PYROGENESIS CANADA INC.

MANAGEMENT'S DISCUSSION AND ANALYSIS

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 fourth quarter and the Fiscal year ended December 31, 2019. 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 financial statements and related notes thereto of the Company for the year ended December 31, 2019.

The financial statements and MD&A have been reviewed by PyroGenesis' Audit Committee and were approved by its Board of Directors on June 15, 2020. 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 June 15, 2020, 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 SEDAR (www.sedar.com), OTC Markets (www.otcmarkets.com) and on the Company's website at www.pyrogenesis.com.

FORWARD-LOOKING STATEMENTS

This MD&A contains forward-looking statements. 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 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.

The future outcomes that relate to forward-looking statements may be influenced by many factors, including, but not limited 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 in this document under the heading "Risk Factors". 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.

OVERVIEW

PyroGenesis Canada Inc. is a world leader in the design, development, manufacturing and commercialization of advanced plasma processes. The Company provides engineering and manufacturing expertise, cutting-edge contract research, as well as turnkey process equipment packages to the defense, metallurgical, mining, advanced materials (including 3D printing), oil & gas, and environmental industries. With a team of experienced engineers, scientists and technicians working from its Montreal office and its 3,800m^2 production facility, PyroGenesis maintains its competitive advantage by remaining at the forefront of technology development and commercialization. PyroGenesis' core competencies allow the Company to be a leader in providing innovative plasma torches, plasma waste processes, plasma atomization processes, high-temperature metallurgical processes, and engineering services to the global marketplace. PyroGenesis' operations are ISO 9001:2015 certified and AS9100D certified, and have been since 1997. PyroGenesis is a publicly traded Canadian company on the TSX Venture Exchange (Ticker symbol: PYR.V), on the OTCQB in the United States (Ticker symbol: PYRNF) and on the Frankfurt Stock Exchange (FSX) under the symbol "8PY ".

ADOPTION OF IFRS 16 LEASES

The Company has adopted *IFRS 16 Leases* using the modified retrospective method of adoption, with the effect of initially applying this standard recognized at the date of initial application, i.e. January 1, 2019. Accordingly, the comparative information presented for 2018 has not been restated, i.e. it is presented, as previously reported, under IAS 17 and related interpretations.

The following table summarizes the impacts of adopting IFRS 16 on the Company's consolidated statement of financial position as at January 1, 2019:

	As at January 1, 2019
	$
Lease liabilities	4,116,347
Reversal of deferred rent	(11,333)
Right-of-use assets	4,102,552

As a result of the IFRS 16 adoption, the depreciation charge for right-of-use assets, expenses related to variable lease payments not included in the measurement of lease liabilities and gains and gains and losses related to lease modifications are allocated in the Company's profit and loss statement based on their function within the Company, while interest expense on lease liabilities is presented within finance costs.

EXTRACT FROM STATEMENT OF COMPREHENSIVE LOSS FOR THE PERIODS ENDED DECEMBER 31:

	Three months ended Dec 31 2019	2018	% Change 2019vs2018	Twelve months ended Dec 31 2019	2018	% Change 2019vs2018
Revenues	$ 1,066,329	$ 450,436	137%	$ 4,813,978	$ 5,030,116	-4%
Cost of sales and services	977,347	795,594	23%	3,515,886	3,920,819	-10%
Gross margin	88,982	(345,157)	-126%	1,298,092	1,109,297	-17%
Expenses						
Selling, general and administrative	1,763,066	1,806,773	-2%	6,188,898	6,537,777	-5%
Research and development	306,558	258,128	19%	851,512	892,045	-5%
Net finance costs	725,598	113,224	541%	1,061,267	1,525,275	-30%
Impairment of plasma automation system	1,981,410	-	100%	1,981,410	-	100%
Write-off of inventories	386,121	-	100%	386,121	-	100%
	5,162,753	2,178,125	137%	10,469,208	8,955,097	17%
Comprehensive loss	$ (5,073,771)	$ (2,523,283)	101%	$ (9,171,116)	$ (7,845,800)	17%
Basic and diluted loss per share	$ (0.04)	$ (0.02)		$ (0.07)	$ (0.06)	
Modified EBITDA (loss)	$ (1,545,956)	$ (2,308,908)	-33%	$ (4,743,961)	$ (5,271,749)	-10%

Modified EBITDA (loss) is not a performance measure defined under IFRS and it is not considered an alternative to Income (Loss) from operations or Comprehensive Earnings (Loss) in the context of measuring a 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 their results and related trends, and as such increases transparency and clarity. Modified EBITDA (loss) 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 our return on capital and operating efficiencies, from period to period, by removing the impact of its capital structure (interest expense to service outstanding debt), asset base (depreciation and amortization), tax consequences, and other non-operating items not requiring cash outlays including share-based compensation and change in fair value of investment. 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.

We have included definitions of this and other non-IFRS financial measures in the "Reconciliation of non- IFRS Measures (EBITDA, Adjusted and Modified)" section of this MD&A.

SELECTED FINANCIAL INFORMATION

	Dec 30, 2019	Dec 31, 2018
Current assets	1,324,554	2,868,280
Non-current assets	8,254,675	5,891,195
Total assets	$ 9,579,229	$ 8,759,475
Current liabilities	11,816,655	6,969,708
Non-current liabilities	3,845,497	2,795,817
Total liabilities	$ 15,662,152	$ 9,765,525
Shareholders' deficiency	$ (6,082,923)	$ (1,006,050)

RESULTS OF OPERATIONS

Revenues

PyroGenesis recorded revenues of $4,813,978 for the year ended December 31, 2019, representing a decrease of 4% compared to $5,030,116 recorded in 2018.

