, 2022 consists of the net loss of \$13,050,346 (2021 – net loss of \$20,362,205) less adjustments for operating activities of \$9,861,066 (2021 – decrease of \$21,624,326), plus a net negative change in non-cash operating working capital items of \$2,752,116 (2021 – negative change of \$7,282,329).

Investing activities resulted in a use of cash of \$2,152,488 in Q2 2022, compared to a use of cash of \$5,000,280 for the same period in the prior year, mainly resulting from the purchase of strategic investments.

Financing activities in Q2, 2022 resulted in a use of funds of \$419,500, compared with generated funds of \$4,084,805 for the same period in 2021. In Q2, 2022 the cash used for such Financing activities included the increase in bank indebtedness of \$2,295 and proceeds from the Economic Development Agency of Canada Loan of \$96,157. In Q2, 2022, the Company also made payment of leases liabilities of \$145,415, (compared to \$25,965 in Q2, 2021) and a payment on the balance due on business combination of \$217,778. Interest paid was \$141,946 in Q2 2022 compared to \$101,427 in Q2 2021.

The net cash position of the Company decreased by \$5,321,116 for Q2, 2022 compared to a decrease of \$8,197,805 for Q2, 2021.

# PyroGenesis Canada Inc.

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### CAPITAL STOCK INFORMATION

The authorized share capital of the Company consists of an unlimited number of Common shares (the "Common Shares"). On August 15, 2022, PyroGenesis had 170,125,795 Common shares, 10,653,000 outstanding stock options issued, and 8,100,500 exercisable options issued.

### GOING CONCERN

The Company presumes it will be able to realize its assets and discharge its liabilities in the normal course of business for the foreseeable future. The Company's management has reviewed the Company's projected cash flow and backlog and is of the opinion that the Company has sufficient cash and cash equivalents and will generate cash flow inflow and profits from operations and strategic investments to meet current and future cash requirements. Management expects that the investments currently being made in accelerating projects under development for various clients, together with executing on its \$35.3M backlog as of August 15, 2022, which is primarily related to the Company's successful diversification into niche markets of the additive manufacturing (including 3D printing), and metals & mining industries, and projects related to biogas upgrading, will continue to improve the Company's cash position.

The 2021 consolidated Financial Statements have been prepared using IFRS as issued by the IASB applicable to a going concern, which contemplates the realization of assets and settlement of liabilities in the normal course of business as they become due. If the going concern assumption were not appropriate for these consolidated financial statements, then adjustments would be necessary to the carrying value of assets and liabilities, the reported expenses and the statements of financial position classifications used. The impact on the consolidated financial statements could be material.

### RELATED PARTY TRANSACTIONS

During the three-month and six-month period ended June 30, 2022, the Company concluded the following transactions with related parties:

In January 2020, the Company entered into a lease agreement for the rental of a property with a trust whose beneficiary is the controlling shareholder and CEO of the Company. At June 30, 2022 the carrying amount of the ROU asset and lease liabilities are \$898,977 and \$976,874 (\$1,107,131 and \$Nil, respectively, at December 31, 2021).

Rent and property taxes were charged by a trust whose beneficiary is the controlling shareholder and CEO of the Company, for the three and six month periods ended June 30, 2022, amount to \$70,226 and \$139,280 respectively, compared to \$68,825 and \$137,284 for the three and six month periods ended June 30, 2022 and 2021, respectively.

A balance due to the controlling shareholder and CEO of the Company amounted to \$144,450 (\$144,506 at December 31, 2021) and is included in accounts payable and accrued liabilities.

The Key Management Personnel of the Company, in accordance with IAS 24, are the members of the Board of Directors and certain officers. Total compensation to key management, for the three-month periods, consisted of the following:

	2022	2021	2022	2021
	\$	\$	\$	\$
Salaries – key management	257,871	218,656	573,842	460,215
Pension contributions	4,787	3,971	10,680	8,407
Fees – Board of Directors	69,000	41,500	89,000	75,000
Share - based compensation - officers	486,841	1,312,708	812,914	1,792,325
Share – based compensation – Board of Directors	1,106,066	1,539,634	1,758,213	1,711,850
Other benefits – key management	7,599	43,363	14,038	53,352
Total compensation	1,932,164	3,159,832	3,258,687	4,101,149

# PyroGenesis Canada Inc.

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(Unaudited)

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### **CRITICAL ACCOUNTING ESTIMATES, NEW AND FUTURE ACCOUNTING POLICIES AND FINANCIAL INSTRUMENTS**

For a discussion of significant accounting policies, judgements, estimates assumptions and financial instruments, please refer to notes 3, 4 and 28 of the 2021 consolidated Financial Statements.

### **CONTROLS AND PROCEDURES**

In the years prior to, and most of 2020, the Company's shares traded on the TSX Venture Exchange ("TSXV"), and all requirements of the TSXV were attained by the Company. The Company graduated from the TSXV to the Toronto Stock Exchange ("TSX") on November 20, 2020, and subsequently became listed on the NASDAQ on March 11, 2021. It was recognized by the Company that being listed on the TSX, and NASDAQ would require more stringent disclosure controls, and started implementing such before the NASDAQ listing.

When listed on the TSXV, management was not required to assess disclosure controls and procedures ("DC&P") and internal control over financial reporting ("ICFR"). As a result of the graduation to the TSX and NASDAQ, the Company became subject to additional requirements under applicable securities laws relating to the establishment and maintenance of DC&P and ICFR, as defined in NI 52-109 and the applicable rules of the U.S. Securities and Exchange Commission. Such requirements also include the evaluation of both DC&P and ICFR. Consequently, the Company took and continues to take a number of actions to improve its DC&P and ICFR. The Company is currently implementing measures designed to improve its ICFR environment and remediate the control deficiencies that led to the material weaknesses identified below.

In accordance with the provisions of National Instrument 52-109 – Issuers' annual and interim filings ("NI 52-109") adopted by Canadian securities regulators and in Rule 13a-15(e) and 15d-15(e) under the U.S. Securities Exchange Act of 1934, as amended (the "Exchange Act"), the Company has filed certificates signed by the Chief Executive Officer ("CEO") and Chief Financial Officer ("CFO") that report on, among other items, i) their responsibility for establishing and maintaining DC&P and ICFR for the Company, ii) the design of DC&P and the design of ICFR.

### **Disclosure controls and procedures**

The Company under the supervision of the CEO and CFO, have designed DC&P (as defined in NI-52-109 and Rule 13a-15(e) and 15d-15(e) under the Exchange Act), in order to provide reasonable assurance that:

- material information relating to the Company is made known to the CEO and CFO by others; and
- information required to be disclosed by the Company in its filings, under applicable securities legislation is recorded, processed, summarized and reported within the time periods specified in securities legislation.

As of June 30, 2022, an evaluation was carried out under the supervision of the CEO and CFO, of the design of the Company's disclosure controls and procedures. Based on this evaluation, the CEO and CFO concluded that due to the material weaknesses in our ICFR as described below, and in Management's Annual Report on Internal Controls over Financial Reporting, at December 31, 2021, the Company's DC&P were not effective as of June 30, 2022, as the controls have not yet been adequately remediated.

### **Management's Annual Report on Internal Controls over Financial Reporting**

The Company under the supervision of the CEO and CFO, are responsible to design ICFR (as defined in NI-52-109 and Rules 13a-15(f) and 15d-15(f) under the Exchange Act) in order to provide reasonable assurance regarding the reliability of financial reporting and the preparation of consolidated financial statements for external purposes in accordance with IFRS as issued by the IASB.

As of December 31, 2021, an evaluation was carried out, under the supervision of the CEO and the CFO, of the effectiveness of the Company's ICFR. Based on this evaluation, the CEO and the CFO concluded that material weaknesses exist, as described below, and due to these material weaknesses, the Company's ICFR is not effective as of December 31, 2021. The control framework used to design and evaluate effectiveness of the Company's ICFR is established under the criteria set forth by the Committee of Sponsoring Organizations of the Treadway Commission (COSO) on Internal Control

# PyroGenesis Canada Inc.

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– Integrated Framework (2013 framework). A material weakness is a deficiency, or combination of deficiencies, in ICFR, such that there is a reasonable possibility that a material misstatement of the Company's annual or interim consolidated financial statements will not be prevented or detected on a timely basis.

In connection with the Company's evaluation of ICFR, the following control deficiencies were considered to be material weaknesses:

- **Control environment:** The Company did not maintain an effective control environment and has identified deficiencies relating to: (i) appropriate organizational structure, reporting lines, and authority and responsibilities, including our Board of Directors' and Audit Committee's oversight and governance of external financial reporting and related party transactions, (ii) lack of senior financial reporting resources for a portion of the year, to deal with complex accounting matters and perform management review controls over period-end consolidated financial statements. The Company did not have a sufficient number of trained resources with the appropriate skills and knowledge with assigned responsibilities and accountability for the design and operation of ICFR; and (iii) holding individuals accountable for their internal control related responsibilities.
- **Control activities:** The Company did not fully design and implement effective control activities and has identified deficiencies relating to: (i) selecting and developing control activities that contribute to the mitigation of risks to acceptable levels, and (ii) deploying control activities through policies that establish what is expected and procedures that put policies into action. For example, control activities related to documentation and consistency in accounting for intangible assets internally generated and revenue recognition were deficient.
- **Journal Entries:** The Company did not effectively design and maintain appropriate segregation of duties and controls over the effective preparation, review and approval, and associated documentation of journal entries, across its ERP platform. The Company did not have adequate review procedures for the recording of manual entries.
- **Complex Spreadsheet Controls:** The Company did not implement and maintain effective controls surrounding certain complex spreadsheets, including addressing all identified risks associated with manual data entry, completeness of data entry, and the accuracy of mathematical formulas, impacting complex spreadsheets used in fixed asset continuity schedules, production and revenue forecasting, and the calculation of the fair value of investments
- **User Access Controls:** The Company did not maintain effective user access controls to adequately restrict user access to financial applications and related data in accordance with job responsibilities. Management did not perform appropriate user access reviews, including superuser access.

