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Zacks Small-Cap Research

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Midwest Energy Emissions (MEEC-OTCQB)

Midwest Energy Emissions launches new patent strategy and reports 3Q results

Based on comparative analysis that utilizes the valuation metric of price-to-sales (P/S), a mid-second quartile industry P/S ratio of 2.78 on TTM sales through 3Q-2018 of $14.5 million indicates a share price target of $0.53

Current Price (11/19/18)	$0.32
Valuation	**$0.53**

OUTLOOK

Midwest Energy Emissions is well-positioned to benefit from the reduction of mercury emissions initiatives in the U.S, Canada and Europe. The company holds patents to SEA™ Technology for the reduction of mercury emissions by coal-fired electric generating units. Midwest Energy Emissions has expanded into Canada having signed contracts regarding five EGUs. Now, Europe offers significant prospects through a Licensing Agreement with Cabot Corp. Under the Industrial Emissions Directive (IED), 1,384 coal-fired EGUs in Europe will be required to achieve new mercury emission compliance standards by 2020.

SUMMARY DATA

52-Week High	**$0.46**
52-Week Low	**$0.12**
One-Year Return (%)	**-15.79**
Beta	**-0.85**
Average Daily Volume (shrs.)	**40,940**
Shares Outstanding (million)	**76.246**
Market Capitalization ($ mil.)	**$20.59**
Short Interest Ratio (days)	**0.01**
Institutional Ownership (%)	**15.3**
Insider Ownership (%)	**22.1**
Annual Cash Dividend	**$0.00**
Dividend Yield (%)	**0.00**
5-Yr. Historical Growth Rates	
Sales (%)	**N/A**
Earnings Per Share (%)	**N/A**
Dividend (%)	**N/A**
P/E using TTM EPS	**N/M**
P/E using 2018 Estimate	**N/M**
P/E using 2019 Estimate	**N/M**

Risk Level	**Above Average**
Type of Stock	**Small-Growth**
Industry	**Pollution Control**

ZACKS ESTIMATES

Revenue
(in millions of $)

	Q1 (Mar)	Q2 (Jun)	Q3 (Sep)	Q4 (Dec)	Year (Dec)
2016	3.37 A	9.39 A	11.77 A	7.81 A	32.35 A
2017	5.43 A	7.93 A	8.45 A	5.69 A	27.50 A
2018	2.12 A	2.45 A	4.21 A	2.93 E	11.71 E
2019					14.50 E

Earnings per Share
(EPS is operating earnings before non-recurring items)

	Q1 (Mar)	Q2 (Jun)	Q3 (Sep)	Q4 (Dec)	Year (Dec)
2016	$0.02 A	-$0.01 A	$0.01 A	-$0.00 A	-$0.03 A
2017	-$0.02 A	$0.00 A	$0.01 A	-$0.02 A	-$0.04 A
2018	-$0.03 A	-$0.02 A	-$0.01 A	-$0.01 E	-$0.06 E
2019					-$0.04 E

Zacks Projected EPS Growth Rate - Next 5 Years % **7**

2016 EPS do not reflect non-re-occurring debt restricting charges.

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EXECUTIVE SUMMARY

Patent Strategy:

Midwest Energy Emissions is **pursuing a licensing model** to benefit from its patented SEA™ Technology patent portfolio. As coal-fired EGUs sought to become compliant with MATS, many (the company believes over 100) have adopted aspects of the patented methods of SEA technology, particularly the enhancement of sorbent with a halide-based substance. Management has engaged Caldwell Cassady & Curry PC to analyze and validate the company's patent portfolio. As an IP (Intellectual Property) law firm, Caldwell Cassady & Curry will lead the effort to seek fair compensation. Potential resolutions include a licensing program with Midwest Energy Emissions or a supply contract by which Midwest would become the provider of the sorbent. A relationship with Midwest Energy Emissions also would provide certain other benefits. With a sophisticated understanding of mercury interactions with flue gas constituents and the knowledge of modifying the composition of sorbent based on coal type and the plant configuration, Midwest Energy has the expertise to further improve the operational efficiencies of these coal-fired systems.

Opportunities:

- In April 2018, Midwest Energy Emissions secured another order from the previously announced Canadian customer, this time to install SEA™ Technology at an EGU in Alberta.
- **Vistra Energy** (NYSE: VST) awarded its **Nexus Small Business** Award
    - Midwest Energy Emissions estimates that the use of SEA Technology has saved Vistra almost $15 million in operating costs over the past three years.
    - Vistra Energy's merger with Dynegy (NYSE: DYN) closed on April 9, 2018.
        - The merger will add 13 coal-fired plants to Vistra's portfolio.
        - Despite retiring three coal-fired plants, Vistra's coal-fired capacity increases from 28% to 32% of its total portfolio after the merger.
        - Current contracts cover only 5 of the Vistra's prospective coal-fired 25 EGUs. For the last three years, Midwest Energy Emissions has been the sole source of mercury capture technology for Vistra Energy.
- Midwest Energy Emissions entered into a **licensing agreement with Cabot Corp**. for the development of mercury removal solutions for coal-fired EGUs in **Europe**. The agreement established the foundation for Midwest Energy to expand its footprint into Europe.