Revenues recorded in fiscal 2019 were generated primarily from:

(i) PUREVAP™ related sales of $525,556 (2018 - $1,781,009)

(ii) DROSRITE™ related sales of $560,916 (2018 - $1,237,740)

(iii) support services related to systems supplied to the US Military $637,841 (2018 - $1,451,998)

(iv) torch related sales of $2,323,351 (2018 - $Nil)

(v) other sales and services $766,314 (2018 - $559,369)

Cost of Sales and Services and Gross Margin

	Three months ended Dec 31 2019	2018	% Change 2019vs2018	Twelve months ended Dec 31 2019	2018	% Change 2019vs2018
Employee compensation	$ 401,136	$ 500,982	-20%	$ 1,678,995	$ 1,819,980	-8%
Subcontracting	(1,086)	4,317	-125%	167,382	364,463	-54%
Direct materials	427,454	(57,958)	-838%	1,303,844	1,125,645	16%
Manufacturing overhead & other	200,581	197,631	1%	551,366	644,755	-14%
Foreign exchange loss	8,087	15,595	-48%	(26,164)	64,598	-141%
Investment tax credits	(64,134)	74,701	-186%	(179,670)	(158,948)	13%
Cost of Sales and Services before Amortization of Intangible Asset	$ 972,038	$ 735,268	32%	$ 3,495,753	3,860,493	-9%
Amortization of intangible assets	5,309	60,326	-91%	20,133	60,326	-67%
Total Cost of Sales and Services	$ 977,347	$ 795,594	23%	$ 3,515,886	$ 3,920,819	-10%

Gross Margin

	Three months ended Dec 31 2019	2018	Twelve months ended Dec 31 2019	2018
Revenues	$ 1,066,329	$ 450,436	$ 4,813,978	$ 5,030,116
Cost of Sales and Services	977,347	795,594	3,515,886	3,920,819
Gross Margin	$ 88,981	$ (345,158)	$ 1,298,092	$ 1,109,297
Gross Margin %	8.3%	-76.6%	27.0%	22.1%

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.

Cost of sales and services before amortization of intangible assets was $3,495,753 in 2019, representing a decrease of 9% compared to $3,860,493 in 2018, primarily due to a decrease in employee compensation, a decrease in subcontracting expenses and a decrease in manufacturing overhead and other.

In 2019, employee compensation, subcontracting, manufacturing overhead and other decreased to $2,397,743 (2018 - $2,829,198) while direct materials increased to $1,303,844 (2018- $1,125,645). The gross margin for 2019 was $1,298,092 or 27% of revenue compared to a gross margin of $1,109,297 or 22.1% of revenue for 2018. As a result of the type of contracts being executed, the nature of the project activity had a significant impact on the gross margin and the overall level of cost of sales and services reported in a period, as well as the composition of the cost of sales and services, as the mix between labour, materials and subcontracts may be significantly different. The cost of sales and services for 2019 and 2018 are in line with management's expectations

Investment tax credits recorded against cost of sales are related to projects that qualify for tax credits from the provincial government of Quebec. Qualifying tax credits increased to $179,670 in 2019, compared to $158,948 in 2018. This represents an increase of 13% year-over-year. The Company continues to make investments in research and development projects involving strategic partners and government bodies. In total, the Company earned investment tax credits of $354,241 in 2019.

The amortization of intangible assets of $20,133 in 2019 and $60,326 for 2018 relates to patents and deferred development costs. Of note, these expenses are non-cash items and will be amortized over the duration of the patent lives.

Selling, General and Administrative Expenses

	Three months ended Dec 31		% Change	Twelve months ended Dec 31		% Change
	2019	2018	2019vs2018	2019	2018	2019vs2018
Employee compensation	**$ 779,021**	$ 957,705	-19%	**$ 3,159,948**	$ 3,164,631	-0.1%
Professional fees	**289,478**	380,907	-24%	**1,142,308**	1,267,908	-10%
Office and general	**140,841**	155,126	-9%	**317,200**	548,497	-42%
Travel	**55,192**	84,795	-35%	**357,537**	319,911	12%
Depreciation on property and equipment	**23,034**	99,045	-77%	**168,835**	212,622	-21%
Depreciation rou assets	**32,953**	-	100%	**359,783**	-	100%
Investment tax credits	**(7,500)**	(30,881)	-76%	**(29,913)**	(30,881)	-3%
Government grants	**(7,500)**	(6,352)	18%	**(56,563)**	(45,910)	23%
Other expenses	**84,158**	122,067	-31%	**320,156**	427,750	-25%
Tax Assessment	**277,800**	-	100%	**277,800**	-	100%
Sub-total before Share-based payments	**$ 1,667,477**	$ 1,762,412	-5%	**$ 6,017,091**	$ 5,864,528	3%
Share-based payments	**95,590**	44,361	115%	**171,807**	673,249	-74%
Total selling, general and administrative	**$ 1,763,067**	$ 1,806,773	-2%	**$ 6,188,898**	$ 6,537,777	-5%

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 2019 excluding the costs associated with share-based compensation (a non-cash item in which options vest principally over a four-year period), were $6,017,091, representing an increase of 3% compared to $5,864,528 reported for 2018.