As a consequence, the Company did not have effective control activities related to the design, implementation and operation of process-level and management review control activities related to order-to-cash (including revenue trade receivables, and billings in excess of cost/cost in excess of billings), procure-to-pay (including operating expenses, prepaid expenses, accounts payable, and accrued liabilities), hire-to-pay (including compensation expense and accrued liabilities), long-lived assets, significant unusual transactions, related party transactions and other financial reporting processes. The Company's subsidiaries from the Pyro Green-Gas Inc. acquisition were excluded from the evaluation of DC&P and ICFR given that the acquisition occurred less than 365 days prior to June 30, 2022 and their assets and revenues represent approximately 12% and 22% respectively, of the consolidated amounts included in this interim report.

Aside from these material weaknesses, management has concluded that the Company's audited consolidated financial statements for the year ended December 31, 2021, present fairly in all material respects, the Company's financial position, results of operations, changes in shareholders' equity and cash flows in accordance with IFRS as issued by the IASB. These material weaknesses did not have an impact on the Company's financial reporting and as a result, there were no material adjustments to the Company's audited consolidated financial statements for the year ended December 31, 2021. In addition, there were no changes to previously released financial results. However, because the deficiencies and material weaknesses create a reasonable possibility that a material misstatement to our consolidated financial statements would not be prevented or detected on a timely basis, the CEO and CFO concluded that as of December 31, 2021, the Company's design of ICFR were not effective.

# PyroGenesis Canada Inc.

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### Management's Remediation Measures

During the three-month and six-month periods ended June 30, 2022, management continued to implement remediation measures outlined in the 2021 MD&A. Management has performed an initial risk assessment using a top-down, risk-based approach with respect to the risks of material misstatement of the consolidated financial statements. In addition, compensating controls have been applied to the areas where the risks of material misstatement are considered moderate to high. The Company is using and plans to continue to use outside resources to strengthen the business process documentation and help with management's self-assessment and testing of internal controls.

Management, with oversight of the Audit Committee, continue to implement remediation plans for the aforementioned material weaknesses in ICFR and DC&P as follows:

- Continue to establish and improve an appropriate organizational structure and policies that the Board of Directors and Audit Committee will enforce to ensure proper oversight and governance of the external financial reporting process and related party transactions. Awareness by the Audit Committee and support over financial reporting matters has been improved
- Train, and retain individuals with appropriate skills and experience, assign responsibilities and hold individuals accountable for their roles related to ICFR. During the latter part of 2021, a new CFO was retained with the appropriate skills and knowledge to deal with complex accounting matters and perform management review controls over period-end consolidated financial statements as well as skills and knowledge of ICFR which has contributed to mitigating to a certain extent the severity of this control deficiency.
- Design and implement a risk assessment process to identify and assess risks of material misstatement and ensure that the impacted financial reporting processes and related internal controls are properly designed and in place to respond to those risks in our financial reporting; as a result, additional compensating internal controls were implemented in order to address and mitigate such risks, and
- Enhance the design of existing control activities and implement additional process-level control activities (including controls over the order-to-cash, procure-to-pay, hire-to-pay, long-lived assets, inventory, significant unusual transactions, related party transactions and other financial reporting processes) and ensure they are properly evidenced and operating effectively. A firm has been engaged to assist in the selection and testing of key internal controls and validate their effectiveness.

Although the Company can give no assurance that these actions will remediate these material weaknesses in internal controls or that additional material weaknesses in our ICFR will not be identified in the future, management believes the foregoing efforts will, when implemented, strengthen our ICFR and DC&P and effectively remediate the identified material weaknesses.

Management will take additional remedial actions as necessary as they continue to evaluate and work to improve the Company's ICFR environment.

### Changes in internal controls over financial reporting

Other than the material weaknesses described above, and the remediation process described above, there were no changes to the Company's ICFR during the three-month and six-month periods ended June 30, 2022, that have materially affected, or are reasonably likely to materially affect, the Company's ICFR.

### *Limitations on Effectiveness of Disclosure Controls and Procedures and Internal Control over Financial Reporting*

The Company's management recognizes that any disclosure controls and procedures and internal control over financial reporting, no matter how well designed and operated, can provide only reasonable assurance of achieving their objectives. Because of their inherent limitations, disclosure controls and procedures and internal control over financial reporting may not prevent or detect all errors or misstatements on a timely basis.

# PyroGenesis Canada Inc.

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### **RISK FACTORS**

The Company has identified below certain significant risks relating to the business of the Company and the industry in which it operates. The following information is only a summary of certain risk factors and is qualified in its entirety by reference to, and must be read in conjunction with, the detailed information appearing elsewhere in this MD&A. These risks and uncertainties are not the only ones facing the Company. Additional risks and uncertainties not currently known to the Company, or that the Company currently considers immaterial, may also impair the operations of the Company. If any such risks materialize into actual events or circumstances, the Company's assets, liabilities, financial condition, results of operations (including future results of operations), business and business prospects, are likely to be materially and adversely affected. There is no assurance that risk management steps taken will avoid future loss due to the uncertainties described below or other unforeseen risks. An investment in the Common Shares or other securities of the Company is highly speculative and involves a high degree of risk. Before making any investment decision, prospective investors should carefully consider all the information contained in this document including, in particular, the risk factors described below.

Certain factors may have a material adverse effect on the Company's business, financial condition and results of operations. Current and prospective investors should carefully consider the risks and uncertainties and other information contained in this MD&A, the 2021 Financial Statements and the Annual Information Form, particularly under the heading "Risk Factors" in the Annual Information Form, and in other filings that the Company has made and may make in the future with applicable securities authorities, Company's website at [www.pyrogenesis.com](http://www.pyrogenesis.com). The risks and uncertainties described herein and therein are not the only ones the Company may face. Additional risks and uncertainties that the Company is unaware of, or that the Company currently believes are not material, may also become important factors that could adversely affect the Company's business. If any of such risks actually occur, the Company's business, financial condition, results of operations, and future prospects could be materially and adversely affected. In that event, the trading price of the Common Shares (or the value of any other securities of the Company) could decline, and the Company's securityholders could lose part or all of their investment.

#### ***Risks Related to the Company's Business and Industry***

##### ***Operating Income (Loss) and Negative Operating Cash Flow***

Prior to December 31, 2021, the Company had a history of losses and negative cash flows. For the year ended December 31, 2021, the Company has net losses of \$38,431,939, cash flows used in operations of \$18,113,432, and an accumulated deficit of \$61,217,831. To the extent that the Company has net losses and negative operating cash flow in future periods, it may need to allocate a portion of its cash reserves to fund such negative cash flow. The Company may also be required to raise additional funds through the issuance of equity or debt securities. There can be no assurance that the Company will be able to generate a positive cash flow from its operations, that additional capital or other types of financing will be available when needed or that these financings will be on terms favourable to the Company.

The Company's ability to continue as a going concern is dependent upon its ability in the future to grow its revenue, achieve profitable operations, successfully developing and introducing new products and, in the meantime, to obtain the necessary financing to meet its obligations and repay its liabilities when they become due. While the Company has been successful in securing financing in the past, raising additional funds is dependent on a number of factors outside the Company's control, and as such there is no assurance that it will be able to do so in the future. External financing, predominantly by the issuance of equity and debt, might be, sought to finance the operations of the Company; however, there can be no certainty that such funds will be available at terms acceptable to the Company, or at all. If the Company is unable to obtain sufficient additional financing, it may have to curtail operations and development activities, any of which could harm the business, financial condition and results of operations.

##### ***Actual Financial Position and Results of Operations May Differ Materially from the Expectations of the Company's Management***

The Company's actual financial position and results of operations may differ materially from management's expectations. The Company has experienced some changes in its operating plans and certain delays in the timing of its plans. As a result, the Company's revenue, net income and cash flow may differ materially from the Company's projected revenue, net income and cash flow. The process for estimating the Company's revenue, net income and cash flow requires the use of judgment in determining the appropriate assumptions and estimates. These estimates and assumptions may be revised as additional

# PyroGenesis Canada Inc.

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information becomes available and as additional analyses are performed. In addition, the assumptions used in planning may not prove to be accurate, and other factors may affect the Company's financial condition or results of operations.

### **Revenue Risks**

PyroGenesis may experience delays in achieving revenues, particularly with plasma gasification projects which have a long sales cycle. Revenues may be delayed or negatively impacted by issues encountered by the Company or its clients including:

- (i) unforeseen engineering and/or environmental problems;
- (ii) delays or inability to obtain required financing, licenses, permits and/or regulatory approvals;
- (iii) supply interruptions and/or labour disputes;
- (iv) foreign exchange fluctuations and/or collection risk; and
- (v) competition from other suppliers and/or alternative energy solutions that are less capital intensive.

There is no assurance that the business will perform as expected or that returns from the business will support the expenditures needed to develop it.

### **Concentration Risk and Credit Risk**

To date, a small number of customers have accounted for a majority of PyroGenesis' revenues. As its business expands, the Company expects that revenue distribution will be over a larger number of different customers. For the three months ending June 30, 2022, sales of PyroGenesis to its two principal customers accounted for approximately 49% of its total revenue. For the three months ending June 30, 2021, sales to three principal customers accounted for approximately 91% of PyroGenesis' total revenue. The loss of, or a reduction in, purchase orders or anticipated purchase orders from PyroGenesis' principal customers could have a material adverse effect on its business, financial condition and results of operations. Additionally, if one of PyroGenesis' customers is unable to meet its commitments to PyroGenesis, the Company's business, financial condition and results of operations could be adversely affected.

As a result of the Drosrite International Exclusive Agreement and the Dross Processing Service Agreement, the Company generates significant revenues from payments made to Drosrite International under the Dross Processing Service Agreement. The Company will no longer receive payments under such arrangement if the Dross Processing Service Agreement, which involves a third party in a foreign jurisdiction, is terminated, which could have a material adverse effect on the business, financial condition and results of operations of the Company.

