



PyroGenesis Provides Corporate Update on Aluminum Business Line

April 20, 2022

DROSRITE™ metal recovery systems in demand as supply shortages and increased prices impact Aluminum producers; PyroGenesis announces new-use markets as Aluminum industry eyes greater technological innovation

MONTREAL, Quebec, April 20, 2022 (GLOBE NEWSWIRE) -- PyroGenesis Canada Inc. (<http://pyrogenesis.com>) (TSX: PYR) (NASDAQ: PYR) (FRA: 8PY), a high-tech company (hereinafter referred to as the "Company" or "PyroGenesis"), that designs, develops, manufactures and commercializes advanced plasma processes and sustainable solutions which are geared to reduce greenhouse gases (GHG), is pleased to provide today a comprehensive update on its Aluminum business line.

After unveiling an initial Aluminum Industry Strategy in September 2020, the Company's mandate has since expanded as global aluminum producers face increasing metal demand, rising energy costs, higher market prices for high-quality aluminum, and approaching carbon emissions targets^{1,2}. As a result, the Company has increased sales efforts and R&D, targeting innovative new uses of its ultra-high heat expertise and plasma-based solutions. All of these endeavors have reached client-discussion stage.

"Due to a series of macroeconomic and geopolitical factors that have intensified the already tightening market for aluminum – even now the world's 2nd most widely used metal after steel, and whose demand is estimated to rise by 80% over the next two decades³ – aluminum prices have spiked, currently up almost 40% after rising as high as 56% year-over-year in March⁴," said Mr. P. Peter Pascali, CEO and Chair of PyroGenesis. "As the metal has become more valuable and with raw material supply chains experiencing added volatility, producers are seeking technological answers to boost their production yield, and PyroGenesis solutions, most notably our Drosrite™ dross recovery system, provides an in-stream benefit."

"We have entered an exciting stage in our aluminum business line", continued Mr. Pascali, "Therefore, we decided to provide a timely update regarding all areas of this business line and the impact we are having with aluminum producers around the world."

The Company is pleased to provide an update on both existing customers, as well as a selection of the many proposals and new-use developments that are currently ongoing:

Drosrite™– Metal Recovery Systems

PyroGenesis' Drosrite™ is a system that helps aluminum producers recover valuable metal from the smelting waste known as "dross" – a residual by-product generated throughout the metallurgical industry, when oxygen comes into contact with molten and solid impurities float to the surface to be skimmed off. Smelters typically lose anywhere from 2%-10% of their total annual melt production due to dross, as the material itself can be composed of as much as 80% metallic aluminum⁵. The valuable metals and chemicals within this waste can be recovered if processed correctly.

PyroGenesis' Drosrite™ system modernized and significantly enhanced dross processing, introducing a method to recover much more – up to 98% – of the valuable aluminum left in dross, a 20% higher rate than the most commonly used process (the Rotary Salt Furnace)⁶, with a 50% lower operating cost, a lower carbon footprint and energy consumption, and a higher return on investment – all without the use of salt that can cause contamination, while also not creating salt cakes, another environmental problem as landfill bans multiply for this hazardous solid.

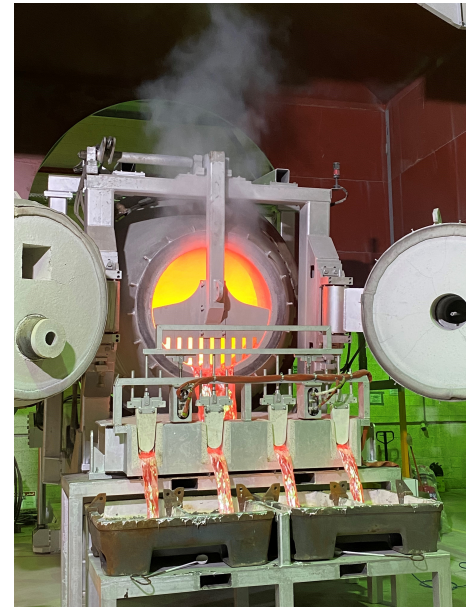
As a result, PyroGenesis' Drosrite™ systems are in-demand, with the Company having successfully won some of the largest dross recovery projects internationally, making the Company one of the largest and certainly fastest-growing dross recovery solutions in the world.