The increase in SG&A expenses in 2019 over the same period in 2018 is mainly attributable to the net effect of:

i) a decrease of 0.1% in employee compensation due to changes in staffing,
ii) a decrease of 10% for professional fees, primarily due to a decrease in consulting fees, legal fees and investor relation expenses,
iii) a decrease of 42% in office and general expenses, is primarily due to the adoption of IFRS 16 using the modified retrospective method on January 1, 2019. In 2019 rent included in office and general expenses was $Nil compared to $278,458 in 2018,
iv) travel costs increased by 12%, due to an increase in travel abroad,
v) depreciation on property and equipment decreased by 21% due to lower amounts of property and equipment being depreciated. In 2019, depreciation was not taken on the Plasma atomization system (previously asset under development) as it was written off,
vi) investment tax credits decreased by 3%, due to a decrease in qualifying projects,
vii) government grants increased by 23%, due to a non-refundable government grant contribution for a maximum amount of $350,000 for the period 2018-2020,
viii) other expenses decreased by 25%, primarily due to a decrease in subcontracting and advertising expenses,
ix) tax assessment represents the amount due from a taxation audit for the period of 2008 to 2011. The Company paid royalties for the use of intangible property prior to the purchase of the asset. The royalties were subject to a 25% withholding tax that was not deducted or withheld by the Company at that time.

Separately, share based payments decreased by 74% in 2019 over the same period in 2018 as a result of the vesting structure of the stock option plan including the stock options granted in 2019.

Depreciation on Property and Equipment

	Three months ended Dec 31 2019	2018	% Change 2019vs2018	Twelve months ended Dec 31 2019	2018	% Change 2019vs2018
Depreciation on property and equipment	**$ 23,034**	$ 99,045	-77%	**$ 168,835**	$ 212,622	-21%

The depreciation on property and equipment decreased to $168,835 in 2019, compared to $212,622 in 2018. The 21% decrease is due to lower amounts of property and equipment being depreciated. In 2019, depreciation was not taken on the Plasma atomization system (previously asset under development) as it was written off.

Research and Development ("R&D") Costs

	Three months ended Dec 31 2019		2018	% Change 2019vs2018	Twelve months ended Dec 31 2019		2018	% Change 2019vs2018
Employee compensation	$ 293,993	$	242,177	21%	$ 956,813	$	846,222	13%
Investment tax credits	(36,406)		(79,529)	-54%	(144,658)		(79,529)	82%
Subcontracting	3,600		2,500	44%	19,885		10,420	91%
Materials and equipment	34,472		120,922	-71%	197,665		224,179	-12%
Other expenses	10,900		8,517	28%	26,332		36,223	-27%
Sub-total before government grants	$ 306,561	$	294,587	4%	$ 1,056,037	$	1,037,517	2%
Government grants	-		(36,459)	-100%	(204,525)		(145,470)	41%
Total net R&D costs	$ 306,561	$	258,128	19%	$ 851,512	$	892,045	-5%

The Company incurred $851,512 of R&D costs, net of government grants and investment tax credits, on internal projects in 2019, a decrease of 5% compared to $892,045 in 2018. The decrease in 2019 is primarily related to an increase in investment tax credits and government grants recognized.

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).

Net Finance Costs

	Three months ended Dec 31 2019		2018		Twelve months ended Dec 31 2019		2018	
Interest and fees on convertible debentures	$ 71,250	$	70,316	1%	$ 285,000	$	291,140	-2%
Interest accretion of convertible debentures	97,915		142,616	-31%	371,117		328,153	13%
Interest expense	24,709		(9,151)	-370%	46,749		54,063	-14%
Interest on promissory notes	36,266		-	100%	53,317		7,427	618%
Interest on lease liabilities	41,562		-	100%	258,288		-	100%
Interest on obligations under capital leases	-		1,534	100%	-		1,534	100%
Interest accretion on promissory notes	(30,836)		775	-4079%	-		22,646	-100%
Change in the fair value of investments	261,363		9,713	2591%	(176,237)		919,463	-119%
Penalties and other interest expenses	275,520		-	100%	275,183		3,428	7928%
Sub-total before Share-based payments	$ 777,749	$	215,803	260%	$ 1,113,417	$	1,627,854	-32%
Dividend in kind	-		(102,579)	-100%	-		(102,579)	-100%
Capitalized borrowing costs	(52,150)		-	0%	(52,150)		-	0%
Net finance costs	$ 725,599	$	113,224	541%	$ 1,061,267	$	1,525,275	-30%

Finance costs for 2019 totaled $1,061,267 as compared with $1,525,275 for 2018, representing a decrease of 30% year-over-year. The decrease in finance costs in 2019, is primarily attributable to the adjustment in fair value of investments resulting in a gain of $176,237 compared to a loss in the amount of $919,463 in 2018, offset by an amount of $275,183 in 2019 for the interest and penalty amount due related to the tax assessment from a taxation audit for the period of 2008 to 2011 and further to the adoption of IFRS 16, as mentioned above, the finance costs increased by $258,288 related to the interest calculated on the lease liabilities during the year 2019.