Credit risk is the risk that one party to a financial instrument will cause a financial loss for the other party by failing to discharge an obligation. The maximum credit risk to which the Company is exposed on June 30, 2022, represents the carrying amount of cash and cash equivalents, trade accounts receivable, deposits and royalties receivable. Cash and cash equivalents, which only comprise guaranteed investment certificates, are held with major reputable financial institutions. The Company manages its credit risk by performing credit assessments of its customers and does not generally require collateral or other security from customers on accounts receivable. The Company believes that there is no unusual exposure associated with the collection of these receivables and mitigates the risk by monitoring factors such as the current economic conditions, forward-looking macroeconomic data and historical information (collection history). On June 30, 2022, the Company's major credit risk exposure is a result of two customers which represent 91% of trade accounts receivable with amounts owing to the Company of \$13.6 million.

### **Technology Development and Manufacturing Capability Risks**

PyroGenesis recently expanded into new areas of business and, as a result, many of the Company's products are at various stages of the development cycle. The Company may be unable to commercialise such products, or it may be unable to manufacture such products in a commercially viable manner. Whilst management is confident in both its technology and in its team of experienced engineers, scientists and technicians, it cannot know with certainty, which of its products will be

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commercialised, when such products will be commercialised, or whether such products will be able to be manufactured and distributed profitably.

### ***Product Revenues/History of Losses***

PyroGenesis has incurred losses in the majority of years since its inception. In the past the Company's operations have not generated sufficient earnings and cash flows to date to result in consistent profitability or positive cash flow. For the three months ending June 30, 2022, the Company has net losses of \$13,050,346, which includes a loss from the change in value of strategic investment of \$7,477,865 and cash flows used in operations of \$2,752,116. There can be no assurance that the Company will be able to continue to generate significant gains from the value of its strategic investments in the future.

### ***Additional financing and dilution***

PyroGenesis may require additional financing. There can be no assurance that additional financing will be available to the Company when needed, or on terms acceptable to the Company. PyroGenesis' inability to raise financing to support ongoing operations or to fund capital expenditures could limit the Company's growth and may have a material adverse effect upon the Company.

The Company does not exclude raising additional funds by equity financing. In addition, as of June 30, 2022, 10,533,000 stock options are currently issued and outstanding. The exercise of stock options and/or warrants, as well as any new equity financings, represents dilution factors for present and future shareholders.

### ***Reliance on Third Party Suppliers, Service Providers, Distributors and Manufacturers***

The Company's direct and indirect suppliers, service providers, distributors and manufacturers may elect, at any time, to breach or otherwise cease to participate in supply, service, distribution or manufacturing agreements, or other relationships, on which the Company's operations rely. Loss of its suppliers, service providers, distributors and manufacturers could have a material adverse effect on the Company's business and operational results. Further, any disruption in the manufacturing process done by third party manufacturers could have a material adverse effect on the business, financial condition and results of operations of the Company. The Company cannot ensure that alternative production capacity would be available in the event of a disruption, or if it would be available, it could be obtained on favorable terms.

### ***Manufacturing Facility***

The vast majority of the Company's products are manufactured in its manufacturing facility located in Montreal, Quebec. Accordingly, the Company is highly dependent on the uninterrupted and efficient operation of its manufacturing facility. If for any reason the Company is required to discontinue production at its facility, it could result in significant delays in production of the Company's products and interruption of the Company's sales as it seeks to resume production. The Company may be unable to resume production on a timely basis. If operations at the facility were to be disrupted as a result of equipment failures, natural disasters, fires, accidents, work stoppages, power outages or other reasons, the Company's business, financial condition and/or results of operations could be materially adversely affected.

### ***Sales Cycle and Fixed Price Contracts***

PyroGenesis sales cycle is long and the signing of new contracts is subject to delay, over which the Company has little control. The Company also enters into sales contracts with fixed pricing, which may be impacted by changes over the period of implementation. There is no assurance that delays or problems in fulfilling contracts with clients will not adversely affect the Company's activities, operating results or financial position.

### ***Reliance on Technology***

PyroGenesis will depend upon continuous improvements in technology to meet client demands in respect of performance and cost, and to explore additional business opportunities. There can be no assurance that the Company will be successful in its efforts in this regard or that it will have the resources available to meet this demand. Whilst management anticipates that the research and development will allow the Company to explore additional business opportunities, there is no guarantee that such business opportunities will be presented or realized. The commercial advantage of the Company will

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depend to a significant extent on the intellectual property and proprietary technology of PyroGenesis and the ability of the Company to prevent others from copying such proprietary technologies. PyroGenesis currently relies on intellectual property rights and other contractual or proprietary rights, including (without limitation) copyright, trade secrets, confidential procedures, contractual provisions, licenses and patents, to protect its proprietary technology. PyroGenesis may have to engage in litigation in order to protect its patents or other intellectual property rights, or to determine the validity or scope of the proprietary rights of others. This type of litigation can be expensive and time consuming, regardless of whether or not the Company is successful. PyroGenesis may seek patents or other similar protections in respect of particular technology; however, there can be no assurance that any future patent applications will actually result in issued patents, or that, even if patents are issued, they will be of sufficient scope or strength to provide meaningful protection or any commercial advantage to the Company. Moreover, the process of seeking patent protection can itself be long and expensive. In the meantime, competitors may develop technologies that are similar or superior to PyroGenesis' technology or design around the patents owned by the Company, thereby adversely affecting the Company's competitive advantage in one or more of its areas of business. Despite the efforts of the Company, its intellectual property rights may be invalidated, circumvented, challenged, infringed or required to be licensed to others. It cannot be assured that any steps the Company may take to protect its intellectual property rights and other rights to such proprietary technologies that are central to the Company's operations will prevent misappropriation or infringement of its technology.

### **Changes to Contracts**

PyroGenesis is dependent upon its ability to establish and develop new relationships and to build on existing relationships with current clients. The Company cannot provide assurance that it will be successful in maintaining or advancing its relationships with current clients or procure additional clients. In addition, PyroGenesis cannot provide assurance that its customers and the end users of its products will continue to provide the Company with business, or that existing customers and end users will not seek to renegotiate or terminate existing contracts providing for the sale of the Company's products and technology based on circumstances on which the Company is not currently aware. Any termination or amendment of a contract under which the Company derives an important portion of its revenues, including the Drosrite International Exclusive Agreement and the Dross Processing Service Agreement, and any adverse change in the relationship of the Company with its customers and end users, will have an adverse effect on the Company's business, financial condition and results of operations.

Sales to governments and governmental entities are subject to specific additional risks, such as delays in funding, termination of contracts or sub-contracts at the convenience of the government, termination, reduction or modification of contracts or sub-contracts in the event of changes in the government's policies or as a result of budgetary constraints and increased or unexpected costs resulting in losses or reduced profits under fixed price contracts.

### **Foreign Exchange Exposure**

PyroGenesis' products and services are increasingly being sold in markets outside of Canada, whilst most of its operating expenses and capital expenditures are denominated in Canadian dollars. As a result, the Company is exposed to fluctuations in the foreign exchange rates between Canadian dollar and the currency in which a particular sale is transacted, which may result in foreign exchange losses that could affect earnings. Foreign sales are predominantly denominated in U.S. dollars. The Company has not to date sought to hedge the risks associated with fluctuations in foreign exchange rates.

### **Competition**

The industry is competitive and PyroGenesis competes with a substantial number of companies which have greater technical and financial resources. There can be no assurance that such competitors will not substantially increase the resources devoted to the development and marketing of products and services that compete with those of the Company or that new or existing competitors will not enter the various markets in which PyroGenesis is active. There can be no assurance that competitors will not develop new and unknown technologies with which the Company may have difficulty competing. Furthermore, failure to remain cost competitive may result in PyroGenesis losing business to its competitors.

The plasma technology of PyroGenesis competes against other plasma and conventional technologies. Without limitation, the demand for the plasma technology of PyroGenesis, particularly in waste destruction and waste-to-energy systems, can be impacted by the commodity prices of the energy source used for the process and the price at which waste is accepted by landfills and traditional waste processing plants. While the Company believes that demand for sustainable waste

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management practices that have lower environmental impacts than traditional solutions such as landfill or incineration is increasing, the high flows of electricity necessary to operate the waste destruction and waste-to-energy systems of PyroGenesis have an impact on the operational costs of the Company's systems, and traditional solutions may constitute lower-cost solutions, particularly if commodity prices (including of oil and natural gas) remain low or experience a decline.

### ***Management and Key Personnel***

PyroGenesis depends on the skills and experience of its management team and other key employees. The Company relies heavily on its ability to attract and retain highly skilled personnel in a competitive environment. PyroGenesis may be unable to recruit, retain, and motivate highly skilled employees in order to assist the Company's business, especially activities that are essential to the success of the Company. Failure to recruit and retain highly-skilled employees may adversely affect PyroGenesis' business, financial condition and results of operations.

### ***Implementation of a strategic plan***

PyroGenesis' commercial strategy aims to leverage its products, consumables, and services whilst focusing on the resolution of problems within niche markets within the industries served by the Company. There can be no assurances as to the success of the Company's strategic plan, which should be considered under the risks perspective and difficulties frequently encountered by a developing business.

### ***Adverse Decisions of Sovereign Governments***

PyroGenesis conducts an increasing portion of its business internationally. There is no assurance that any sovereign government, including Canada's, will not establish laws or regulations that will not be detrimental to the Company's interests or that, as a foreign corporation, it will continue to have access to the regulatory agencies in other countries. Governments have, from time to time, established foreign exchange controls, which could have a material adverse effect on the Company's business, financial condition and results of operations.

### ***Risks Related to International Operations***

A substantial portion of the Company's sales are made to customers and end users outside Canada. The Company conducts its international operations directly or through distributors or other agents or intermediaries, including Drosrite International. The Company plans to continue to expand its international sales and marketing efforts. International operations are subject to a number of inherent risks, and the Company's future results could be adversely affected by a number of factors, including:

- unfavorable political or economic environments; requirements or preferences for domestic products or solutions, which could reduce demand for the Company's products;
- differing existing or future regulatory and certification requirements;
- unexpected legal or regulatory changes;
- greater difficulty in collecting accounts receivable and longer collection periods;
- difficulties in enforcing contracts; an inability to effectively protect intellectual property;
- tariffs and trade barriers, export regulations and other regulatory and contractual limitations on the Company's ability to sell its products; and
- potentially adverse tax consequences, including multiple and possibly overlapping tax structures.