The Company reports several key developments with regards to Drosrite™:

Drosrite™ / Middle East Client

- The first 3 PyroGenesis Drosrite systems, of the 7 total ordered by a Middle Eastern end-user – one of the world's largest aluminum producing complexes – continue to perform exceptionally well. As producers have entered a period of heightened pressure to maximize output of existing operations, the output rate, quality, and purity level of PyroGenesis' salt-free Drosrite™ metal recovery system has proven to be a differentiator.
- Additionally, with that client's recent expansion achieved, the Company can report that the remaining 4 systems are completed, packed, and ready for shipping.

PyroGenesis' Drosrite(TM) system in operation



[In the accompanying image taken April 13, 2022, high-quality metal pours from a Drosrite system after being recovered.]

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Recurring Client 1

It was noted in the Company's [February 2, 2022, news release](#) that a \$4 Million purchase order for the first of three 10-ton Drosrite™ systems from an existing client had been received.

The Company is announcing that procurement for production of this system has begun.

Recurring Client 2

The Company is also announcing an additional Drosrite™ system was completed and delivered to this client, already arriving at the client's factory for commissioning at the time of this writing.

This represents the 14th Drosrite™ system either installed/in shipping (11) or newly ordered/requested (3).

Separately, the Company understands that, due to the confidential and recurring nature of some of our clients, it may be difficult for investors to measure the progress of Drosrite™ orders. The Company will therefore confirm that all systems – 11 in total – ordered and announced prior to the most recent purchase order for the first of 3 units that was received and announced in February 2022, have been completed and are either on-site at the clients' location or in shipping.

Drosrite™ Joint Venture

Background

On September 27, 2021, the Company announced that it had signed a joint venture and license agreements (both agreements collectively the "JV") with a leading residue processor to transform dross residues – the material left over after Drosrite™ metal recovery – into high-value chemical products (the process known as "valorization"), that can then be sold to demanding applications such as fertilizer production and water purification for global markets. The 50:50 JV will be geared towards building, installing and operating dross residue valorization facilities worldwide.

The Company believes this technology will not only make the Drosrite™ offering more appealing but could also be offered as a stand-alone service. PyroGenesis believes that valorizing the residues and producing these high-end chemical products will further define the Company as the go-to supplier for dross-related processing, and a one-stop shop for all aluminum producers to eliminate landfill waste streams and help meet their ESG mandates and targets.

Under the terms of the JV, the exclusive access to the technology initially applies to projects in North America and in the Gulf Cooperation Council nations. Upon successful completion of the first project, the exclusive access to the technology will expand to include, for all intents and purposes, most of the world. These dross residues are currently either being (i) landfilled (which is increasingly becoming banned by regulators) or (ii) dumped into the cement market to avoid landfill costs and liabilities.

Status

This joint venture is in the final due diligence phase, but the JV is already evaluating specific locations for the first plant in which a country decision has already been finalized. The joint venture has also started evaluating additional locations in other countries for further plants.

We expect the final agreement for the JV to be reached shortly. Of note, the pending JV has already attracted interest from both a major North American primary smelter as well as a South American primary smelter, to valorize their dross residues.

Drosrite™ Tolling Services

Background

The Company had previously announced a strategy to provide dross recovery through a tolling approach, meaning rather than sell a Drosrite™ system to a customer for them to operate, PyroGenesis would instead own and operate the Drosrite system on-site for the customer – charging a fee for service instead of the capital cost of an entire system.

New Developments

- The Company has been working on a tolling arrangement with a very large European integrated midstream aluminum producer and manufacturer.
- The Company has recently provided a quote for on-site tolling pilot trials for one of the largest scrap remelters in the world, also located in Europe.
- The Company has submitted a tolling proposal (at the request of the client) for one of the largest primary smelters in South America.
- The Company is currently developing tolling proposals for several other companies across several different countries.

Spent Pot Linings – Safe Destruction and Valorization

Background

Previously, the Company had announced that it had received a grant of \$194,090 from the Ministry of the Economy and Innovation, through the support for innovation projects component of the Innovation program, administered by Investissement Québec, to develop a solution to recover the residues of pot lining.

The production of aluminium occurs in large smelters containing carbon-lined cells or “pots”, which typically have a lifespan of 2 to 6 years ⁷

Eventually the lining of the pot can no longer conduct the required electricity properly and must be removed and replaced. But being heavily contaminated with metals and various compounds, it is often stored at tremendous cost until a safe process can treat the material. In the past (and sadly even today in some areas), this dangerous solid waste – also known as “spent cathode” – has been dumped in lakes and in landfill, a major environmental problem.

But while dangerous, the spent pot lining contains valuable material that, if processed correctly, could be recovered and reused. The goal of this project is to develop a solution to recover that material, but also do so in a safe and environmentally healthy way. PyroGenesis' partner in this project, Aluminerie Alouette – co-owned by Rio Tinto and Norsk Hydro – is the largest primary aluminum smelter in the Americas.