Challenges:

- Despite the pipeline of prospective customer opportunities, the anticipated closing of new contracts this summer did not materialize due to an **unexpected pricing response by incumbent suppliers of sorbent**. The competitive pricing response also impacted pricing in contract renewals.
- Revenue from **product (sorbent) deliveries declined 58% in the nine months of 2018**.
    - Company-initiated optimization efforts at each EGU have improved operating efficiencies resulting in less-than-expected product (sorbent) usage.
    - In addition, some customers lowered capacity factors, reducing the amount of product needed to achieve MATS compliance.
    - Some EGUs were shut down as a result of competitive disadvantages versus other EGUs in their service areas.

Conclusion:

Despite the challenges reflected in the financial results reported for the first nine months of 2018, particularly price competition by chemical companies (which are desperate to retain sorbent sales),

Midwest Energy Emissions is well positioned to benefit from the reduction of mercury emissions initiatives in the U.S, Canada and Europe. It is important to remember that:

- Midwest Energy Emissions continues to generate revenues from its operationally-effective and cost-effective mercury emissions technology.
- The company announced **two multi-million dollar contracts in October 2018**.
  - A 3-year contract with its largest customer was renewed in October 2018
  - The same customer expanded its contract to extent to two additional EGUs
- Despite recent challenges, **the company has not issued any common shares** in the last two quarters, and currently management has no plans to seek capital through the issuance of equity.
- The company has **meaningful potential in Europe** beginning in 2019 as a result of mercury control standards at coal-fired EGUs being fully enforced across Europe by mid-2020 with installation of equipment & testing starting in 2019. In Europe, the barriers to entry should be significantly reduced since Cabot Corp. (with its established relationships) will be the sales point contact.
- The **licensing model** being pursued under management's patent strategy could provide significant top-line and/or licensing revenues, both of which would enhance the company's profitability.

RECENT NEWS

Third Quarter 2018 Financial Results

On November 13, 2018, Midwest Energy Emissions reported results for the third quarter ending September 30, 2018. The company reported revenues of $4,209,092 down 50.2% from $8,447,967 reported in comparable quarter last year. The revenue decline was primarily driven by a 49.1% decline in product (sorbent) deliveries due to a variety of factors, including the shutdown of some EGUs as a result of competitive disadvantages relative to other EGUs, the optimization efforts with the company's existing customers and lower capacity factors at some customer sites.

Total operating expenses decreased 41.0% to $4.37 million versus $7.42 million in the third quarter of 2017, primarily attributable to the decline in sorbent sales. Cost of goods sold decreased 45.4% to $3.0 million. The direct product gross margin declined from 31.8% to 26.8%.

The company reported a net loss of $635,962 (or $0.01 per diluted share) versus a profit of $813,221 (or $0.01 per diluted share) in the third quarter of 2017. The net loss in the third quarter of 2018 was primarily due to the decline in sorbent sales.

Adjusted EBITDA was $97,000 compared to a positive $1,572,000 in the third quarter of 2017. As of September 30, 2018, working capital was a negative $3,580,770, which improved sequentially from negative $3,869,263 on June 30, 2018. Shares outstanding remained stable at 76,246,113 shares for the last three quarters.

Recent Contract Announcements

On October 16, 2018, the company announced that **the company's largest customer has expanded** the use of SEA® technologies **to two additional coal-fired boilers (EGUs)**. Management expects that this expansion will generate multi-million dollars annually in revenue over the course of three years. The customer was described as "one of the largest utilities in North America and a long-term customer."

On October 11, 2018, Midwest Energy Emissions announced that **the company's largest current customer extended its supply contract for an additional three years**. Under the multi-million dollar,

Midwest Energy Emissions will continue supplying its proprietary Sorbent Enhancement Additive (SEA®) so that the customer can cost-effectively achieve the mercury capture requirements mandated by MATS.

In April 2018, Midwest Energy Emissions secured **another order** from the previously announced Canadian customer, this time to install SEA™ Technology **at an EGU in Alberta**. Midwest Energy has worked with this Canadian customer since 2011.

European Licensing Agreement with Cabot Corporation

On April 17, 2018, Midwest Energy Emissions announced that the company has entered into a multi□year European licensing agreement with **Cabot Corp**. (NYSE: CBT). Under the agreement, Cabot has exclusive access to Midwest Energy's patented SEA™ Technologies for the development of mercury removal solutions for coal-fired EGUs in Europe. Cabot will market and sell Midwest Energy's proven **two□part mercury capture technology** and **proprietary scrubber additive technology** under the licensing agreement. Cabot has a strong presence in Europe and is expected to be a major player in the implementation of mercury emissions solutions that are required to achieve the European standards set forth by the Best Available Techniques (BAT) Reference Document (BREF) under the *Industrial Emissions Directive*. According to Midwest Energy Emissions, Europe's coal market includes a total of 1,384 coal□fired EGUs with 914 of those located in Eastern Europe.

Given the opportunities in Europe for Midwest Energy's mercury emissions control technologies, management (John Pavlish, Senior VP and Chief Technology Officer) made a presentation as a featured speaker at the **13th Annual MEC Workshop in Krakow, Poland**. The launch of the Midwest Energy Emissions-Cabot licensing arrangement in the European Union was jointly introduced at this meeting of international emission control experts. Midwest Energy Emissions has begun testing with major utilities across multiple EU member nations.

In October 10, 2013, 140 nations (including the US, Canada, China, Germany, Netherland and the U.K.) signed the **Minamata Convention** on mercury, an international treaty that recognized mercury is a chemical of global concern and addresses the reduction of emissions of mercury and mercury compounds. In Europe, under the **Industrial Emissions Directive (IED)** of 2010, a BAT (Best Available Technique) Reference (aka BREF) document has been published (the most recent in 2017) to cover the required emission prevention activities on installations rated 50 MW or more. The standards are expected to be fully in force across Europe by mid-2020 with demonstration activity beginning in 2018, installation of equipment & testing starting in 2019 and continuing until **full implementation in mid-2020**.