Fluctuations in currency exchange rates could materially adversely affect sales denominated in currencies other than the Canadian dollar and cause a reduction in revenues derived from sales in a particular country. Financial instability in foreign markets could also affect the sale of the Company's products in international jurisdictions. In addition, the Company may be denied access to its end customers as a result of a closing of the borders of the countries in which its products are sold due to economic, legislative, political and military conditions in such countries.

There can be no assurance that such factors will not materially adversely affect the operations, growth prospects and sales of the Company and, consequently, its results of operations. In addition, revenues the Company earns in other jurisdictions may be subject to taxation by more than one jurisdiction, which could materially adversely affect the Company's earnings. Each of these factors could have an adverse effect on the Company's business, financial condition and results of operations.

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### ***Governmental Regulation***

PyroGenesis is subject to a variety of federal, provincial, state, local and international laws and regulations relating namely to the environment, health and safety, export controls, currency exchange, labour and employment and taxation. These laws and regulations are complex, change frequently and have tended to become more stringent over time. Failure to comply with these laws and regulations may result in a variety of administrative, civil and criminal enforcement measures, including assessment of monetary penalties, imposition of remedial requirements and issuance of injunctions as to future compliance. The Company may be subject to compliance audits by regulatory authorities in the various countries in which it operates.

### ***Government-funded Defense and Security Programs***

Like most companies that supply products and services to governments, government agencies routinely audit and investigate government contractors. These agencies may review the Company's performance under its contracts, business processes, cost structure, and compliance with applicable laws, regulations and standards. The Company's incurred costs for each year are subject to audit by government agencies, which can result in payment demands related to costs they believe should be disallowed. The Company works with governments to assess the merits of claims and where appropriate reserve for amounts disputed. The Company could be required to provide repayments to governments and may have a negative effect on its results of operations. Contrary to cost-reimbursable contracts, some costs may not be reimbursed or allowed under fixed-price contracts, which may have a negative effect on the Company's results of operations if it experiences costs overruns.

### ***Environmental Liability***

PyroGenesis is subject to various environmental laws and regulations enacted in the jurisdictions in which it operates, which govern the manufacturing, processing, importation, transportation, handling and disposal of certain materials used in the Company's operations. Management believes that it has adequate procedures in place to address compliance with current environmental laws and regulations. Furthermore, management monitors the Company's practices concerning the handling of environmentally hazardous materials. However, there can be no assurance that the Company's procedures will prevent environmental damage occurring from spills of materials handled by the Company or that such damage has not already occurred. On occasion, substantial liabilities to third parties may be incurred. The Company may have the benefit of insurance maintained by it or the operator, however, the Company may become liable for damages against which it cannot adequately insure or against which it may elect not to insure because of high costs or other reasons. The Company's clients are subject to similar environmental laws and regulations, as well as limits on emissions to the air and discharges into surface and sub-surface waters. While regulatory developments that may follow in subsequent years could have the effect of reducing industry activity, the Company cannot predict the nature of the restrictions that may be imposed. The Company may be required to increase operating expenses or capital expenditures in order to comply with any new restrictions or regulations.

### ***Product Liability and Other Lawsuits***

PyroGenesis is subject to a variety of potential product liabilities claims and other lawsuits related with its operations, including liabilities and expenses associated with product defects. The Company maintains product liability and other insurance coverage that management believes is generally in accordance with the market practice in its industry, but there can be no assurance that the Company will always be adequately insured against all such potential liabilities.

A malfunction or the inadequate design of the Company's products could result in product liability or other tort claims. Accidents involving the Company's products could lead to personal injury or physical damage. Any liability for damages resulting from malfunctions could be substantial and could materially adversely affect the Company's business and results of operations. In addition, a well-publicized actual or perceived problem could adversely affect the market's perception of the Company's products. This could result in a decline in demand for the Company's products, which would materially adversely affect the Company's financial condition and results of operations.

The sale and use of products and processes developed by the Company may entail potential liability and possible warranty claims. The Company may be subject to personal injury claims for injuries resulting from use of its products. Although the

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Company maintains product liability insurance, there can be no assurance that such insurance will continue to be available on commercially reasonable terms or that the risks covered, or coverage amounts will be sufficient to cover all claims.

### ***Information systems disruptions***

The Company relies on various information technology systems to manage its operations. Over the last several years, the Company has implemented, and it continues to implement, modifications and upgrades to such systems, including changes to legacy systems, replacing legacy systems with successor systems with new functionality, and acquiring new systems with new functionality. These types of activities subject the Company to inherent costs and risks associated with replacing and changing these systems, including impairment of the Company's ability to fulfill customer orders, potential disruption of its internal control structure, substantial capital expenditures, additional administration and operating expenses, retention of sufficiently skilled personnel to implement and operate the new systems, demands on management time and other risks and costs of delays or difficulties in transitioning to or integrating new systems into the Company's current systems. These implementations, modifications, and upgrades may not result in productivity improvements at a level that outweighs the costs of implementation, or at all. In addition, the difficulties with implementing new technology systems may cause disruptions in the Company's business operations and have a material adverse effect on its business, financial condition, or results of operations.

### ***Security Breaches***

As part of its day-to-day business, the Company stores its data and certain data about its customers in its global information technology system. Unauthorized access to the Company's data, including any regarding its customers, could expose the Company to a risk of loss of this information, loss of business, litigation and possible liability. These security measures may be breached by intentional misconduct by computer hackers, as a result of third-party action, employee error, malfeasance or otherwise. Additionally, third parties may attempt to fraudulently induce employees or customers into disclosing sensitive information such as usernames, passwords or other information in order to gain access to the data of the Company's customers or the Company's data, including the Company's intellectual property and other confidential business information, or the Company's information technology systems. Because the techniques used to obtain unauthorized access, or to sabotage systems, change frequently and generally are not recognized until launched against a target, the Company may be unable to anticipate these techniques or to implement adequate preventative measures. Any security breach could result in a loss of confidence by the Company's customers, damage its reputation, disrupt its business, lead to legal liability and negatively impact its future sales.

### ***Public Health Crises***

Public health crises, including local, regional, national or international outbreak of a contagious disease, could have an adverse effect on local economies, the global economy, and the markets in which the Company operates and markets its products, and may adversely impact the price and demand for the Company's products and the ability of the Company to operate and market its products. Any such alterations or modifications could cause substantial interruption to the Company's business, any of which could have a material adverse effect on the Company's operations or financial results, and could include temporary closures of one or more of the Company's or its partner's offices or facilities; temporary or long-term labor shortages; temporary or long-term adverse impacts on the Company's supply chain and distribution channels; the potential of increased network vulnerability and risk of data loss resulting from increased use of remote access and removal of data from the Company's facilities.

Subsequent to December 31, 2019, the global emergence of coronavirus (COVID-19) occurred. The global outbreak of COVID-19 has resulted in governments worldwide enacting emergency measures to protect against the spread of the virus. These measures, which include, among other things, limitations on travel, self-imposed quarantine periods and social distancing measures, have caused material disruption to businesses globally resulting in an economic slowdown. Global equity markets have experienced significant volatility and weakness. Governments and central banks have reacted with significant monetary and fiscal interventions designed to stabilize economic conditions. The duration and impact of the COVID-19 outbreak is unknown at this time, as is the efficacy of any government and/or central bank interventions. It is not possible to reliably estimate the length and severity of these developments and the impact on the financial results and condition of the Company in future periods.

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As of the date of this MD&A, the Company has successfully continued operations under COVID-19 protocols. COVID-19 has not resulted in any material delays in the development or testing of the Company's products or any other material development projects. The Company is not currently experiencing any material delays or interruptions in service or product delivery. At the outset of the COVID-19 pandemic, certain of the Company's operations were negatively impacted, but have since normalized. The Company has not experienced any material disruption in its supply chain, and the pandemic has not materially impacted the Company's business.

The Company's production schedule has continued throughout COVID-19 on a modified employee schedule, with certain non-production employees working remotely. The Company has been able to operate largely unaffected by the COVID-19 pandemic. Notwithstanding the foregoing, if the Company or its vendors and suppliers are unable to continue operations or keep up with increasing demands as a result of COVID-19, customers may experience delays or interruptions in service or the delivery of products, which may be detrimental to the Company's reputation, business, results of operations and financial position. The Company cautions that it is impossible to fully anticipate or quantify the effect and ultimate impact of the COVID-19 pandemic as the situation is rapidly evolving. The extent to which COVID-19 impacts the Company's results will depend on future developments, which are highly uncertain and cannot be predicted, including new information that may emerge concerning the severity of COVID-19 and the actions taken by governments to contain it or treat its impact, including shelter in place directives, which, if extended, may impact the economies in which the Company now operates, or may in the future operate, key markets into which the Company sells products and delivers services, and markets through which the Company's key suppliers source their products.

### ***Litigation***

The Company may from time to time become party to litigation in the ordinary course of business which could adversely affect its business. Should any litigation in which the Company becomes involved be determined against the Company, such a decision could adversely affect the Company's ability to continue operating and the market price for the Common Shares and could use significant resources. Even if the Company is involved in litigation and wins, litigation can redirect significant Company resources. Litigation may also create a negative perception of the Company's brand.

### ***Trade Secrets May Be Difficult to Protect***

The Company's success depends upon the skills, knowledge and experience of its scientific and technical personnel, consultants and advisors, as well as contractors. Because the Company operates in a highly competitive industry, it relies in part on trade secrets to protect its proprietary products and processes. However, trade secrets are difficult to protect. The Company generally enters into confidentiality or non-disclosure agreements with its corporate partners, employees, consultants, outside scientific collaborators, developers and other advisors. These agreements generally require that the receiving party keep confidential, and not disclose to third parties, confidential information developed by the receiving party or made known to the receiving party by the Company during the course of the receiving party's relationship with the Company. These agreements also generally provide that inventions conceived by the receiving party in the course of rendering services to the Company will be its exclusive property, and the Company enters into assignment agreements to perfect its rights.