Status

Lab-scale tests have been concluded. Next phase is to include an initial pilot phase, assuming ongoing negotiations around IP and rights are successfully negotiated.

As we feel the negotiations will be successful, the Company is also working behind the scenes on business planning in preparation for eventual commercialization.

Previously Announced Opportunities

Potential New Contract 1

The Company has announced previously that it is bidding on an up-stream opportunity, valued at approximately \$40MM. This process is plasma based, and not only reduces GHG, but it also appears to be cheaper than alternate technologies.

Also mentioned previously, the bid process was experiencing delays, and this has continued, primarily relative to a change in personnel on the potential customer's end, and other administrative tie-ups that are beyond the control of The Company. The bid process is being administered by a 3rd party global engineering firm, who has kept both the name of the potential customer, and the country in which they are located, confidential from bidders.

PyroGenesis is still in the running for this bid, but it is not yet known when it could be concluded.

Potential New Contract 2

The Company has announced previously being in discussions with a second opportunity to provide a similar upstream process for approximately the same consideration.

This opportunity, not a competitive bid, is about to enter a preliminary testing phase at-scale in conjunction with PyroGenesis. This is being done with existing equipment within the client's current production line.

New Opportunities in Primary Aluminum Production

Fuel-Switching to Plasma

PyroGenesis is involved with a European-based aluminum and renewables conglomerate, active throughout the world, and operator of one of the world's largest primary smelters, who is exploring a comprehensive fuel-switching program that would replace carbon-fired burners with plasma torches.

The burners targeted for potential replacement are in furnaces within the company's aluminum cast-house, within various heated molten holding tanks that – post-smelting – store the newly made liquid aluminum in preparation for ingot creation.

The potential scale of this opportunity is in the range of hundreds of plasma torches.

Comprehensive Solution Set

As a result of the Company's many new innovations that have increased the breadth of its aluminum business line, the Company is now able to offer a comprehensive set of services to aluminum producers.

As a result, in anticipation for the construction of a new primary aluminum smelter – one of the largest hydro-electric-powered facilities to be built in some time – PyroGenesis is planning a full end-to-end tender of solutions, from plasma-torches to Drosrite tolling services, and are already in talks with the producer about such a tender.

While a longer-term opportunity, this represents potentially one of the most exciting developments, not just for the Company's aluminum business line, but also for the Company as a whole, and we see this as a future model.

New Opportunities in Secondary Aluminum Production

The aluminum market is comprised of two types of aluminum producers: those that make *primary aluminum*, which is original aluminum extracted from refined bauxite ore and the electrolysing of the resulting alumina; and those that produce *secondary aluminum*, from the re-melting of aluminum scrap.

Until recently, PyroGenesis had been focused on the primary aluminum market. However, the Company's solutions are now being explored by secondary aluminum producers worldwide.

The following are under consideration by several major secondary aluminum producers, and the Company already has quotes out for some of these initiatives:

- Retrofitting of secondary aluminum recycling furnaces, across all furnace types within the process, with plasma torches.

There is a potential need for several hundred torches at just the companies we have provided quotes for alone.

- Working with some of the largest manufacturers of industrial furnaces (for both aluminum and steel) to study providing plasma torch burner options to their customers at initial furnace sale.
- Providing various technology solutions and services to a major global automaker.

Finally, the Company has been developing relationships throughout the industry, and through those it has seen interest from secondary producers to utilize plasma-fired technologies throughout their aluminum scrap re-melting operations. The Company may provide more information on this development at a later date.

Overall, the Company continues to innovate, develop new systems, and pursue new markets that will help aluminum producers improve their processes, optimize their output of valuable material, and reduce greenhouse gas emissions and hazardous waste.

"This industry was tailor-made for us," said Mr. Pascali. "The similarity between PyroGenesis and the aluminum industry as a whole is unique and cannot be understated: few if any industries have both an intrinsic expert understanding, and a long-term need of high-powered electricity solutions, like the aluminum industry (for context, if the aluminum industry was a country, it would rank as the 5th-largest power consumer in the world⁸). As such, it's a perfect fit for PyroGenesis, a world-leader in advancing the understanding, and harnessing the capabilities, of ultra-high temperature and electrified processes such as plasma."

With the global aluminum market experiencing unprecedented demand, and a series of macroeconomic and geopolitical factors conspiring to exert additional pressure on the industry, technology-based solutions are poised to gain even more traction.