Nexus Small Business Award

In the first quarter of 2018, Midwest Energy Emissions received the Nexus Small Business Award by Vistra Energy at its Nexus Awards Recognition Reception. The Nexus Small Business Award is given to recognize excellent service and also for utilizing a diverse supply chain and workforce. Every year, Vistra Energy (the largest retailer and generator of electricity in Texas) recognizes companies that provide exceptional service to Vistra Energy and demonstrate a positive commitment to the community.

Amendments to Financing Agreement

On June 14, 2018, the Amended and Restated Financing Agreement between Midwest Energy Emissions and AC Midwest Energy LLC was amended whereby the principal balance of $521,686.10 due on June 15, 2018 would be paid in two installments: $250,000 on June 15, 2018 and the balance on or prior to September 1, 2018 with the balance incurring rate equal to the current interest rate on the note plus 3.0% per annum until the remaining principal balance is paid in full.

On September 12, 2018, Midwest Energy Emissions entered into Amendment No. 2, which delays the principal balance of $271,686.10 due in September 2018 to December 15, 2018.

KEY POINTS

- **Environmental standards are being implemented globally**.
  - The U.S. Environmental Protection Agency's Mercury and Air Toxic Standards (MATS) created a multi-billion dollar market for mercury remediation solutions.
  - **Canada** signed the UNECE Protocol on Heavy Metals in June 1998 and the Minamata Convention in October 2013. Developed by the Canadian Council of Ministers of the Environment (CCME), nationwide **mercury reduction standards in Canada** has required a 60% reduction from the baseline year of 2003, though by early 2017 a 91% reduction had been attained.
  - In **Europe**, under the Industrial Emissions Directive (**IED**) of 2010, a BAT (Best Available Technique) Reference (aka **BREF**) document has been published (the most recent in 2017) to cover the required emission prevention activities on installations rated 50 MW or more.
    - The standards are expected to be fully in force across Europe by mid-2020 with demonstration activity beginning in 2018, installation of equipment & testing starting in 2019 and continuing until full implementation in mid-2020.
- Midwest Energy Emissions is **well-positioned** to benefit from the implementation of MATS, the CCME standards and BREF.
  - The company **owns 42 issued patents and patents-pending** related to mercury removal processes developed by the Energy & Environmental Research Center, including SEA™ Technology.
  - SEA Technology provides an operationally-effective and cost-effective mercury emissions solution that is flexible to accommodate a broad range of configurations of coal-fired power plants fueled by varying coal types.
  - SEA Technology has been **successfully demonstrated over 50 times** at large operating power plants across the United States and Canada.
- Midwest Energy Emissions has won contracts that span at least **24 Electric Generating Units** (EGUs) across no less than ten power plants, although today many of the EGUs have been shut down or have lowered capacity factors due to competitive disadvantages.
  - a **West Coast utility** for two EGUs
  - a **major U.S. power producer** for 9 EGUs
  - two separate utility **cooperatives in the Southwest**, each with one EGU
  - a large **northern Midwest utility** for two EGUs
  - four additional EGUs contracts awarded in early 2016
  - 3-year contract secured at another electric utility in September 2016
  - 2-year contract with Midwest utility customer was renewed in April 2017
  - 3-year contract for 9 EGUs with its largest customer was renewed in August 2017
  - $700,000 purchase order for 4 Canadian EGUs in January 2018
  - 3-year contract with its largest customer was renewed in October 2018
  - a current customer expanded its contract for two additional EGUs in October 2018
- Midwest Energy Emissions has international **blue sky market opportunities** for the implementation of SEA Technology in **Europe, Canada** and **China**.
  - The **Minamata Convention** on Mercury should bolster international demand for the company's mercury remediation solutions.
  - Midwest Energy Emissions has entered into a multi□year European licensing agreement with **Cabot Corp**. (NYSE: CBT) to develop and market mercury removal solutions for coal-fired EGUs in Europe.
- Management presents at industry conferences
  - John Pavlish (Senior VP and Chief Technology Officer) presented at the MEC 13 Workshop (an international emission control conference) in **Krakow, Poland** on May 21, 2018.

- John Pavlish also was a featured speaker and Session Chair of Session 6A (Mercury Measurement and Controls 2) at the MEGA Symposium (technical conference for particulate matter and mercury control) in **Baltimore, MD** on August 23, 2018.

OVERVIEW

Headquartered Lewis Center, Ohio, Midwest Energy Emissions Corp. (MEEC) provides patented mercury capture solutions for coal-power plants whose mercury emissions exceed the U.S. Environmental Protection Agency's Mercury and Air Toxic Standards (MATS). **The company has successfully commercialized its Sorbent Enhancement Additive (SEA™) Technology**, which can achieve mercury removal levels that are compliant with MATS at a significantly lower cost than other methods while preserving the quality (and hence the marketability) of fly-ash, a by-product from the coal burning process. The company holds **42 issued patents and patents-pending** related to a mercury removal processes developed by the Energy & Environmental Research Center (EERC) and has a close and mutually beneficial relationship with the EERC Foundation, which aids in the commercialization EERC's research efforts. The company's holistic **cost-competitive solution** for mercury emission control is a proven, effective technology that reduces mercury emissions to MATS-compliant levels over a wide range of plant configurations and coal types.

