MGX Minerals Announces Completion of Gasification Scoping Study for Petroleum Coke to Hydrogen with Vanadium, Nickel and Cobalt Extraction

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VANCOUVER, Nov. 21, 2018 - MGX Minerals Inc. (“MGX” or the “Company”) (CSE: XMG / FKT: 1MG / OTCQB: MGXMF) and Highbury Energy Inc. (“Highbury”) are pleased to report completion of a comprehensive study analyzing beneficial gasification routes from Petroleum Coke (“Petcoke”) to three products of value: Hydrogen, FT Liquids and Fuel Gas. Each of these products has potential markets in the oil sands and heavy oil industry. The report outlines a variety and comparison of plant design parameters and a Petcoke-to-Hydrogen process with metals concentration via gasification, utilizing Highbury’s patented dual-bed gasification technology, which requires no fine grinding or air separation unit. The goal of ongoing joint research with Highbury is to develop fuel source alternatives and concentrated battery metals by-products including vanadium, nickel and cobalt, which can be seamlessly integrated into existing refinery operations. The study is viewed as positive and the project will now move to the demonstration plant design phase and preliminary pre-feasibility analysis.

Metals in Pet Coke and Ash
Previously released assay results of Petcoke samples collected from stockpiles produced from the Fort McMurray area mining and upgrading operation as well as an Edmonton refinery are summarized below. Both samples originated from Delayed Coking operations. Samples were obtained and prepared by Highbury and metal contents analyzed by Acme Labs of Vancouver, British Columbia using standard ICP analyses.

Ash Content
Ash content was determined by weighing residues after burning coke samples of about 200 g in air in a muffle oven over extended periods at 815°C. Table A indicates the average ash content of 6 to 7 samples of each coke.

Table A. Ash Content of Coke Samples

Sample name	Ash content (% wt.)	No. of samples tested
Upgrader Coke A	2.73 ±0.09	6
Refinery Coke B	0.32 ±0.04	7

Upgrader Coke A had about nine times as much ash as was in Refinery Coke B.

Proximate Analyses
The cokes contain over 95 % organic (non-mineral) matter. Thermogravimetric analyses on 10 mg quantities are shown below.

Table B. Proximate Analyses of Coke by the Thermogravimetric Analyser Method

Quantity (wt. %)	Upgrader Coke A	Refinery Coke B
Volatile Matter	8.9	10.0
Fixed Carbon	86.9	86.3
Residues	4.3	1.7

Residue refers to residual mineral matter left after the thermogravimetric test. Except for the % Residue, the two cokes have similar combustion properties.

Metals Analysis in the Coke Samples
Lithium borate fusion ICP-MS method measures 45 trace metal concentrations in the coke. Results are

expressed as (mg/kg) or ppmwt. Table C lists concentrations of selected metals.

Table C. Selected Metal Concentrations in Coke (mg Metal/kg Coke)

Sample	V	Ni	Cu	Zr	Co	Au	Ag
Upgrader Coke A	421	76.8	86.2	40.5	4.8	0.0011	<0.1
Refinery Coke B	458	53.4	35.9	1.3	1.3	<0.0005	<0.1

Vanadium is the highest concentration of the 45 trace metals detected in the coke samples.

Ash Analyses
Ash analysis was completed by Bureau Veritas Commodities Canada Ltd. (“BV”) of Vancouver, British Columbia using XRF method (XF701). Results are expressed as % wt. in the ash as oxide. Sixteen elements as oxides, and LOI (loss on ignition) are determined. The ash samples were prepared in Highbury’s laboratory and sent to BV for analysis. The maximum % the analysis method could accommodate was 10.0 % for V_2O_5; therefore ash samples were diluted by mixing with other solids. In the Highbury laboratory both Al_2O_3 and Fe_2O_3 were used.

Table D. Selected Species in the Ash of Each Coke Type

Species (wt. %)	Upgrader Coke Ash A	Refinery Coke Ash B
Al_2O_3	27.7	9.8
SiO_2	42.6	23.6
V_2O_5	6.6	45.1
Fe_2O_3	8.0	2.7
TiO_2	5.7	0.7
K_2O+MgO+CaO	4.0	6.4
LOI	0.0	4.3
SubTotal (wt.%)	90.8	92.5

For Upgrader Coke A, the sum of Al_2O_3 +SiO_2 is about 70 %. V_2O_5 is about 6.6%, according to the ash analyses. For Refinery Coke B, the average % V_2O_5 in the ash is 45 %.