These confidentiality, inventions, and assignment agreements, where in place, may be breached and may not effectively assign intellectual property rights to the Company. The Company's trade secrets also could be independently discovered by competitors, in which case the Company would not be able to prevent the use of such trade secrets by its competitors. The enforcement of a claim alleging that a party illegally obtained and was using the Company's trade secrets could be difficult, expensive and time consuming and the outcome could be unpredictable. The failure to obtain or maintain meaningful trade secret protection could adversely affect the Company's competitive position.

### ***Risks Related to Acquiring Companies***

The Company may acquire other companies in the future and there are risks inherent in any such acquisition. Specifically, there could be unknown or undisclosed risks or liabilities of such companies for which the Company is not sufficiently indemnified. Any such unknown or undisclosed risks or liabilities could materially and adversely affect the Company's financial performance and results of operations. The Company could encounter additional transaction and integration related costs or other factors such as the failure to realize all of the benefits from such acquisitions. All of these factors could cause dilution to the Company's earnings per share or decrease or delay the anticipated accretive effect of the acquisition.

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and cause a decrease in the market price of the Company's securities. The Company may not be able to successfully integrate and combine the operations, personnel and technology infrastructure of any such acquired company with its existing operations. If integration is not managed successfully by the Company's management, the Company may experience interruptions in its business activities, deterioration in its employee and customer relationships, increased costs of integration and harm to its reputation, all of which could have a material adverse effect on the Company's business, financial condition and results of operations. The Company may experience difficulties in combining corporate cultures, maintaining employee morale and retaining key employees. The integration of any such acquired companies may also impose substantial demands on the management. There is no assurance that these acquisitions will be successfully integrated in a timely manner.

### ***Global Economic Uncertainty***

Demand for the Company's products and services are influenced by general economic and consumer trends beyond the Company's control. There can be no assurance that the Company's business and corresponding financial performance will not be adversely affected by general economic or consumer trends. In particular, global economic conditions are still tight, and if such conditions continue, recur or worsen, there can be no assurance that they will not have a material adverse effect on the Company's business, financial condition and results of operations.

Furthermore, such economic conditions have produced downward pressure on stock prices and on the availability of credit for financial institutions and corporations. If these levels of market disruption and volatility continue, the Company might experience reductions in business activity, increased funding costs and funding pressures, as applicable, a decrease in the market price of the Common Shares, a decrease in asset values, additional write-downs and impairment charges and lower profitability.

### ***Inability to Renew Leases***

The Company may be unable to renew or maintain its leases (commercial or real property) on commercially acceptable terms or at all. An inability to renew its leases, or a renewal of its leases with a rental rate higher than the prevailing rate under the applicable lease prior to expiration, may have an adverse impact on the Company's operations, including disruption of its operations or an increase in its cost of operations. In addition, in the event of non-renewal of any of the Company's leases, the Company may be unable to locate suitable replacement properties for its facilities or it may experience delays in relocation that could lead to a disruption in its operations. Any disruption in the Company's operations could have an adverse effect on its financial condition and results of operations.

### ***Financial Reporting and Other Public Issuer Requirements***

As a public company, the Company is subject to the reporting requirements of the Canadian Securities Administrators, or the CSA, and the U.S. Securities Exchange Act of 1934, as amended, and the rules and regulations of the listing standards of the TSX and NASDAQ and the U.S. Sarbanes-Oxley Act. The requirements of these laws, rules and regulations have increased and will continue to increase the Company's legal, accounting, and financial compliance costs, make some activities more difficult, time-consuming, and costly, and place significant strain on the Company's personnel, systems, and resources. The Company is continuing to develop and refine its disclosure controls and other procedures that are designed to ensure that information required to be disclosed by the Company in the reports that it will file with the CSA is recorded, processed, summarized, and reported within the time periods specified in CSA rules and forms and that information required to be disclosed in reports under applicable securities laws is accumulated and communicated to the Company's principal executive and financial officers. The Company is also continuing to improve its internal control over financial reporting. In order to improve the effectiveness of its disclosure controls and procedures and internal control over financial reporting, the Company has expended, and anticipate that it will continue to expend, significant resources, including accounting-related costs and significant management oversight.

The Company has identified certain material weaknesses in its internal controls, as more fully explained in its management's discussion and analysis for the year ended December 31, 2021 under "Disclosure Controls and Procedures". Additional weaknesses in the Company's disclosure controls and internal control over financial reporting may also be discovered in the future. Any failure to develop or maintain effective controls or any difficulties encountered in their implementation or improvement could harm the Company's results of operations or cause the Company to fail to meet its reporting obligations and may result in a restatement of the Company's financial statements for prior periods. Any failure to improve and maintain

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effective internal control over financial reporting also could adversely affect the results of periodic management evaluations and annual independent registered public accounting firm attestation reports regarding the effectiveness of the Company's internal control over financial reporting that the Company will eventually be required to include in its periodic reports that will be filed with the CSA. Ineffective disclosure controls and procedures and internal control over financial reporting could also cause investors to lose confidence in the Company's reported financial and other information, which could have a negative effect on the trading price of the Common Shares. In addition, if the Company is unable to continue to meet these requirements, it may not be able to remain listed on the TSX and/or NASDAQ.

### ***Influence of the Significant Shareholders***

To the Company's knowledge, no shareholder beneficially owns, or controls or directs, directly or indirectly, more than 10% of the voting rights attached to the Company's outstanding voting securities, except for Mr. Photis Peter Pascali, President and Chief Executive Officer of the Company, who holds or controls, directly or indirectly, 78,370,198 Common Shares, representing in aggregate 46.07% of the total voting rights attached to the outstanding Common Shares, and options to acquire an additional 6,520,000 Common Shares (increasing the total number of Common Shares held or controlled, directly or indirectly, by him to 84,890,198 Common Shares, or 48.06% of the Common Shares, on a fully diluted basis). In addition, from time to time, the Company may have other shareholders who have the ability to exercise significant influence over matters submitted to the shareholders of the Company for approval, whether subject to approval by a majority of the shareholders of the Company or subject to a class vote or special resolution.

### ***Limited Control Over the Company's Operations***

Holders of the Common Shares have limited control over changes in the Company's policies and operations, which increases the uncertainty and risks of an investment in the Company. The Board determines major policies, including policies regarding financing, growth, debt capitalization and any future dividends to shareholders of the Company. Generally, the Board may amend or revise these and other policies without a vote of the holders of the Common Shares. The Board's broad discretion in setting policies and the limited ability of holders of the Common Shares to exert control over those policies increases the uncertainty and risks of an investment in the Company.

### ***Change in Tax Laws***

New income, sales, use or other tax laws, statutes, rules, regulations or ordinances could be enacted at any time. Further, existing tax laws, statutes, rules, regulations or ordinances could be interpreted, changed, modified or applied adversely to the Company. These enactments and events could require the Company to pay additional tax amounts on a prospective or retroactive basis, thereby substantially increasing the amount of taxes the Company is liable to pay in the relevant tax jurisdictions. Accordingly, these events could decrease the capital that the Company has available to operate its business. Any or all of these events could harm the business and financial performance of the Company.

### ***Forward-Looking Information***

The forward-looking information included in this MD&A relating to, among other things, the Company's future results, performance, achievements, prospects, targets, intentions or opportunities or the markets in which it operates and the other statements listed is based on opinions, assumptions and estimates made by the Company's management in light of its experience and perception of historical trends, current conditions and expected future developments, as well as other factors that the Company believes are appropriate and reasonable in the circumstances. However, there can be no assurance that such estimates and assumptions will prove to be correct. The Company's actual results in the future may vary significantly from the historical and estimated results and those variations may be material. The Company makes no representation that its actual results in the future will be the same, in whole or in part, as those included in this MD&A.

### ***Credit Facilities***

The Company's credit facilities and financing agreements mature on various dates. There can be no assurance that such credit facilities or financing agreements will be renewed or refinanced, or if renewed or refinanced, that the renewal or refinancing will occur on equally favourable terms to the Company. The Company's ability to continue operating may be adversely affected if the Company is not able to renew its credit facilities or arrange refinancing, or if such renewal or refinancing, as the case may be, occurs on terms materially less favorable to the Company than at present. The Company's

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current credit facilities and financing agreements impose covenants and obligations on the Company. There is a risk that such loans may go into default if there is a breach in complying with such covenants and obligations, which could result in the lenders realizing on their security and causing our shareholders to lose some or all of their investment.

### ***Risks Related to the Company's Securities***

#### ***Potential Volatility of Common Share Price***

The market price of the Common Shares could be subject to significant fluctuations. Some of the factors that may cause the market price of the Common Shares to fluctuate include:

- (i) the public's reaction to the Company's press releases, announcements and filings with regulatory authorities and those of its competitors;
- (ii) fluctuations in broader stock market prices and volumes;
- (iii) changes in market valuations of similar companies;
- (iv) investor perception of the Company, its prospects or the industry in general;
- (v) additions or departures of key personnel;
- (vi) commencement of or involvement in litigation;
- (vii) announcements by the Company or its competitors of strategic alliances, significant contracts, new technologies, acquisitions, commercial relationships, joint ventures or capital commitments;
- (viii) variations in the Company's quarterly results of operations or cash flows or those of other comparable companies;
- (ix) revenues and operating results failing to meet the expectations of securities analysts or investors in particular quarter;
- (x) changes in the Company's pricing policies or the pricing policies of its competitors;
- (xi) future issuances and sales of Common Shares;
- (xii) sales of Common Shares by insiders of the Company;
- (xiii) third party disclosure of significant short positions;
- (xiv) demand for and trading volume of Common Shares;
- (xv) changes in securities analysts' recommendations and their estimates of the Company's financial performance;
- (xvi) short-term fluctuation in stock price caused by changes in general conditions in the domestic and worldwide economies or financial markets; and
- (xvii) the other risk factors described under this heading of the MD&A.

The realization of any of these risks and other factors beyond the Company's control could cause the market price of the Common Shares to decline significantly.