The EPA's **MATS have created a multi-billion dollar market for mercury remediation solutions**. MATS require that all coal-fired Electric Generating Units (EGUs) larger than 25 megawatts (MW) remove approximately 90% of mercury from their emissions beginning April 16, 2015. On a plant-by plant basis, power plant operators must find an economical feasible method to upgrade existing plants in order to comply with MATS; otherwise, non-compliant plants could be forced to be decommissioned, which will affect the capacity, reliability and supply attributes of the associated electric networks.

The process of commercializing any pollution control technology or method within the utility industry is a lengthy and expensive process, which involves the migration of a technology from the laboratory to commercial-scale demonstrations and then to contract signings, installations, testing and finally commercial operations. SEA Technology has been successfully demonstrated over 50 times at large operating power plants across the United States and in Canada.

Midwest Energy Emissions is deploying what appears to be the industry's most cost-effective solution for coal power plants to comply with MATS. Management and the EERC believe that the SEA Technology process with an optimized blend of sorbents is the most efficient, cost-effective manner to capture mercury. **SEA Technology provides an approach that optimizes the mercury capture process while minimizing the cost of injected materials**. As a result, SEA Technology lessens the total amount of sorbent injected, thereby reducing the cost of MATS compliance. **The technology is also flexible**, allowing Midwest Energy's consumable products to be formulated specifically for a coal-fired unit and its coal-fuel-type. Importantly, the process has less operational impact with minimal corrosion to the plant's equipment and preserving the marketability of fly ash, an important ancillary revenue stream for power plants.

In a **milestone event**, on April 24, 2017, Midwest Energy Emissions closed on the acquisition of all patents rights and patents pending related to the Sorbent Enhancement Additive (SEA™) Technology from the Energy & Environmental Research Center (EERCF) at University of North Dakota. The purchase price was $2,500,000 and 925,000 shares of MEEC common stock, of which 628,998 shares were issued directly to EERCF and 296,002 shares were issued to the inventors. The cash payment was funded by cash-on-hand, which includes a portion of the net proceeds from the private placement that closed in November 2016.

Midwest Energy Emissions owns the Technology, and therefore no longer is required to pay monthly license maintenance fees of $$25,000 ($300,000 annually) and annual running royalties of $100 per one

megawatt (MW) of electronic nameplate capacity and $100 per three MW per hour at systems utilizing licensed products and/or processes. In 2017, royalty fees paid to EERCF decreased by $1.022 million.

SEA Technology, the company's **core IP**, provides an operationally-effective and cost-effective mercury emissions solution that is flexible to accommodate a broad range of configurations of coal-fired power plants fueled by varying coal types. Developed by researchers at the Energy & Environmental Research Center (EERC), SEA Technology utilizes the application of sorbent enhancement additives to promote the oxidation of elemental mercury in preparation for adsorption by uniquely formulated blends of sorbent products. Utilizing this Technology, Midwest Energy Emissions is able to offer at lower-cost option to utilities so that their coal-fired units can achieve compliance with MATS while maintaining the marketability of the fly ash by-product.

The portfolio of patents rights and patents pending is composed of **42 patents and patents-pending** related to mercury removal processes developed by the EERC. The patents in the United States include:

- Sorbents and Flue Gas Additives for the Oxidation and Removal of Mercury (7,435,286)
- High-Temperature Halogen Dissociation for Mercury Control in Coal-Fired Systems (7,615,101)
- Multifunctional Abatement of Air Pollutants in Flue Gas (7,628,969)
- Sorbents for the Oxidation and Removal of Mercury (8,168,147)
- Process for Regenerating a Spent Sorbent (8,173,566)
- Mercury Control Using Moderate-Temperature Dissociation of Halogen Compounds (8,312,822)
- Process for Regenerating a Spent Sorbent (Continuation) (8,440,585)
- Sorbents for the Oxidation and Removal of Mercury (Continuation) (8,652,235)

The patent and patents pending portfolio also includes international **blue sky market opportunities** with SEA Technology patents in **Europe, Canada** and **China**. SEA Technology has been successfully demonstrated for a few large utilities in Canada, where raising mercury capture regulations is being contemplated. Since 2012, a nationwide **mercury reduction agreement in Canada** has required a 60% reduction, though by early 2017 a 91% reduction had been attained.

China has promulgated emission regulations, but has yet to implement mercury reductions. In October 10, 2013, 140 nations (including the US, Canada, China, Germany, Netherland and the U.K.) signed the **Minamata Convention** on mercury, an international treaty that recognized mercury is a chemical of global concern and addresses the reduction of emissions of mercury and mercury compounds. Long-term, there is **blue sky potential** for international demand for the company's mercury remediation solutions.

Midwest Energy Emissions has demonstrated a **technical competitive advantage** by bringing EGUs to MATS compliance in a cost-effective manner. As many coal-fired utilities are having difficulties, ranging from encountering prohibitive costs in achieving a 90% reduction in mercury emissions to having to de-rate (lower the capacity of) boilers to attain compliance, management is focused on further penetrating the fleets of existing customers as well as securing new clients (electric utilities) which are challenged and are seeking an economical solution to comply with MATS.

Midwest Energy Emissions is unique in that it has a singular focus (the mercury emissions control market), holds the patents on processes, has achieved market penetration through the commercialization of SEA™ Technology and is positioned to take advantage of further opportunities afforded by the implementation of MATS.