Table E. Trace Metals Concentration in Ash (mg Metal/kg Ash) for Selected Species [Two Determinations Average]

Sample	V	Ni	Cu	Zr	Co	Au	Ag	Mo
Upgrader Coke Ash A	34600	740	130	1840	230	0.02	2.5	1405
Refinery Coke Ash B	193000	177000	340	405	620	0.02	0.175	5000

Vanadium metal concentrations are 3.5 % wt. in Upgrader Coke Ash A, and 19.3 % wt. in Refinery Coke Ash B, which is also enriched in Nickel.

Background
Petcoke is a carbon material by-product of the oil and gas industry that forms during the oil refining process. As refineries have become more efficient at processing extra heavy crude oils (bitumen) over the last two decades, output of petcoke globally has risen significantly. Because petcoke originates from heavier petroleum fractions, its denser impurities such as metals and sulphur compounds are concentrate in it.

The majority of Canadian petcoke output occurs in close proximity to oil sand producing regions, where bitumen is upgraded into synthetic crude oil. Specifically, the Province of Alberta is known to host vast stockpiles of petcoke. According to the Alberta Energy Regulator, petcoke inventories are estimated to have reached 106 million tonnes in 2016(1).

(1) Source: Alberta Energy Industry, Alberta Mineable Oil Sands Plant Statistics

Research and Development
Development of the detailed process will be spearheaded by Dr. Paul Watkinson, a Professor Emeritus in the Department of Chemical and Biological Engineering at the University of British Columbia and a co-founder of Highbury. Dr. Watkinson is a published expert in the field of gasification and oversaw early work on related

oil sand gasification in the early 1990’s. He is also a registered Professional Engineer, Fellow of the Chemical Institute of Canada and Fellow of the Canadian Academy of Engineering. Dr. Watkinson is also an active participant in the Canadian Society for Chemical Engineering as well as Engineering Conferences International. He has received numerous awards for his research and has published multiple articles in scientific journals on pilot-scale investigations of conversion of carbonaceous solids, such as coal, shale and biomass, into gaseous and liquid fuels.

N.I. 43-101
Although authored by leading experts in the field and significantly advancing research and development of gasification and metals extraction, N.I. 43-101 does not recognize a scoping study as a N.I. 43-101 Compliant Report. As such MGX cannot release any economic projections whatsoever in regard to metals extraction or associated gasification steps. As Petcoke is widely available in very large quantities at low cost in the Alberta Oil Sands it is unlikely MGX will complete an N.I. 43-101 Resource Estimate, which precludes a compliant Preliminary Economic Assessment, Pre-feasibility Study or Feasibility Study that would allow for the release of economic projections. It is anticipated that a Pre-feasibility and Feasibility Study will be completed for the plant design itself but not the Petcoke resource as it will be purchased as needed and not owned or controlled by MGX.

Qualified Person
Andris Kikauka (P. Geo.), Vice President of Exploration for MGX Minerals, has reviewed and approved the technical information in this press release. Mr. Kikauka is a non-independent Qualified Person within the meaning of National Instrument 43-101 Standards.

About Highbury Energy
Highbury Energy Inc. is an innovative energy company dedicated to the development and utilization of renewable energy resources through the procurement and conversion of biomass. Highbury has developed a proprietary dual-bed steam gasification technology and patented gas cleanup system that converts biomass into high-grade synthesis or fuel gas. This robust process produces a medium calorific value gas from most types of organic matter, such as wood or agricultural wastes, without need of tonnage oxygen. The cleaned synthesis gas can readily replace natural gas in industrial kilns and furnaces in the mineral, pulp & paper, glass, and cement industries. Alternately, the syngas can fuel an internal combustion engine to make electricity, with waste heat used for refrigeration, or district heating. Syngas can also be converted to high value low carbon liquid fuels such as diesel or jet fuel, or into chemicals such as methanol or ethanol.

About MGX Minerals

MGX Minerals is a diversified Canadian resource and technology company with interests in global advanced material, energy and water assets. Learn more at www.mgxminerals.com.

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Forward-Looking Statements

This press release contains forward-looking information or forward-looking statements (collectively "forward-looking information") within the meaning of applicable securities laws. Forward-looking information is typically identified by words such as: "believe", "expect", "anticipate", "intend", "estimate", "potentially" and similar expressions, or are those, which, by their nature, refer to future events. The Company cautions investors that any forward-looking information provided by the Company is not a guarantee of future results or performance, and that actual results may differ materially from those in forward-looking information as a

result of various factors. The reader is referred to the Company's public filings for a more complete discussion of such risk factors and their potential effects which may be accessed through the Company's profile on SEDAR at www.sedar.com.