Impairment and Write Offs

	Three months ended Dec 31 2019		2018	% Change 2019vs2018	Twelve months ended Dec 31 2019		2018	% Change 2019vs2018
Impairment of plasma automation system	$ 1,981,410	$	-	100%	$ 1,981,410	$	-	100%
Write-off of inventories	386,121		-	100%	386,121		-	100%
Total Impairment and Write-offs	$ 2,367,531	$	-	100%	$ 2,367,531	$	-	100%

In 2019 the Company commenced construction on a new and improved Plasma Powder Production equipment with advanced technological improvements with regards to production output and operating costs. As a result, the existing powder production, Plasma Atomization system, was no longer deemed to have any future benefit and was written down by $1,981,410, to the net recoverable amount of nil. The powders and raw materials inventory related to the old Plasma Atomization system were no longer deemed to have any future value and were written down by $386,121 to their net recoverable amounts of nil.

Net loss and comprehensive loss

	Three months ended Dec 31 2019		2018	% Change 2019vs2018	Twelve months ended Dec 31 2019		2018	% Change 2019vs2018
Net comprehensive loss	$ (5,073,771)	$	(2,523,283)	101%	$ (9,171,116)	$	(7,845,800)	17%

The net comprehensive loss for 2019 of $9,171,116 compared to a loss of $7,845,800, in 2018, represents an increase of 17% year-over-year. The increase of $1,325,316 in the comprehensive loss in 2019 is primarily attributable to the factors described above, which have been summarized as follows:

(i) a decrease in product and service-related revenue of $216,138 arising in 2019,
(ii) a decrease in cost of sales and services totaling $18,811, primarily due to lower subcontract costs, and lower manufacturing overhead as a result of lower revenues in 2019,
(iii) a decrease in SG&A expenses of $348,879 arising in 2019 primarily due a decrease in share-based payments over the same period in 2018 as a result of the vesting structure of the stock option plan including the stock options granted in 2019,
(iv) a decrease in R&D expenses of $40,533 primarily related to an increase in investment tax credits and government grants recognized,
(v) a decrease in net finance costs of $464,008 in 2019 primarily attributable to the adjustment in fair value of investments,
(vi) an increase of $1,981,410 in 2019 due to impairment of a Plasma Atomization 2019. The Company commenced construction on a new and improved Plasma Powder Production equipment,
(vii) an increase of $386,121 in 2019 due to the write off, of powders and raw materials inventory.

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

	Three months ended Dec 31 2019	2018	% Change 2019vs2018	Twelve months ended Dec 31 2019	2018	% Change 2019vs2018
Comprehensive loss	**$ (5,073,771)**	$ (2,523,283)	101%	**$ (9,171,116)**	$ (7,845,800)	17%
Depreciation on property and equipment	**23,034**	99,045	-77%	**168,835**	212,622	-21%
Depreciation rou assets	**32,953**	-	100%	**359,783**	-	100%
Amortization of intangible assets	**5,309**	60,326	-91%	**20,133**	60,326	-67%
Financing charges	**464,235**	206,090	125%	**1,237,503**	$ 708,391	75%
EBITDA (loss)	**$ (4,548,240)**	$ (2,157,822)	111%	**$ (7,384,862)**	$ (6,864,461)	8%
Other non-cash items:						
Share-based payments	**95,590**	44,361	115%	**171,807**	673,249	-74%
Tax assessment	**277,800**	-	100%	**277,800**	-	100%
Inventory write-off	**386,121**	-	100%	**386,121**	-	100%
Equipment write-off	**1,981,410**	-	100%	**1,981,410**	-	100%
Adjusted EBITDA (loss)	**$ (1,807,319)**	$ (2,113,461)	-14%	**$ (4,567,724)**	(6,191,212)	-26%
Change in fair value of investments	261,363	(195,445)	-234%	(176,237)	919,463	-119%
Modified EBITDA (loss)	**$ (1,545,956)**	$ (2,308,906)	-33%	**$ (4,743,961)**	$ (5,271,749)	-10%

EBITDA is defined as Earnings (from operations) before Net Financing Charges, Taxes, Depreciation and Amortization, Adjusted EBITDA is defined as Earnings (from operations) 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, and Modified EBITDA is defined as Adjusted EBITDA before the change in fair value of investments.

EBITDA, Adjusted EBITDA and Modified EBITDA are not performance measures defined under IFRS and they are not considered an alternative to income or loss from operations, or to comprehensive earnings or loss, in the context of measuring a 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. Management believes that EBITDA, Adjusted EBITDA and Modified EBITDA are important measures of operating performance because it allows management, investors and others to evaluate 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 (interest expense to service outstanding debt), asset base (depreciation and amortization), tax consequences, and other non-operating items not requiring cash outlays including the adjustment to the fair value of investments and share-based compensation. 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.

The adoption of IFRS 16 had a favourable impact of $618,071 on the calculation of EBITDA, Adjusted EBITDA and Modified in EBITDA in 2019 compared 2018. The reconciliation above includes add-backs for depreciation of the right-of-use asset of $359,783 and finance charges of interest on lease liabilities of $258,288 in 2019, compared to nil for 2018 as a result of the use of the modified retrospective method used at date of transition.

The EBITDA loss in 2019 was $7,384,862 compared to an EBITDA loss of $6,864,461 for 2018, representing an increase of 8% year-over-year. The increase in the EBITDA loss in 2019 compared to 2018 is due to the increase in comprehensive loss of $1,325,316, offset by a decrease in depreciation on property and equipment of $43,787, an increase in depreciation on right-of-use assets of $359,783, a decrease in amortization of intangible assets of $40,193, and an increase in finance charges of $529,112.