Many coal-fired utilities are having difficulties, ranging from encountering prohibitive costs in achieving a 90% reduction in mercury emissions to having to de-rate (lower the capacity of) a boiler to attain compliance. Electric utilities with challenged EGUs have sought out solutions to achieve compliance with MATS.

SEA™ TECHNOLOGY

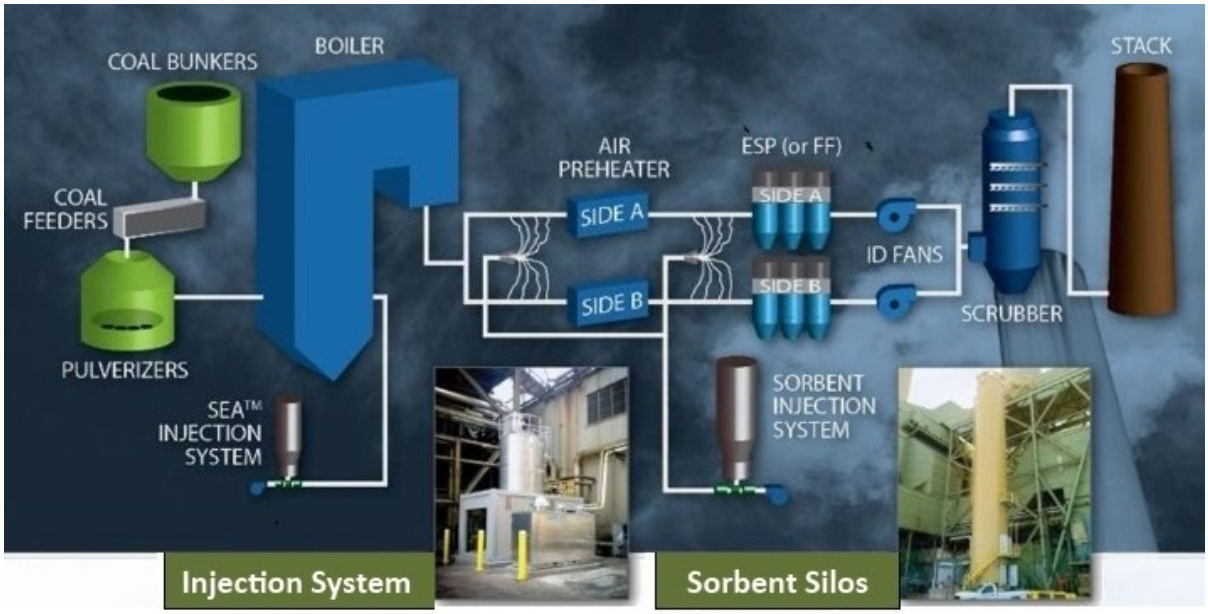
Utilizing a patented Sorbent Enhancement Additive (SEA™) Technology, Midwest Energy Emissions is able to offer at lower-cost option to utilities so that their coal-fired units can achieve compliance with MATS while maintaining the marketability of the fly ash by-product. Developed by researchers at the EERC, the company's SEA Technology utilizes the application of sorbent enhancement additives to promote the oxidation of elemental mercury in preparation for adsorption by uniquely formulated blends of sorbent products.

Mercury is emitted from coal-fired boilers in three basic forms: elemental mercury (Hg^0), oxidized mercury (Hg^{2+}) and particulate-bound mercury (Hg_p). **Compliance with MATS requires that the <u>total</u> of all three forms of mercury be measured and reduced.** The ratio of elemental to the oxidized forms of mercury emitted from combustion is highly dependent on the type of coal that is combusted. By and large, bituminous coal-fired boilers emit primarily oxidized mercury while the majority of mercury produced by low rank coal-fired (subbituminous and lignite) boilers is elemental mercury.[i] The strongest factor for this generalization is that the relatively high concentrations of halogens, such as chlorine and bromine, in bituminous coals results in the oxidization of elemental mercury to form oxidized mercury, primarily the mercuric halides ($HgCl_2$ and HBr_2). In contrast, both subbituminous and lignite coals not only have lower quantities of halogens, but also higher amounts of alkaline material (such as calcium and sodium) than bituminous coals. The halogens from the combustion of subbituminous coal and lignite have a tendency to react with the alkaline materials with the result that little halogen oxidizes the elemental mercury.[ii] Though in aggregate, roughly 60% of the mercury emitted by coal combustion is elemental mercury and 40% is oxidized mercury.[iii]

Elemental mercury is very difficult to capture and remove because, by definition, it is in its elemental form (a single atom with a neutral charge). Elemental mercury is the most difficult to remove from flue gas since it is practically insoluble in water, and hence, not typically removed by wet processes like flue gas desulfurization (FGD) systems aka scrubbers. However, **oxidized mercury** is reactive in that it more easily deposited and captured by sorbents. Through the chemical reaction by which oxidized mercury is formed, it becomes charged allowing its efficient capture by pollution control devices. It is highly soluble in water, and therefore, readily captured in wet scrubbers. **Particle-bound mercury** is condensed on the fine fly ash particles emitted by coal-fired boilers. With charged components, Hg_p sticks to surfaces and is readily removed by pollution control devices designed to remove particulates (bag houses/fabric filters, electrostatic precipitators and scrubbers) and also by activated carbon.