In addition, broad market and industry factors may harm the market price of the Common Shares. Hence, the price of the Common Shares could fluctuate based upon factors that have little or nothing to do with the Company, and these fluctuations could materially reduce the price of the Common Shares regardless of the Company's operating performance. In the past,

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following a significant decline in the market price of a company's securities, there have been instances of securities class action litigation having been instituted against that company. If the Company were involved in any similar litigation, it could incur substantial costs, management's attention and resources could be diverted and it could harm the Company's business, operating results and financial condition.

### ***Market Liquidity***

The market price for the Common Shares could be subject to wide fluctuations. Factors such as the announcement of significant contracts, technological innovations, new commercial products, patents, a change in regulations, quarterly financial results, future sales of Common Shares by the Company or current shareholders, and many other factors could have considerable repercussions on the price of the Common Shares. In addition, the financial markets may experience significant price and value fluctuations that affect the market prices of equity securities of companies that sometimes are unrelated to the operating performance of these companies. Broad market fluctuations, as well as economic conditions generally may adversely affect the market price of the Common Shares.

### ***Dividends to Shareholders***

The Company does not anticipate paying cash dividends on the Common Shares in the foreseeable future. The Company currently intends to retain all future earnings to fund the development and growth of its business. Any payment of future dividends will be at the discretion of the directors and will depend on, among other things, the Company's earnings, financial condition, capital requirements, level of indebtedness, statutory and contractual restrictions applying to the payment of dividends, and other considerations that the directors deem relevant.

### ***Impact of Future Sales by Existing Shareholders***

If the Company's shareholders sell substantial amounts of the Common Shares in the public market, the market price of the Common Shares could decrease. The perception among investors that these sales will occur could also produce this effect. All currently outstanding Common Shares other than those subject to lock-up agreements executed by certain existing shareholders will, subject to applicable securities laws, generally be immediately available for resale in the public markets.

Subject to compliance with applicable securities laws, the Company's officers, directors and their affiliates may sell some or all of their Common Shares in the future. No prediction can be made as to the effect, if any, such future sales of Common Shares will have on the market price of the Common Shares prevailing from time to time. However, the future sale of a substantial number of Common Shares by the Company's officers, directors and their affiliates, or the perception that such sales could occur, could materially adversely affect prevailing market prices for the Common Shares.

Additional Common Shares issuable upon the exercise of stock options may also be available for sale in the public market, which may also cause the market price of the Common Shares to fall. Accordingly, if substantial amounts of Common Shares are sold in the public market, the market price could fall.

### ***Working Capital and Future Issuances***

The Company may issue additional Common Shares in the future which may dilute a shareholder's holdings in the Company. The Articles permit the issuance of an unlimited number of Common Shares, and shareholders of the Company will have no pre-emptive rights in connection with any further issuances. The directors of the Company have the discretion to determine the provisions attaching to the Common Shares and the price and the terms of issue of further Common Shares.

Additional equity financing may be dilutive to holders of Common Shares. Debt financing may involve restrictions on the Company's financing and operating activities. Debt financing may be convertible into other securities of the Company which may result in immediate or resulting dilution. In either case, additional financing may not be available to the Company on acceptable terms or at all. If the Company is unable to raise additional funds as needed, the scope of its operations or growth may be reduced and, as a result, the Company may be unable to fulfil its long-term goals. In this case, investors may lose all or part of their investment. Any default under such debt instruments could have a material adverse effect on the Company, its business or the results of operations.

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### ***Securities or Industry Analysts***

The trading market for Common Shares could be influenced by the research and reports that industry and/or securities analysts may publish about the Company, its business, the market or competitors. If any of the analysts who may cover the Company's business change their recommendation regarding the Common Shares adversely, or provide more favourable relative recommendations about its competitors, the share price would likely decline. If any analyst who may cover the Company's business were to cease coverage or fail to regularly publish reports on the Company, it could lose visibility in the financial markets, which in turn could cause the share price or trading volume to decline.

### ***Risks Related to the Company's Status as a Foreign Private Issuer***

#### ***Information Publicly Available to the Company's U.S. shareholders***

The Company is a foreign private issuer under applicable U.S. federal securities laws. As a result, the Company does not file the same reports that a U.S. domestic issuer would file with the U.S. Securities and Exchange Commission (the "SEC"), although the Company is required to file with or furnish to the SEC the continuous disclosure documents that the Company is required to file in Canada under Canadian Securities Laws, in certain respects the reporting obligations are less detailed and less frequent than those of U.S. domestic reporting companies. In addition, the Company's officers, directors and principal shareholders are exempt from the reporting and short-swing profit recovery provisions of Section 16 of the U.S. Exchange Act. Therefore, the Company's shareholders may not know on as timely a basis when the Company's officers, directors and principal shareholders purchase or sell Common Shares as the reporting periods under the corresponding Canadian insider reporting requirements are longer.

As a foreign private issuer, the Company is exempt from the rules and regulations under the Exchange Act related to the furnishing and content of proxy statements. The Company is also exempt from Regulation FD, which prohibits issuers from making selective disclosures of material non-public information. While the Company complies with the corresponding requirements relating to proxy statements and disclosure of material non-public information under Canadian securities laws, these requirements differ from those under the Exchange Act and Regulation FD and shareholders should not expect to receive the same information at the same time as such information is provided by U.S. domestic companies. In addition, the Company may not be required under the Exchange Act to file annual and quarterly reports with the SEC as promptly as U.S. domestic companies whose securities are registered under the Exchange Act.

In addition, as a foreign private issuer, the Company has the option to follow certain Canadian corporate governance practices, except to the extent that such laws would be contrary to U.S. securities laws, and provided that the Company discloses the requirements it is not following and describe the Canadian practices it follows instead. The Company plans to rely on this exemption. As a result, the Company's shareholders may not have the same protections afforded to shareholders of U.S. domestic companies that are subject to all U.S. corporate governance requirements.

#### ***Loss of Foreign Private Issuer Status in the Future***

In order to maintain its status as a foreign private issuer, a majority of the Company's Common Shares must be either directly or indirectly owned by non-residents of the U.S. unless the Company also satisfies one of the additional requirements necessary to preserve this status. The Company may in the future lose its foreign private issuer status if a majority of the Common Shares are held in the United States and the Company fails to meet the additional requirements necessary to avoid loss of foreign private issuer status. The regulatory and compliance costs to the Company under U.S. federal securities laws as a U.S. domestic issuer may be significantly more than the costs the Company incurs as a Canadian foreign private issuer eligible to use the multi-jurisdictional disclosure system ("MJDS"). If the Company is not a foreign private issuer, it would not be eligible to use the MJDS or other foreign issuer forms and would be required to file periodic and current reports and registration statements on U.S. domestic issuer forms with the SEC, which are more detailed and extensive than the forms available to a foreign private issuer. In addition, the Company may lose the ability to rely upon exemptions from Nasdaq corporate governance requirements that are available to foreign private issuers.

#### ***Inability for U.S. Investors to Enforce Certain Judgments***

The Company is a corporation existing under the Canada Business Corporations Act. A number of the Company's directors and officers are residents of Canada, and substantially all of the Company's assets are located outside the United States.

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As a result, it may be difficult to effect service within the United States upon the Company or upon its directors and officers. Execution by United States courts of any judgment obtained against the Company or any of the Company's directors or officers in United States courts may be limited to the assets of such companies or such persons, as the case may be, located in the United States. It may also be difficult for holders of securities who reside in the United States to realize in the United States upon judgments of courts of the United States predicated upon civil liability and the civil liability of the Company's directors and executive officers under the United States federal securities laws. The Company has been advised that a judgment of a U.S. court predicated solely upon civil liability under U.S. federal securities laws or the securities or "blue sky" laws of any state within the United States, would likely be enforceable in Canada if the United States court in which the judgment was obtained has a basis for jurisdiction in the matter that would be recognized by a Canadian court for the same purposes. However, there may be doubt as to the enforceability in Canada against these non-U.S. entities or their controlling persons, directors and officers who are not residents of the United States, in original actions or in actions for enforcement of judgments of courts of the United States, of liabilities predicated solely upon U.S. federal or state securities laws.

### ***Risks Relating to the Company's Status as an "Emerging Growth Company" Under U.S. Securities Laws***

The Company is an "emerging growth company" as defined in section 3(a) of the Exchange Act (as amended by the JOBS Act, enacted on April 5, 2012), and the Company will continue to qualify as an emerging growth company until the earliest to occur of: (a) the last day of the fiscal year during which the Company has total annual gross revenues of US\$1,070,000,000 (as such amount is indexed for inflation every five years by the SEC) or more; (b) the last day of the fiscal year of the Company following the fifth anniversary of the date of the first sale of common equity securities of the Company pursuant to an effective registration statement under the United States Securities Act of 1933, as amended; (c) the date on which the Company has, during the previous three year period, issued more than US\$1,000,000,000 in non-convertible debt; and (d) the date on which the Company is deemed to be a "large accelerated filer", as defined in Rule 12b-2 under the Exchange Act. The Company will qualify as a large accelerated filer (and would cease to be an emerging growth company) at such time when on the last business day of its second fiscal quarter of such year the aggregate worldwide market value of its common equity held by non-affiliates will be US\$700,000,000 or more.

For so long as the Company remains an emerging growth company, it is permitted to and intends to rely upon exemptions from certain disclosure requirements that are applicable to other public companies that are not emerging growth companies. These exemptions include not being required to comply with the auditor attestation requirements of Section 404 of the JOBS Act. The Company takes advantage of some, but not all, of the available exemptions available to emerging growth companies. The Company cannot predict whether investors will find the Common Shares less attractive because the Company relies upon certain of these exemptions. If some investors find the Common Shares less attractive as a result, there may be a less active trading market for the Common Shares and the Common Share price may be more volatile. On the other hand, if the Company no longer qualifies as an emerging growth company, the Company would be required to divert additional management time and attention from the Company's development and other business activities and incur increased legal and financial costs to comply with the additional associated reporting requirements, which could negatively impact the Company's business, financial condition and results of operations.

### **OUTLOOK**

The first half of 2022 has proffered an unusual combination of events and results.