Adjusted EBITDA loss in 2019 was $4,567,724 compared to an Adjusted EBITDA loss of $6,191,212 for 2018. The decrease of $1,623,488 in the Adjusted EBITDA loss in 2019 is attributable to an increase in EBITDA loss of $520,401, a decrease of $501,442 in share-based payments. an increase in tax assessment of $277,800, an increase in inventory write-off of $386,121, and an increase in equipment write-off of $1,981,410

The Modified EBITDA loss in 2019 was $4,743,961 compared to a Modified EBITDA loss of $5,271,749 for 2018, representing a decrease of 10%. The decrease in the Modified EBITDA loss in 2019 is attributable to the decrease as mentioned above in the Adjusted EBITDA of $1,623,490 and a decrease in change of fair value of investments of $1,095,700.

SUMMARY OF QUARTERLY RESULTS

The majority of PyroGenesis' revenues are recognised from long-term contracts over time and are dependent on the timing of project initiation and execution, including project engineering, manufacturing, and testing.

	2019				2018			
	Q4	Q3	Q2	Q1	Q4	Q3	Q2	Q1
Revenues	$1,066,329	$2,097,437	$ 913,769	$ 736,443	$ 450,436	$ 1,097,726	$ 1,421,352	$ 2,060,602
Gross margin Gross margin %	88,982 8.3%	947,090 45.2%	185,349 20.3%	76,671 10.4%	(345,158) -76.6%	252,152 23.0%	496,398 34.9%	705,906 34.3%
Comprehensive loss	(5,073,771)	(965,031)	(2,253,390)	(878,925)	(2,523,283)	(2,758,831)	(1,534,890)	(1,028,796)
Net loss per share - basic and diluted	(0.04)	(0.01)	(0.02)	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)

LIQUIDITY AND CAPITAL RESOURCES

The following table summarizes the contractual maturities and interest to be paid of financial liabilities as at December 31, 2019.

	Carrying value	Total Contractual amount	6 months or less	6 to 12 months
	$	$	$	$
Accounts payable and accrued liabilities	4,913,155	4,900,355	4,900,355	-
Term loans	496,000	579,795	332,295	247,500
Long-term debt	284,956	299,425	299,425	-
Convertible debentures	2,898,358	3,142,500	3,142,500	
	8,592,469	8,922,075	8,764,575	247,500

Maturity analysis – contractual undiscounted cash flows of lease liabilities as at December 31, 2019

	$
2020	389,152
2021	394,445
2022	3,088,912
2023	218,241
2024	213,402
Thereafter	444,588
	4,748,740

The Company has incurred, in the last several years, operating losses and negative cash flows from operations, resulting in an accumulated deficit of $60,237,656 and a negative working capital of $10,492,102 as at December 31, 2019 (December 31, 2018 - $51,066,540 and $4,101,428 respectively). Furthermore, as at December 31, 2019, the Company's current liabilities and expected level of expenses for the next twelve months exceed cash on hand of $34,431 (December 31, 2018 - $644,981). The Company has relied upon external financings to fund its operations in the past, primarily through the issuance of equity, debt, and convertible debentures, as well as from investment tax credits.

Revenue generated from active projects does not yet produce sufficient positive cash flow to fund operations. However, the Company has a strong backlog from signed contracts totaling $30.27MM, and a pipeline of prospective new projects resulting in the Company's business plan becoming less dependent on raising additional funds to finance operations within and beyond the next 12 months. 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, should it need to, in the future. If the Company is unable to obtain sufficient additional financing when needed, it may have to curtail operations and development activities, any of which could harm the business, financial condition and results of operations. Until such financing is secured, there exists a material uncertainty that may cast significant doubt about the Company's ability to continue operating as a going concern and realize its assets and settle its liabilities and commitments in the normal course of business. See note 1(b) to the financial statements.

SUMMARY OF CASH FLOWS

	Three months ended Dec 31		Twelve months ended Dec 31	
	2019	2018	**2019**	2018
Cash provided by (used in) operating activities	**$ (596,864)**	$ (2,177,864)	**$ (3,172,195)**	$ (3,277,988)
Cash provided by (used in) investing activities	**(309,405)**	(461,161)	**(867,598)**	(3,663,983)
Cash provided by (used in) financing activities	**664,633**	1,450,970	**3,429,243**	6,964,106
Increase (decrease) in cash	**(241,636)**	(1,188,055)	**(610,550)**	22,135
Cash - end of period	**34,431**	644,981	**34,431**	644,981

On a year to date basis, cash flow used by operating activities was $3,172,195 compared to $2,954,630 for the same period in the prior year.

The use of cash during 2019 consists of the comprehensive loss of $9,171,116 (2018 - $7,845,800) plus adjustments for operating activities of $4,149,354 (2018 - $4,891,170), including a net change in non-cash operating working capital items of $1,849,567 (2018 – net change of $2,439,731).

Investing activities resulted in a use of cash of $867,598 in 2019, compared to a use of cash of $3,663,983 in 2018 resulting from the purchase of investments, property and equipment and additions to intangible assets.