The use of a Brominated Activated Carbon (BAC) injection system is the most common method used today to oxidize elemental mercury, primarily since BAC is more effective than Standard Powdered Activated Carbon (PAC) for removing mercury from flue gas of boilers burning low chlorine content coal. However, the cost of operation can become uneconomical, since the injection of activated carbon sorbent is only cost-effective at capturing about 60% of the mercury emissions, at which point diminishing effectiveness is achieved by the injection of additional sorbent. For some 1,000 MW coal-fired units, the cost to achieve a 90% reduction in mercury emissions can exceed over $10 million per year.

Midwest Energy Emissions can provide a MATS-compliant process, along with custom-blended halogenated front-end sorbent enhancement additives and back-end sorbents, for an effective and cost-competitive solution for controlling emissions mercury in coal-fired units. The use of SEA Technology, namely the proprietary additives and sorbents, costs around $2.5 million annually, depending on size of the EGU, the coal being combusted and the amount of time the plant is being operated. In addition, the fly ash by-product remains marketable, which may not be the case in a BAC system. Fly ash is fine, powdery matter collected by the fabric filters and electrostatic precipitators, which is mostly utilized by the cement/concrete industry, but also for structural fills (such as embankments), the stabilization of waste materials and road bases. The sale of fly ash represents an opportunity for utilities to both increase revenues and reduce costs.



Midwest Energy Emissions **provides a process** that can be fine-tuned to achieve optimum efficiency, by tweaking not only the **location and method of injection** of products, but especially the **blend and reactivity** of sorbents. The company's solution for 90%+ mercury emissions reduction is a **two-step process** that can be fine-tuned to the unique configuration of the customer's EGU and the coal type being combusted. The **first step** involves the introduction of **flue gas conditioning products** that promote the conversion of elemental mercury to oxidized mercury and particulate-bound mercury, which are more easily captured in downstream devices.

SF-10, Midwest Energy's proprietary and patented sorbent enhancement additive flue gas conditioner, is **injected into the coal-fired boiler** by MEEC's injection system. The SF-10 immediately gasifies and migrates throughout furnace system promoting mercury oxidation. With a keen understanding of the complex interactions among elemental mercury, sorbent enhancement additives and flue gases, along with the role and impact that these various components of flue gas have on chemisorption, EERC designed SEA Technology to maximize the conversion of elemental mercury to oxidized mercury while minimizing the amount of injected sorbent enhancement additives. The location of front-end injection **optimizes the residence time** for these reactive conditioning products to oxidize the elemental mercury. Promoting mercury oxidation through catalytic processes and materials is a key feature of SEA Technology and only requires the use of a relatively small amount of sorbent enhancement additive. In addition, the amount of SF-10 being injected is adjusted to the unique requirements of each client's system to ensure benefit-to-cost performance.

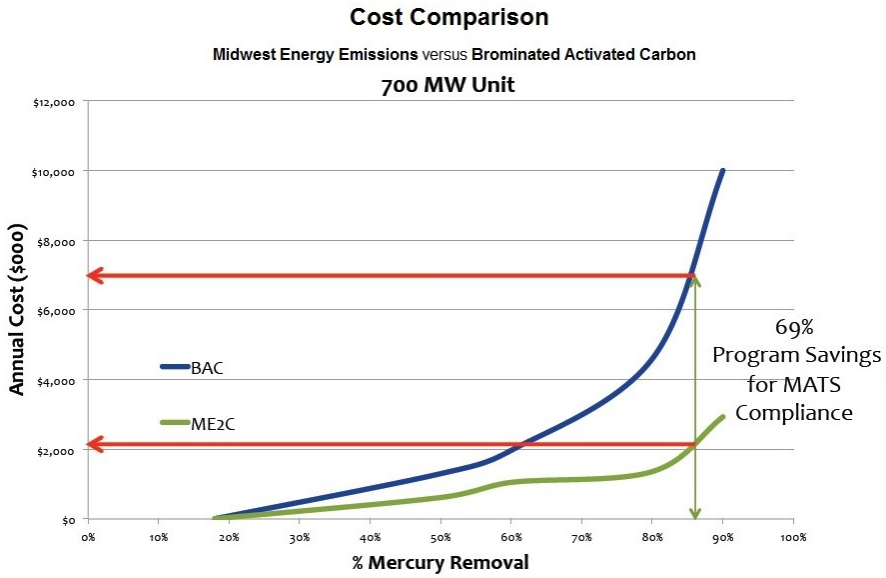
The cost of installing the **front-end injection system** has averaged around $250,000, though high-end, turn-key, automated installations can cost up to $600,000 while low-end, front-end systems can be installed for as low as $175,000. Moreover, the new Canadian purchase order will use test units at no cost. Midwest Energy Emissions sells its front-end and back-end (sorbent) products for the duration of the contract, which are generating annual product revenues for Midwest Energy Emissions in the range of $1.25-to-$1.5 million per EGU. Typically, the lower operating costs can provide a payback of less the one year on the front-end capital equipment when compared to current costs of operating a Brominated Activated Carbon system.

SEA Technology's **back-end injection system** is located up-stream (prior) to the particulate matter (PM) equipment, principally bag-house and electrostatic precipitator. Midwest Energy offers a variety of products for introduction into the mercury-contaminated flue gas stream, with the most-used product being SB-24. The fine sorbent particles of the sorbent are injected through a flue gas duct, where the now more reactive, oxidized mercury contacts the sorbent and attaches to its surface so it can be collected. The pregnant sorbent is removed from the flue gas stream, along with the fly ash, in the bag-

house or electrostatic precipitator. The cost of the back-end system is in the $1.0-$1.5 million range, but an injection silo must be installed in all cases when MATS-compliance cannot be achieved. This back-end injection system is common to almost any mercury collection technology in the industry, and not unique to SEA.