The Company – as with much of the industrial technology and manufacturing sectors – has felt the repercussions of macro-economic headwinds that have affected the planning, logistics, and spending of its customers and of its sales pipeline targets.

These conditions have weighed, at times heavily, on both the Company's top and bottom lines, with potential or planned sales being impacted by customer resourcing, staffing, and purchasing delays, and with continued governmental and logistical issues preventing other customers from finalizing contract negotiations or taking delivery of their fully completed orders – orders that represent significant revenue and income to the Company once they can be moved out of our warehouse.

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What was anticipated to be a major growth first half, has adjusted to be more of a modest stage-setting for the second half of the year and into 2023, as existing and prospective customers moved back their planning and decision-making in the quarter to accommodate their own interruptions.

However, in parallel, and in contrast, during the last quarter the Company achieved some of its greatest corporate milestones – achievements that are considered major advancements for both PyroGenesis and its customers' industries, and which are anticipated to provide potentially large sales bursts through to and beyond 2023.

These achievements include producing and delivering plasma torches for the first-ever in-factory use within an iron ore pelletization furnace – a major upstream step in the steelmaking process – and the movement from sample size to commercial-scale batch production of titanium metal powder production for 3D printing and additive manufacturing, from the Company's plasma atomization system.

These milestones continue to set the company up for the accelerated business growth that the previous three decades of research and development have made possible.

Importantly, as the global economy transitions out of the disruption stage it has found itself in for several quarters, we see a return to logistical and resourcing stability for our heavy industry and government customers throughout the rest of 2022 and 2023, but with a renewed sense of urgency.

Our value proposition remains the same, yet with the events of 2020-2022 revealing the precariousness of the world's supply chain, fossil-fuel energy availability, workforce, and material cost certainty, the Company's technology offering looks even better positioned.

Our ability to help impact and remake several of the major priorities facing heavy industry – priorities that have fallen further behind during these past two years – such as greenhouse gas emissions reduction, fuel switching to combustion-free electric sources, improved value recovery of metal waste-streams, enhanced metal production output from the same input, safe destruction of pervasive chemicals, and more rapid and higher quality metal powder production for component weight reduction – leaves us excited about our recent critical milestones and our long-term positioning.

All of these factors, bolstered by the quickening global push towards fossil fuel reduction at both industry and government levels that further showcases the PyroGenesis advantage, allows Management to state with continued conviction that despite the challenges seen in the year's first half, the company believes opportunities for PyroGenesis continue to expand.

To note, until such time as the Company produces consistent recurring revenue or continuous large scale orders and can offer forward-looking guidance, we will continue to provide an Outlook that is more descriptive, with a combination of actual achievements combined with working opportunities, and less focused on financial numbers.

### Overall Strategy

The Company continues to build on its strategy to offer technology solutions that produce benefits through greenhouse gas ("GHG") emissions reduction, clean electric fuel sources, safe waste destruction, and improved production output and quality, that take advantage of the Company's expertise in patented ultra-high temperature processes for heavy industry.

We have acknowledged our strategy to be timely, as many governments in jurisdictions around the world promote and fund environmental technologies and infrastructure projects. After 2021 proved an even greater affirmation of this approach as major industries targeted by the Company not only recommitted to their targets, but in some cases raised them significantly, 2022 has brought about more circumstances that highlight how technology solutions like those from PyroGenesis will be in even greater demand.

In particular, the conflict in Ukraine has exhibited how geopolitical influences will continue to impact the supply of metals that are already under extraordinary market demand. As supply chain issues, worries about supply reductions, and additional sanctions on Russia (a major producer of the world's aluminum supply) caused massive fluctuations to aluminum spot-prices, the conflict also more fully exposed the vulnerability of aluminum producers to power availability and energy price uncertainty, as energy supply challenges that were already being experienced by European and Asian metal producers were exacerbated during the war.

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All of these factors show that with global metal demand growing (anticipated to grow by 80% by 2050)<sup>1</sup>, and industry carbon-reduction targets not yet on track to meet their goals, aluminum producers must find ways to improve their efficiency, and increase their yield of high-quality metal from current production – all while lowering their carbon footprint. PyroGenesis' range of technology solutions provide just such an opportunity, with the Company's DROSRITE™ systems providing industry-leading dross recovery rates of high-quality aluminum, inline and on-site, with a lower operating expense and lower carbon footprint than all competing technologies; meanwhile, the Company's mainstay plasma torch offering provides another technology-driven solution for metal producers looking to reduce their reliance on a volatile natural gas and diesel supply chain within any aspect of their operations that require metal melting or heating, while again eliminating fossil fuel emissions.

These same or similar pressures are affecting the global steelmaking industry, into which the Company has already sold and now delivered initial clean electric, non-combustion plasma torches for final pre-order test runs. Macroeconomic pressures may in fact serve to expedite the need for faster implementation over the next year or more.

For clarity, as stated often, PyroGenesis' product lines do not depend on environmental incentives (tax credits, GHG certificates, environmental subsidies, etc.) to be economically viable; with the increased industry carbon reduction commitments, it is anticipated that the Company's growth drivers will expand, and shareholders will see increased value.

While the Company is not immune to how COVID-19 and other external factors negatively impacted businesses over the past two years, specifically related to the work force and, more importantly, the supply chain, Management believes that – while it can do little about the strain on its customers' and prospects' – the Company itself is well structured, and through various mitigation measures these challenges continue to be dealt with in an effective manner. The Company expects even greater improvements as the impact of COVID-19 and other external factors continues to recede during the remainder of 2022.

### Organic Growth

Organic growth will be spurred on by (i) the natural growth of our existing offerings; (ii) leveraging off the insider "golden ticket" advantage we have with several industrial customers due to how some of our industrial systems are installed inside a customer's facility (vs. the legacy systems that are installed off-site) – enabling us to see first-hand some of the additional daily challenges faced by our customers, and then upsell to them accordingly; (iii) exploring new ways scientifically (and to corresponding markets laterally) to provide unique solutions and value that helps industries deal with some of the most pressing environmental, engineering, and energy problems; and (iv) building new manufacturing and chemical recovery facilities in overseas markets, as per our recent announcement to pursue the construction of a European production facility for metal powder production.

Over the past several years, PyroGenesis has successfully positioned each of its business lines for rapid growth by strategically partnering with multi-billion-dollar entities. These entities have identified PyroGenesis' offerings to be unique, in demand, and of such a commercial nature as to warrant the unique, long-term, supportive relationships that the Company has experienced while it ramps up various technologies to commercialization. We expect that these relationships have us well positioned to transition into significant revenue streams once full commercialization is achieved.

### Aluminum Industry Process Improvement

As mentioned in previous reports, momentum with PyroGenesis' aluminum Industry strategy and offering continues to expand.

During the quarter, the company announced that its DROSRITE™ waste metal recovery technology had been successfully commissioned for Ma'aden Aluminum in Saudi Arabia, one of the world's largest primary aluminum producers with 2021 revenue in excess of US \$7 billion. There, the DROSRITE™ technology is helping to service the Ma'aden plant in Ras Al-Khair, a joint venture corporation with Alcoa that is the largest and most efficient vertically integrated aluminum complex in the world and includes one of the world's largest smelters. At Ma'aden, the first three DROSRITE™ systems passed site

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<sup>1</sup> <https://international-aluminium.org/iai-releases-aluminium-sectors-decarbonisation-dataset-in-line-with-the-international-energy-agencys-beyond-2-degrees-findings>

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acceptance testing and were fully commissioned, with the remaining four already manufactured and awaiting final shipment at the end-user's request.

In addition to the DROSRITE™ waste metal recovery system – one of the largest and fastest growing dross recovery solutions in the world, with 11 large DROSRITE™ systems in use or slated for delivery to markets around the world, and three more LOI's in play – during the quarter the Company provided a comprehensive update on the aluminum business line as a whole, outlining how increasing demand, global supply shortages, and fluctuating prices and energy availability were impacting aluminum producers, allowing PyroGenesis to announce new-use markets after numerous inquiries for many different aspects of the aluminum production process. As the aluminum industry eyes greater technological innovation to improve production and reduce fossil fuel reliance, few technologies are as ready as PyroGenesis.

Subsequent announcements in the quarter outlined even more areas where the Company's technology is being considered. Combined, the various announcements revealed that PyroGenesis' technology is being used, studied, or actively evaluated for use in the upstream carbon anode baking process, as a fuel replacement in scrap re-melting furnaces, in molten holding furnaces, in new furnace production, in downstream cast-house furnaces, and in retrofitting of existing aluminum recycling furnaces.

With the relationships the Company has been developing throughout the industry, and as a result of the success seen by its technologies in the primary aluminum sector, interest has now expanded into secondary scrap-based producers, as well as downstream parts manufacturers. This represents a significant change and advancement from just 18 months ago.

Finally, the various joint ventures announced in prior quarters continue to evolve.

For the joint venture technology geared to handle the leftover residues resulting from the processing of waste stream metal dross, the pre-launch requirements and considerations have entered the final stage. Chemical residue samples from dross produced at one of the Company's clients' facilities are being tested in two different countries, and the results of those tests will inform final steps.

As stated previously, we believe that valorizing the residues and producing high end products will further define us as the go-to company for all dross-related processing.

For the partnership with Aluminerie Alouette (the largest primary aluminum smelter in the Americas and co-owned by Rio Tinto and Norsk Hydro), for the development of a solution to safely recover various metals and compounds from the heavily contaminated carbon lining of aluminum smelters (known as "spent pot linings"), work continues, with lab-scale tests concluded and initial pilot phase in development.

### **Steel Industry Process Improvement**

With steelmaking being one of the most carbon-emission intensive industries in the world, estimated to be responsible for between 7 to 12 per cent of all global fossil fuel and greenhouse gas emissions, that industry continues to be under intense pressure, including huge financial penalties, to find emission reductions.

This pressure on the steelmaking industry allows PyroGenesis to expect demand for its upstream, iron ore pelletization solution to increase significantly, as steelmakers look to all aspects of the production lifecycle for carbon reduction opportunities.