Financing activities in 2019 resulted in a net source of funds of $3,429,243, compared with a net source of funds of $6,640,748 for the same period in 2018. In 2019, the Company issued common shares upon exercise of stock options for cash proceeds of $3,616,077, received proceeds from the issuance of a loan of $576,700, and repaid an amount of $247,200 in loans and $218,129 in lease liabilities. In 2018, the Company issued debentures and completed a private placement for net cash proceeds of $9,816,856, received proceeds from the issuance of a loan of $3,145,000 and repurchase the convertible debentures in the amount of $3,245,000 and repaid loans and lease obligations in the amount of $2,752,750. Financing activities also include interest paid of $699,428 in 2019 compare to $323,358 in 2018.

The net cash position of the Company decreased by $610,550 for 2019 compared to a net increase of $22,135 for 2018.

CAPITAL STOCK INFORMATION

The authorized share capital of the Company consists of an unlimited number of Class A common shares (the "Common Shares"). As at June 15, 2020 PyroGenesis had 144,594,950 Common shares, 10,590,893 share purchase warrants, 6,810,000 outstanding stock options issued, and 6,070,000 exercisable options issued.

GOING CONCERN

Cash generated from contracts and from providing engineering services to clients has historically been insufficient to meet the overall cash requirements of the Company to cover operating costs. For the Company to generate sufficient positive cash flows from operations and meet current cash requirements, the level of business must exceed that recorded to date. Management expects that the investments currently being made in accelerating projects under development for various clients, together with executing on the $30.27MM backlog at June 15, 2020, which is primarily related to the Company's successful diversification into niche markets of the additive manufacturing (including 3D printing), and metals & mining industries, will continue to improve the Company's cash position.

To date, the Company has raised financing primarily through successive issuances of equity and convertible debentures. There is no certainty that the Company will continue to be able to raise additional financing or expand its sales to fund its operations, although management is confident that it will be able to do so. These conditions indicate the existence of a material uncertainty that may cast significant doubt on the Company's ability to continue as a going concern.

The December 31, 2019 financial statements have been prepared using International Financial Reporting Standards ("IFRS") 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 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 financial statements could be material.

RELATED PARTY TRANSACTIONS

During the year ended December 31, 2019 and 2018, the Company concluded the following transactions with related parties:

The Company entered into a lease agreement for rent of a property with a trust whose beneficiary is the controlling shareholder and CEO of the Company. As at January 1, 2019, following the first application of IFRS 16, the Company recognized a right-of-use asset and lease liabilities in the amount of $1,350,487. As at December 31, 2019, the right-of-use asset and the lease liabilities amount to $1,183,416 and $1,218,958 respectively. In 2019, the variable components of the leases which are not included in the lease liabilities under IFRS 16, comprise property taxes for an amount of $266,581 (2018 - $260,803) which were charged to the Company. A balance due of $51,134 is included in accounts payable and accrued liabilities.

In 2018, rent and property taxes were charged by a trust whose beneficiary is the controlling shareholder and CEO of the Company in the amount of $260,803. The balance due is $Nil.

In 2018, an amount of $240,159 was paid as a deposit for rent to a trust whose beneficiary is the controlling shareholder and CEO of the Company, of this amount $172,941 is included in prepaids.

An amount of $Nil (2018 – $240,159) was paid as a deposit for rent to a trust whose beneficiary is the controlling shareholder and CEO of the Company.

Interest expenses of $Nil (2018 - $9,700) were accreted on a loan from a trust whose beneficiary is the controlling shareholder and CEO of the Company.

An amount of $Nil (2018 – $10,213) was owed by a trust whose beneficiary is the controlling shareholder and CEO of the Company.

Interest of $Nil (2018 - $14,171) was paid on the $755,000 convertible debentures held by Mr. Peter Photis Pascali the father of the controlling shareholder and CEO. Accreted interest related to the 2015 Convertible Debenture held by Peter Photis Pascali amounted to $Nil (2018 - $11,623).

A balance due to the controlling shareholder and CEO of the Company amounted to $214,470 (2018 - $205,222) for expense report, salary and vacation payable and is included in accounts payable and accrued liabilities.

An amount of $53,317 (2018 - $20,373), of interest accretion was expensed in net financing costs in the year on the loan of $295,000 from the controlling shareholder and CEO of the Company and is also included in accounts payable and accrued liabilities.

In 2018, the Company and a company owned by Mr. Peter Photis Pascali, the father of the controlling shareholder and CEO, and under common control of the controlling shareholder and CEO, entered into a settlement agreement to resolve a claim in the amount of $5,531,928 filed on or about April, 5, 2018, made by the company owned by Mr. Peter Photis Pascali, the father of the controlling shareholder and CEO, in connection with the share for debt conversion transaction between the parties that took place in 2014. Under the share for debt conversion, the Company issued 7,500,000 common shares in 2014 to settle $6,000,000 of the carrying value of the Balance of sale payable. The current claim was settled for an amount of $3,700,000. The settlement agreement also constitutes the final payment of the Balance of sale, and provides for the issuance of units by the Company having a fair value of $3,327,571 to the company owned by Mr. Peter Photis Pascali, as follows: (i) on February 9 and March 7, 2018, issuance of 1,899,999 units at a value of $0.70 per unit with each unit consisting of 1 common share of the Company and 1 common share purchase warrant which entitles the holder to purchase 1 common share at a price of $1.25 until August 9, 2019, and (ii) on April 30, 2018, 3,385,715 units at a value of $0.59 per unit with each unit consisting of 1 common share of the Company and 1 common share purchase warrant which entitles the holder to purchase 1 common share at a price of $0.85 until April 19, 2020. The units agreed to on April 30, 2018 were issued on October 25, 2018. As the claim related to a dispute that existed at year-end, a liability and related expense of $3,215,643 was recorded as at December 31, 2017. The liability was initially measured based on the fair value of the units as at their expected issuance date, which is $0.70 on February 9 and March 7, 2018 and $0.59 on April 30, 2018. The difference between the fair value of the units as at April 30, 2018 and October 25, 2018 has been considered a transaction with shareholders and recorded in the shareholders' (Deficiency) Equity.