SB-24 is the mainstream sorbent product of Midwest Energy Emissions and designed to provide active capture sites for mercury absorption. The proprietary blend performs well across all known boiler configurations and most coal types without impacting fly ash quality. SB-24 is the company's most effective and least cost-per-pound sorbent.

The SEA Technology process has been proven to be effective over a broad range of coal types and configurations of coal-fired power plants. Midwest Energy provides an approach that optimizes the mercury capture process while minimizing the cost of injected sorbents. The optimal combination is determined through extended parametric testing of various combinations of front- and back-end products to determine the arrangement that exhibits optimum mercury removal rate at the minimal consumption of sorbent material. Depending on the existing air pollution control equipment and the type of coal being burned, the SEA Technology system can also be tailored on-the-fly through adjustable sorbent enhancement additive and sorbent feed rates. As a result, SEA Technology lessens the total amount of sorbent injected thereby reducing the cost of MATS compliance.



A **case study** was performed in which mercury removal and costs were monitored through parametric testing of the use of both SEA Technology proprietary sorbents and Brominated Activated Carbon at the same 700 MW EGU powered by subbituminous coal. The results (depicted in the graph below) clearly indicate that Midwest energy's SEA Technology is vastly superior to BAC in terms of cost and effectiveness.

Attaining 80%+ mercury reduction levels at low-rank-coal EGUs by injecting Powdered Activated Carbon or Brominated Activated Carbon has proven to be challenging and, in most cases, uneconomical. The higher volumes of injectant not only can increase annual injectant costs to the $5 million to $20 million range, but also potentially can creates severe operational issues, including corrosion of the plant's equipment and the degradation of the fly ash by-product, which renders it unsuitable for sale.

VALUATION

The valuation methodology for pollution control/environmental remediation companies usually is based on the use of EV-to-EBITDA (Enterprise Value/Earnings Before Interest, Taxes, Depreciation and Amortization) reflecting the industry's characteristics of profitability and cash flow generation. However, if a company is experiencing negative profitability, either due to adverse fundamental circumstances or being in the early phases of the company's life cycle, **the applicable valuation metric becomes Price-to-Sales (P/S)**.

Finding comparable companies to Midwest Energy Emissions is challenging. The company is unique in that it has a singular focus (the mercury emissions control market), holds the patents to SEA Technology processes, has achieved market penetration through the commercialization of SEA Technology and is positioned to take advantage of further growth opportunities afforded by the implementation of MATS. Many companies involved in the air pollution control industry range from companies that provide commodity chemicals and/or equipment to divisions of large, diversified companies where emission controls is just a small part of total operations. These types of companies are generally valued in the lower-to-middle portions of the valuation continuum rather than in the higher-end of the spectrum where highly-focused companies with patented treatment processes tend to trade.

For example, competing mercury emission control technologies are largely being commercialized by subsidiaries of large, diversified firms where mercury emission remediation is a small part of the total company. For example, TOXECON™ is being brought to market by Hamon Research-Cottrell, a subsidiary of Hamon & Cie International SA (aka Hamon Group), a publicly-traded Belgium-based engineering, procurement and contracting company (HAMO.BR) while Mer-Cure™ is being offered by US Power Plant Laboratories and URS Group, both subsidiaries of Alstom SA (ALO.PA and ALSMY OTC Pink), a publicly-traded France-based power generation, power transmission and rail infrastructure company. Also, the Air Pollution Control business unit of FMC Environmental Solutions, a division of FMC Corp. (FMC: NYSE), offers methods of mercury emission control as an adjunct to its use of hydrogen peroxide- and sodium bicarbonate-based methods to prevent or remediate contamination of air by power utility and manufacturing industries. FMC Corp. is a diversified chemical company. Mitsubishi Hitachi Power Systems, a merger of thermal power generation businesses of Mitsubishi Heavy Industries, Ltd. (7011) and Hitachi, Ltd. (HTHIF), is dedicated to the engineering, design and service of SCR systems for the control of NOx and SO2, and its SCR system solutions also have mercury oxidation capabilities.

We believe that the **valuation comparables** of Midwest Energy Emissions should Albemarle (ALB), Cabot Corp. (CBT), CECO Environmental (CECE) and IDEX (IEX). For example, CECO Environmental provides engineering, manufacturing and construction services. Also, comparable pollution control and value-added specialty chemical companies have comparable business models to Midwest Energy Emissions and achieve higher-than-average gross margins, generally in the 30% range, which is management's targeted margin for fully functional contracts.

The appropriate valuation methodology for Midwest Energy Emissions is based on price-to-sales (P/S) due the character of the company's enterprise, namely a small-capitalization company, currently with negative profitability, but with an expected sales profile that should grow and expand as the company's SEA Technology processes are deployed within the coal-fired utility industry and the company's patent-protected sorbent is sold into the operating customer base. Ultimately, the growing revenue stream should manifest itself into positive EBITDA and later, positive earnings when the break-even point is surpassed.