As outlined in previous reports, serious consideration is being given to replacing large numbers of the fossil fuel burners in iron ore pelletization with PyroGenesis' proprietary and patented plasma torches.

During the quarter, the Company achieved a major milestone when, after extensive modeling, simulations, business case development, production, and live factory tests – during a period that was engulfed by a global pandemic – our plasma torch system for iron ore pelletization was produced, assembled, and shipped (as per the February 8 news release designating a Q2 quarter end shipping timeline) to the clients – in preparation for first-ever live factory usage and factory acceptance testing toward that carbon reduction goal.

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As previously disclosed, that client is a multi-billion-dollar international producer of iron ore pellets and one of the largest in the industry, whose name will remain confidential for competitive reasons. The Client, which has committed to reduce its GHG emissions, has over ten (10) iron ore pelletization plants, each possibly requiring up to 50 plasma torches, or more than 500 torches in total. The Company has also previously disclosed, that we have provided a cost estimate for 36 plasma torches to that same Client A, at a value of \$95-115 million. The range is an estimate due to usage and customization uncertainties which will be more clearly defined in due course.

Other previously announced clients – Client B, one of the largest iron ore processes in the world who has signed a \$6M contract with the Company for 4 plasma torches for their pelletization system, and Client C, who is not only a significant player in the iron ore pelletization industry but is also a major player in the steel industry – continue to progress at their own pace.

For Client B, production of the four torches is underway. As previously announced, Client B has advised PyroGenesis that, upon the successful implementation of the torches, subsequent orders are expected to be for approximately 130 plasma torches.

PyroGenesis expects that the previously mentioned government initiatives, geared to stimulating their respective economies by promoting and funding environmental technologies and infrastructure projects, will only serve to increase interest in PyroGenesis' plasma torch offerings to other companies in this space. While potential clients seeking government support for large initiatives may draw out the onset of large contracts, the sheer number of potential customers, and the fact that the Company will engage with many of them in different stages at different times, will help to ensure a long, overlapping pipeline of potential projects.

In addition, PyroGenesis continues to target other industries which are experiencing significant pressure to reduce GHGs, and which utilize fossil fuel burners as well, such as the cement, aluminum, and automotive industries.

### **Plasma Torches for Emerging / Niche Markets**

Separately, the Company also offers plasma torches to emerging / niche markets where there is a high probability of on-going sales from successful implementation.

One such example is when, in Q1 on February 7, the Company announced that it had signed a \$273,000 contract with a European research centre, to manufacture and deliver a 50Kw methane plasma torch, which will be used by the client to develop a process to convert hydrocarbons, including methane (a greenhouse gas), into useful chemicals such as olefins (e.g. ethylene, propylene, etc.), thereby significantly reducing GHGs.

That torch and system is currently in production.

For each new market, the Company will also benefit from providing proprietary spare parts and service, which generates significant recurring revenue, thus complementing the Company's long-term strategy to build a recurring revenue model.

### **Additive Manufacturing (Metal Powders for 3D Printing)**

Our metal powders business line also saw a major milestone in Q2.

The Company's NexGen™ facility, which incorporates all the previously disclosed benefits (increased production rates and lower capital & operating expenditures), was announced as having produced and delivered two separate 100kg orders for titanium powders – the first two commercial batch orders for the system, after months of testing and sample size production.

These orders were both an important commercial milestone, as well as further validation of the Company's process and ability to supply some of the highest quality powder produced to the AM industry using our NexGen™ plasma atomization process. This process is a significant departure and upgrade from conventional plasma atomization – a technology the Company also invented and coined the term for, and which is still considered the gold standard for the production of metal powder.

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The two orders came via our European business partner Aubert & Duval, who is a world leader in industrializing high-performance steel, super alloy, aluminum and titanium alloys for over a century. More specifically, they are a recognized supplier of metal powders for additive manufacturing, serving the Aerospace, Energy, Transport, Medical, Defense, Automotive and other large scale, demanding markets.

Of note, a major tier-one global aerospace company has already entered into an agreement with the Company to formally qualify its metal powder, at considerable expense to the global aerospace company, with a view towards having the Company become a supplier.

Under this agreement, the Client has been performing an in-depth qualification process with PyroGenesis – a procedure typically required before a company can become an approved supplier. The process was established to, amongst other things, evaluate the Company's manufacturing methods, test samples of powder for batch-to-batch consistency, and determine various mechanical and chemical properties. Subsequently, larger volumes of powder will be used to print test coupons to further evaluate mechanical and chemical properties.

Upon passing all steps, including acceptance tests, the Company's process will be locked down specifically for each client, with no additional modifications permitted. Upon successful completion of the testing, PyroGenesis would expect to receive formal acceptance as an approved supplier. The formal and methodical process with this top tier aerospace company is on track and is nearing conclusion, with additional updates to investors expected throughout Q3.

There are additional major top tier aerospace companies and OEMs, in both Europe and North America, eagerly awaiting powders from this new state-of-the-art production line, and we are currently in the process of supplying sample powders to them for analysis.

The Company expects that such developments will continue and will translate into significant improvements in contributions to revenue by this segment in the mid-long term.

### HPQ/PUREVAP™

With respect to HPQ, a PyroGenesis client and a company whom PyroGenesis owns significant shares and options, the goal is to continue to expand our role as HPQ's technology provider for the game changing family of silicon processes which we are developing exclusively for HPQ and its wholly owned subsidiaries HPQ Nano Silicon Powders Inc. and HPQ Silica Polvere Inc., namely:

The PUREVAP™ "Quartz Reduction Reactors" (QRR), an innovative process (patent pending), which should permit the one step transformation of lower purity quartz (SiO<sub>2</sub>) than any traditional processes can handle into a silicon (Si) of a higher purity level (2N-4N) that can be produced by any traditional smelter, at reduced costs, energy input, and carbon footprint. The unique capabilities of this process could position HPQ as a leading provider of the specialised silicon material needed to propagate its considerable renewable energy potential; and

The PUREVAP™ Nano Silicon Reactor (NSiR), which, if successful, could position itself as a new proprietary low-cost process that can transform the silicon (Si) made by the PUREVAP™ QRR into the nano-silicon materials (spherical silicon powders and silicon nanowires) sought after by energy storage, batteries, electric vehicle manufactures and clean hydrogen sectors participants. The aim of the ongoing work is to position HPQ NANO as the first to market with a commercial scale low-cost nanoparticle production system.

A new plasma-based process that could convert Silica (Quartz, SiO<sub>2</sub>) into fumed silica (Pyrogenic Silica) in one step. This new process could be a low-cost and environmentally friendly option that combines HPQ Silicon High Purity Quartz initiatives with PyroGenesis' industry leading know-how in the development of commercial plasma processes. It is envisioned that the process will eliminate harmful chemicals presently generated by traditional methods. This new process could revolutionize the manufacturing of fumed silica, while repatriating production back to North America.

Government participation in a \$5.3M funding of the fumed silica project confirms our expectation that 2022 should be a year in which significant developments occur on all these fronts.

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### Land Based Units/Environmental

The Company did not previously aggressively target the Company's land-based/environmental solutions during the period where the Company's other offerings, such as in steelmaking and aluminum industry process improvement, were accelerating.

However, during 2021, interest in the Company's capabilities in this arena was renewed, and PyroGenesis' plasma-based solutions have generated interest in processing a waste stream that has recently been classified as hazardous.

In October of 2021, PyroGenesis was selected by a US municipal water utility to provide a C\$9.2 million system to destroy perfluoroalkyl and polyfluoroalkyl substances (PFAs), a group of hazardous chemicals that have become pervasive in product manufacturing, and which are now understood to be harmful as they leech out of products and into farmland, soil, and the water system.

Planning and negotiations for this project have drawn out considerably, for various client-side reasons related to logistics, resourcing, competing municipal and state project priorities and funding, as well as extensive legal ramifications related to hazardous chemical processing and the newness of operating in this realm, for all parties. As a result, great care has been taken to ensure a proper project and contract framework. The effort involved and the framework created will be very useful for future projects of this nature, as well as in this area of PFAS and hazardous chemical processing that is so new to governments, but expanding rapidly.

### Growth through Synergistic Mergers and Acquisitions

As previously disclosed, the Company is conservatively considering synergistic merger and acquisition strategies to augment its growth, and the Company has been very actively involved in pursuing several opportunities to support this strategy. In so doing, the focus has been on private companies exclusively which (i) primarily leverage the Company's Golden Ticket advantage, or (ii) could uniquely benefit from the Company's engineering advantage and/or international relationships.

### Additional Opportunities for Plasma Torches

Within the general plasma torch line of business, the Company continues to consider options to leverage its plasma expertise. We continue to review torch technologies, pursue grant applications and government research involvement, and client participation partnerships, that could complement our existing torch offerings, leverage off our unique relationships, or explore new opportunities. We are in early stage discussion across many sectors and many potential customers; no additional details are available at this time.

### CONCLUSION

In conclusion, while headwinds have interrupted the intentions of many clients and prospects during the first half of the year, PyroGenesis continues to see 2022 as a platform from which decades of growth will stem.

The Company plans to take advantage of its unique position in its main business offerings to accelerate growth, with a particular emphasis on offerings geared to aggressively reducing GHG emissions and the world's carbon footprint, while finding and offering solutions to pressing environmental, engineering, and energy challenges.

### FURTHER INFORMATION

Additional information relating to Company and its business, including the 2021 consolidated Financial Statements, the Annual Information Form and other filings that the Company has made and may make in the future with applicable securities authorities, may be found on or through SEDAR at [www.sedar.com](http://www.sedar.com), EDGAR at [www.sec.gov](http://www.sec.gov) or the Company's website at [www.pyrogenesis.com](http://www.pyrogenesis.com).

# **PyroGenesis Canada Inc.**

## **Management's Discussion and Analysis**

For the three and six month periods ended June 30, 2022 and 2021

(Unaudited)

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Additional information, including directors' and officers' remuneration and indebtedness, principal holders of the Company's securities and securities authorized for issuance under equity compensation plans, is also contained in the Company's most recent management information circular for the most recent annual meeting of shareholders of the Company.