The key management personnel of the Company are the members of the Board of Directors and certain officers. Total compensation to key management consisted of the following:

	2019	2018
	$	$
Salaries –key management	**723,000**	408,000
Pension contributions	**10,960**	8,160
Fees – Board of Directors	**110,750**	118,000
Share-based compensation – officers	**13,473**	365,379
Share-based compensation – Board of Directors	**89,025**	114,070
Other benefits – officers	**58,412**	13,066
Total compensation	**1,005,620**	1,026,675

The Company has added three employees in key management amounts for 2019. A balance of $130,604 of key management compensation, of the amounts noted above, is included in accounts payable and accrued liabilities as at December 31, 2019 (December 31, 2018 - $127,748).

SUBSEQUENT EVENTS

In January and February 2020, the Company issued 1,488,000 common shares upon the exercise of 1,488,000 stock options with an exercise price of $0.30 for total proceeds of $446,400.

In March 2020, the World Health Organization declared a global pandemic due to the novel coronavirus (COVID-19). The situation is constantly evolving, and the measures put in place are having multiple impacts on provincial, national and global economies. The overall effect of these events on the Company and its operations is too uncertain to be estimated at this time. The impacts will be accounted for when they are known and may be assessed.

On March 18, 2020, the Company closed a $903,000 non-brokered secured convertible loan at 12% per annum, with a trust whose beneficiary is the controlling shareholder and CEO of the Company. The Loan bears interest at the rate of 12% per annum, with interest payable in cash on a quarterly basis in arrears and matures September 17, 2021. The Loan is convertible into common shares of the Company at a conversion price of $0.28 per common share.

The Company received under the exclusivity contract with Drosrite International approximately US$2,545,520 between March 23, 2020, and June 02, 2020.

On March 30, 2020 the Company reached an agreement to extend the maturity date of its $3,000,000 convertible debenture to June 30, 2020, from the original maturity date of March 29, 2020. Under the terms of the agreement, the Company redeemed $300,000 (representing 10% of the principal amount), paid a onetime accommodation fee of $54,000, and is no longer subject to any prepayment penalties going forward. The interest rate and conversion feature have not changed.

The Company received under the exclusivity contract with a US tunneling corporation approximately $1,000,000 between March and April 2020.

On May 26, 2020, the Company completed a share debt transaction with HPQ, to settle outstanding trade accounts receivable in the amount of $395,514, for which an amount of $30,002 was included in trade accounts receivable as at December 31, 2019, whereby the Company received 4,394,600 units at a price of $0.09 per unit. Each unit is comprised of one common share and one common share purchase warrant. Each warrant will allow its holder to subscribe to one common share at the price of $0.10 for a period of 36 months from the date of closing. Each share issued pursuant to the debt settlement will have a mandatory four month and one day holding period from the date of closing. This settlement is subject to the approval of the TSX Venture.

Between April 7, 2020 and June 15, 2020, the Company bought back 1,285,000 of its common shares for an amount of $964,391 including commissions of $12,845. In June 2020, the Company received proceeds of $2,191,725 from 2,578,500 warrants exercised at a price of $0.85 and $156,600 from 270,000 warrants exercised at $0.58.

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 4, 5 and 24 of the annual 2019 Financial Statements.

RISK FACTORS

PyroGenesis is subject to a number of risks and uncertainties that could significantly affect the Company's financial condition and performance. This list of risk factors may not be exhaustive as the Company operates in a rapidly changing business environment and new risk factors emerge from time to time. The Company cannot predict such risk factors, nor can the Company assess the impact, if any, of such risk factors or uncertainties on its business or the extent to which any factor, or combination of factors, may cause actual results to differ materially from those projected in any forward-looking statements. Accordingly, neither shareholders of the Company nor purchasers of securities of the Company should rely on forward-looking statements as a prediction of actual results. If any of these risks actually occur, the Company's business, results of operations, financial position and cash flows could be adversely affected. In any such case, the market price of the Company's common shares could decline, and investors may lose all or part of their investment.

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:

(a) unforeseen engineering and/or environmental problems;
(b) delays or inability to obtain required financing, licenses, permits and/or regulatory approvals;
(c) supply interruptions and/or labour disputes;
(d) foreign exchange fluctuations and/or collection risk; and
(e) 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.

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

Lack of Product Revenues/History of Losses

PyroGenesis has incurred losses in the majority of years since its inception. The Company's operations have not generated sufficient earnings and cash flows to date to result in consistent profitability or positive cash flow. Consequently, the Company's continued existence is dependent upon its ability to generate profitable operations by establishing and expanding its client base and/or raising adequate long-term financing. PyroGenesis has relied primarily on equity financing, debt financing, partner funding and government funding to carry on its business to date. The ability of the Company to achieve profitable sustainable operations in the future is uncertain. PyroGenesis has not yet demonstrated its ability to consistently achieve positive gross margins and its ongoing efforts to improve product gross margins may be insufficient to result in profitability.

