



## **PyroGenesis Announces Grant of Two (2) US Patents for a Total of 54 Patents owned (Issued and Pending)**

October 26, 2017

MONTREAL, Oct. 26, 2017 (GLOBE NEWSWIRE) -- PyroGenesis Canada Inc. (<http://pyrogenesis.com>) (TSX-V:PYR) (OTCQB:PYRNF), a high-tech company (the "Company" or "PyroGenesis") that designs, develops, manufactures and commercializes plasma waste-to-energy systems and plasma torch products, announces today that the U.S. Patent and Trademark Office has issued two unrelated US Patents to the Company, U.S. Patent No. 9,447,705 and U.S. Patent No. 9,752,206; the first targeting the Environmental Industry, and the second targeting the Mining and Metallurgy Industry, which brings the total number of issued and pending patents held by the Company to fifty-four (54).

"We are happy to add these 2 new patents to our solid and substantial global intellectual property portfolio, which now consists of over 17 issued patents worldwide, and an additional 37 patent applications in progress", said Pierre Carabin, Chief Technology Officer of PyroGenesis. "When combined with our know-how and significant trade secrets, we have over time created a formidable barrier to entry in the markets where we are active."

### **U.S Patent. No. 9,447,705 – Maximizing Energy Recovery in Waste to Energy Processes**

U.S Patent. No. 9,447,705 specifically relates to improving the recovery of energy in plasma gasification processes as well as conventional fossil fuel incinerators. As applied to PyroGenesis' waste-to-energy technologies, this patent provides an innovative way to capture waste heat from various components within the process (i.e. plasma torches, reaction vessels, cooling jackets amongst other high-temperature components requiring cooling), in addition to recovering energy from the hot process gas exhausts.

**Block Flow Diagram from Patent No. 9,447,705:** <http://www.globenewswire.com/NewsRoom/AttachmentNg/7076b95f-c9b6-4e61-b8f5-096a3e583b2a>

Building upon its proven track record and its proprietary technology, currently being used by the US Navy, PyroGenesis will now be able to offer systems with even higher efficiency to recover energy from waste for small and medium size applications. "Essentially, we are taking our existing cutting-edge technology and making it so much better", said Mr. Carabin, "which underscores our philosophy at PyroGenesis to strive for innovation with the goal of making our own technologies obsolete."

Of note, the waste-to-energy market is expected to grow at a compounded annual rate in excess of 5.5%, to exceed \$35 billion by 2019<sup>1</sup>.

### **U.S Patent. No. 9,752,206 – Plasma Torches Replace Fossil Fuel Burners**

U.S Patent. No. 9,752,206 relates to using plasma torches instead of diesel burners in blast furnaces during iron ore pellet induration. Induration of iron ore pellets is an essential step in blast furnaces. The purpose of a blast furnace is to reduce and convert iron oxides into liquid iron called "hot metal". This process is traditionally heated by fuel burners.

The use of diesel burners is extremely pollutive as the process burns natural gas, heavy oil or pulverized coal. By using electric powered plasma torches, the generation of CO<sub>2</sub> created by diesel burners is effectively eliminated.

The amount of pollution produced by these diesel burners is significant. For example, a typical pellet plant producing 10 million metric tonnes of pellets annually emits approximately one million metric tonnes of CO<sub>2</sub>. The total world pellet production of 400 million metric tonnes of pellets therefore corresponds to the production of 40 million metric tonnes of CO<sub>2</sub>. This is equivalent to 8.5 million cars on the road, year after year<sup>2</sup>.

"This new patent is a proprietary process whereby the generation of CO<sub>2</sub> by the conventional iron ore pelletizing processes is reduced by using plasma torches powered by renewable electricity instead of burning a fossil fuel, resulting in a near zero emission process", said Mr. Carabin. "Moreover, and most importantly, depending on the price of oil, electricity and carbon credits, replacing diesel burners with plasma torches can result in very significant and quick paybacks."

The total world production of such iron pellets is approximately 400 million metric tonnes per year, which corresponds to about 20% of the total iron ore production. Pellet production thermal energy consumption ranges between 600 and 1000 MJ/t<sup>3</sup>. Assuming all this energy was replaced by 1 MW PyroGenesis' plasma torches, the total number of torches required worldwide would be in the order of 10,000 units. At current torch prices, this represents a market in excess of \$7.5 billion.

"We have patent applications with similarly broad claims which are currently pending in Europe, Japan, China and other industrialized nations," said Mr. Pierre Carabin. "We are extremely selective in terms of what intellectual property we patent, as funds for such expenditures are limited. This in part explains the high level of success in awards we receive as we only pursue those that have a high probability of success."

### **About PyroGenesis Canada Inc.**

PyroGenesis Canada Inc. is the world leader in the design, development, manufacture and commercialization of advanced plasma processes. PyroGenesis provides engineering and manufacturing expertise, cutting-edge contract research, as well as turnkey process equipment packages to the defense, metallurgical, mining, additive manufacturing (3D printing), oil & gas, and environmental industries. With a team of experienced engineers, scientists and technicians working out of our Montreal office and our 3,800 m<sup>2</sup> manufacturing facility, PyroGenesis maintains its competitive advantage by remaining at the forefront of technology development and commercialization. Its 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. Its operations are ISO 9001:2008 certified, and have been ISO certified since 1997. PyroGenesis is a publicly-traded Canadian company

on the TSX Venture Exchange (Ticker Symbol: PYR) and on the OTCQB Marketplace (Ticker Symbol: PYRNF). For more information, please visit [www.pyrogenesis.com](http://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](http://www.sedar.com), or at [www.otcmarkets.com](http://www.otcmarkets.com). 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.*

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1 <https://www.bccresearch.com/market-research/energy-and-resources/thermal-and-biological-waste-to-energy-markets-report-egy063b.html>

2 <https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle-0>

3 <http://www.ironore2015.ausimm.com.au/Media/ironore2015/presentations/S12%20-%20Cameron.pdf>

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