PyroGenesis recently developed a whitepaper that outlines the Company's perspective on the current state of the industry regarding those factors, and that whitepaper can be viewed and downloaded [here](#).

About PyroGenesis Canada Inc.

PyroGenesis Canada Inc., a high-tech company, is a leader in the design, development, manufacture and commercialization of advanced plasma processes and sustainable solutions which reduce greenhouse gases (GHG), and are economically attractive alternatives to conventional "dirty" processes. PyroGenesis has created proprietary, patented and advanced plasma technologies that are being vetted and adopted by multiple multibillion dollar industry leaders in four massive markets: iron ore pelletization, aluminum, waste management, and additive manufacturing. With a team of experienced engineers, scientists and technicians working out of its Montreal office, and its 3,800 m² and 2,940 m² manufacturing facilities, PyroGenesis maintains its competitive advantage by remaining at the forefront of technology development and commercialization. The operations are ISO 9001:2015 and AS9100D certified, having been ISO certified since 1997. For more information, please visit: www.pyrogenesis.com.

This press release contains certain forward-looking statements, including, without limitation, statements containing the words "may", "plan", "will", "estimate", "continue", "anticipate", "intend", "expect", "in the process" and other similar expressions which constitute "forward-looking information" within the meaning of applicable securities laws. Forward-looking statements reflect the Company's current expectation and assumptions and are subject to a number of risks and uncertainties that could cause actual results to differ materially from those anticipated. These forward-looking statements involve risks and uncertainties including, but not limited to, our expectations regarding the acceptance of our products by the market, our strategy to develop new products and enhance the capabilities of existing products, our strategy with respect to research and development, the impact of competitive products and pricing, new product development, and uncertainties related to the regulatory approval process. Such statements reflect the current views of the Company with respect to future events and are subject to certain risks and uncertainties and other risks detailed from time-to-time in the Company's ongoing filings with the securities regulatory authorities, which filings can be found at www.sedar.com, or at www.sec.gov. Actual results, events, and performance may differ materially. Readers are cautioned not to place undue reliance on these forward-looking statements. The Company undertakes no obligation to publicly update or revise any forward-looking statements either as a result of new information, future events or otherwise, except as required by applicable securities laws. Neither the Toronto Stock Exchange, its Regulation Services Provider (as that term is defined in the policies of the Toronto Stock Exchange) nor the NASDAQ Stock Market, LLC accepts responsibility for the adequacy or accuracy of this press release.

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¹ Aluminum Prices Can't Keep Up With Energy Costs, Driving Wave of Closures, by By [Rhiannon Hoyle](#) and [Joe Wallace](#), Jan 2022
<https://www.wsj.com/articles/aluminum-prices-cant-keep-up-with-energy-costs-driving-wave-of-closures-11643547605>

² Global Energy Crisis Piles Pressure on Aluminum Supply by Mark Burton and Jack Farchy, Bloomberg News, October 2021
<https://www.bnnbloomberg.ca/global-energy-crisis-piles-pressure-on-aluminum-supply-1.1664646>

³ World aluminium industry must cut emissions by 77% by 2050 -IAI, Reporting by Eric Onstad, Editing by Nick Zieminski, March 2021
<https://www.reuters.com/world/china/world-aluminium-industry-must-cut-emissions-by-77-by-2050-iai-2021-03-16/>

⁴ <https://markets.businessinsider.com/commodities/aluminum-price>

⁵ Sustainable & Profitable Aluminum Dross Practices by David D'Aoust, July 2019
https://www.linkedin.com/pulse/sustainable-profitable-aluminum-dross-practices-david-d-aoust?trk=public_profile_article_view

⁶ Based on PyroGenesis' Internal Calculations.

⁷ Spent Potlining – A Hazardous Waste Made Safe, Department of Chemical Engineering, University of Melbourne, Victoria, Australia by T.K. Pong
<https://www.sciencedirect.com/science/article/abs/pii/S095758200070872X>

⁸ Global Energy Crisis Piles Pressure on Aluminum Supply by Mark Burton and Jack Farchy, Bloomberg News

[https://www.bnnbloomberg.ca/global-energy-crisis-piles-pressure-on-aluminum-supply-](https://www.bnnbloomberg.ca/global-energy-crisis-piles-pressure-on-aluminum-supply-1.1664646#:~:text=If%20the%2065%20million%20ton,to%20curb%20industrial%20energy%20usage)

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A photo accompanying this announcement is available at <https://www.globenewswire.com/NewsRoom/AttachmentNg/0d2101ae-5124-4c5a-90ff-611f9fff0717>