Additional financing and dilution

PyroGenesis will require additional financing to support ongoing operations and to undertake capital expenditures. 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, at June 15, 2020, 6,810,000 stock options are currently issued and outstanding, together with 10,590,893 share purchase warrants, $2,700,000 outstanding amount of the $3,000,000 convertible debenture (on March 30, 2020 the Company reached an agreement to extend the maturity date to June 30, 2020 from the original date of March 29, 2020, the Company paid $300,000 of the outstanding amount (representing 10% of the principal amount), and paid a one-time accommodation fee of $54,000), and $903,000 convertible loan. The exercise of stock options and/or warrants, together with the conversion of debentures, as well as any new equity financings, represents dilution factors for present and future shareholders.

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 realised. The commercial advantage of the Company will 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 the U.S. Military and/or other military clients will continue to provide the Company with business. 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.

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.

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.

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.

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.

Market Liquidity

The market price for the common shares of the Company 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 Company's 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 Company's common shares.

Information systems disruptions

The Company's business depends on the efficient and uninterrupted operation of its computer and communications software, hardware systems, and its other information technology. If such systems were to fail, or the Company was unable to successfully expand the capacity of these systems or integrate new technologies into its existing systems, its operations and financial results could be adversely affected.

OUTLOOK

Any discussion regarding the OUTLOOK of the company would be remiss if it did not address the recent increase in the Company's market capitalization and the implications that has for the future.

Without a doubt the Company's market capitalization suffered, as did many other companies, in the general Covid-19 market meltdown at the end of March 2020. However, PyroGenesis soon broke from the pack with the issuance of a material press release on March 24th, 2020.

Management believes that its breaking from the ranks caught the attention of investors, fund managers, and money managers who all now had the time during the Covid-19 lockdown to fully analyze the complicated story that is PyroGenesis. Management does not see any reason why this interest would abate anytime soon. To the contrary, Management has reason to believe that interest in the Company will only increase over the foreseeable future. As such, Management has decided that several strategies that have been articulated in the past (up listings, spinoffs) can now be accelerated as some of the impediments to moving quickly have been removed, or may be very shortly.

Having a larger market capitalization has also helped in discussions with potential customers who take comfort from the possibility that a higher market capitalization may translate into easier access to capital. For the record, there is no intention at this time to raise capital for working capital purposes.

If 2018 was the year in which PyroGenesis successfully positioned each of its commercial business lines by strategically partnering with multi-billion-dollar entities, and 2019 was the year that saw the appropriate personnel and infrastructure being put in place while building upon the success of 2018, then 2020 is without a doubt the year that the long awaited breakout, which began in the second half of 2019, takes place; it is in fact already upon us:

To date during 2020 PyroGenesis has:

1) received significant payments under the $22MM contract with DROSRITE™ International thereby validating announcements made during 2019,

2) established a relationship with a US based tunneling company (contracts and payments ongoing),

3) Established itself in the iron ore pelletization industry as a potential supplier of torches geared to replacing existing burners and thereby reducing GHGs. Interest is also spilling over into other industries with GHG reduction targets,

4) Established a relationship with an OEM in North America with the intent to eventually supply powders for their 3D printing needs. This augments our relationship with Aubert & Duval, while at the same time de-risking our dependence on them,

5) retired the $3MM convertible debenture in full,

6) bought back approximately 1.2 Million shares under the existing Normal Course Issuer Bid,

7) increased Company's investment in HPQ, who has subsequently also experienced a significant increase in market capitalization,

8) further benefited from early conversions of warrants maturing in 2021 of over $2MM.

The Company has booked a significant backlog of signed contracts (in excess of $30MM; 2019 Revenues approx. $5MM) which, when taking the eagerly awaited US Navy contract into account, will increase to over $40MM. This provides a solid cornerstone upon which PyroGenesis can:

i. continue to build on the recent successes with the Company's DROSRITE™ offering

ii. Leverage off of the recent successes with the Company's torch offerings to (i) the iron ore pelletization industry, and (ii) a tunneling client.

iii. Accelerate activities with Aubert & Duval in the Additive Manufacturing sector as well as HPQ in the Mining and Metallurgical sector, both of which did not progress as fast as management would have liked in 2019. Significant attention will be placed on both these activities in 2020.

Specifically, with Aubert & Duval the goal will be to complete the integration of the cutting-edge advances PyroGenesis has made to the powder production process.

With respect to HPQ, the goal would be to accelerate the game changing *PUREVAP™* family of processes which we are developing for HPQ, namely:

- The *PUREVAP™ "Quartz Reduction Reactors" (QRR)*, an innovative process (patent pending), which will permit the one step transformation of quartz (SiO_2) into high purity silicon (Si) at reduced costs, energy input, and carbon footprint that will propagate its considerable renewable energy potential*; and*

- The *PUREVAP^{TM} Nano Silicon Reactor (NSiR)*, a new proprietary process that use *PUREVAP^{TM} QRR* silicon (Si) as feedstock, to make spherical silicon nano powders and nanowires;

Looking forward, the Company has, as of December 31st, 2019, approximately $10MM of in-the-money warrants and options expiring in 2020 and 2021. The Company also has over $50MM in tax loss carryforwards (roughly evenly distributed between federal and provincial obligations) which is not reflected as an asset on the balance sheet.

All in all, 2020 is shaping up to be the year that we have been expecting for some time.