Industry Comparables	Pr Chg YTD	P/E CFY	EPS Gr 5Yr Est	Gross Margin	Price/ Book	Price/ Sales	Price/ CF
MIDWEST ENERGY EMISSIONS	28.0	N/M	7.0	26.7	N/M	1.7	N/M
Industry Mean	6.4	20.9	12.5	34.2	3.0	2.3	14.3
Industry Median	-8.2	22.1	12.2	34.5	2.7	2.0	11.7
S&P 500	2.3	16.9	10.8	N/A	8.8	4.0	18.3
ALBEMARLE CORP.	-21.0	18.6	14.2	36.2	3.0	3.2	15.7
CABOT CORP.	-19.9	10.7	10.5	23.0	2.4	0.9	7.6
CECO ENVIRONMENTAL	62.8	28.8	15.0	32.8	1.6	0.9	8.8
IDEX CORP.	3.6	25.5	10.2	45.0	5.1	4.2	24.9
Recent Industry Acquisition		**Acquiror**					
CALGON CARBON		Kuraray	16.0	30.0	2.7	1.8	17.1
CYTEC INDUSTRIES INC.		Solvay SA	16.0	30.0	3.6	2.6	14.4
PALL CORP.		Danaher	12.5	50.2	8.3	4.8	19.3

Comparable companies trade in a P/S valuation range between 0.89 and 4.21.

Also, as a reference,

- Cytec Industries was acquired by Solvay SA at 2.6 times TTM revenues (19.7 EV/EBITDA)
- Pall Corp. was acquired by Danaher (DHR) at 4.8 times TTM revenues (20.3 EV/EBITDA) and
- Calgon Carbon was acquired by Kuraray SA at 1.8 times TTM revenues (16.1 EV/EBITDA).

Utilizing a mid-second quartile industry average P/S ratio of 2.78 on TTM sales through 3Q-2018 of $14.47 million, our **share price target is $0.53**.

We are optimistic the ultimate success of Midwest Energy Emissions. The company should experience increases in revenues over the next few years as the coal-fired plants (both in North America and Europe) utilize Midwest Energy's SEA Technology to control mercury emissions in order to become compliant with the EPA's mercury emissions reduction regulations.

RISKS

- The industry addressing the reduction of mercury emissions is a market driven by governmental regulation. Any reduction in the EPA's regulations concerning mercury emissions or the timing of enforcement would significantly impact the demand for the company's products and services.
- Investors should be aware of the potential dilution from options, warrants and convertible notes as the company becomes profitable. The fully diluted share count is higher than the 76,246,113 shares outstanding (as of September 30, 2018) with an additional 9,012,289 shares exercisable through options at a weighted average exercise price of $1.17 and 5,823,322 shares exercisable through warrants.
- Recent quarters have demonstrated that the demand for SEA Technology faces certain challenges. Company-initiated optimization efforts at each EGU have improved operating efficiencies and have resulted in less-than-expected product (sorbent) usage. In addition, some customers lowered capacity factors, reducing the amount of product needed to achieve MATS compliance. And some EGUs were shut down as a result of competitive disadvantages versus other EGUs in their service areas.

BALANCE SHEET

Midwest Energy Emissions Corp.						
Year ending December 31st	12/31/2013	12/31/2014	12/31/2015	12/31/2016	12/31/2017	9/30/2018
ASSETS						
Cash and cash equivalents	509,605	7,212,114	1,083,280	7,751,557	2,418,427	449,546
Accounts receivable	383,859	410,950	1,150,602	3,553,096	2,931,353	1,776,867
Inventory	-	5,784,905	2,715,91	609,072	659,57	468,328
Prepaid expenses and other assets	63,132	140,559	161,81	199,49	210,53	418,242
Total Current Assets	**956,596**	**13,548,528**	**5,111,608**	**12,113,220**	**6,219,894**	**3,112,98**
Property and Equipment, net	173,072	255,33	1,243,450	2,569,35	2,728,99	2,513,096
Deferred tax asset	-	-	-	500,000	-	-
Patents & patent rights, net	70,589	64,70	58,825	52,94	2,934,862	2,783,962
Prepaid expenses and other assets	23,539	13,79	4,058	-	-	-
Debt issuance costs, net	700,011	2,285,696	-	-	-	-
Customer acquisition costs	-	1,156,521	897,428	642,20	172,33	68,933
TOTAL ASSETS	**1,923,807**	**17,324,581**	**7,315,369**	**15,877,722**	**12,056,08**	**8,478,974**
Liabilities and Stockholders' Equity						
Accounts payable and accrued expenses	275,145	688,73	1,235,162	4,363,55	1,795,70	2,638,475
Accrued legal and consulting fees	365,348	86,304	-	-	-	-
Accrued salaries and benefits	377,213	399,48	-	-	-	-
Deferred revenue	-	5,808,301	2,281,76	-	517,060	-
Customer credits	-	936,500	936,50	590,20	167,00	167,000
Current portion of equipment notes payable	-	-	-	39,499	61,17	63,359
Other current liabilities	261,036	250,00	-	-	-	-
Accrued interest	247,696	-	-	-	-	42,597
Advances payable - related party	4,167	-	-	78,750	77,50	-
Convertible note payable	50,000	-	-	-	1,461,417	907,322
Notes payable	300,000	3,080,376	2,497,114	1,500,000	2,500,000	2,875,000
Current liabilities of discontinued operations	-	-	-	-	-	-
Note payable - related party of disc. ops.	-	-	-	-	-	-
Total Current Liabilities	**1,880,605**	**11,249,698**	**6,950,536**	**6,572,008**	**6,579,85**	**6,693,75**
Notes payable	-	-	-	11,678,669	9,733,361	9,021,256
Convertible notes payable	4,675,673	4,724,598	3,175,085	1,142,154	-	760,000
Warrant liability	-	5,597,011	9,854,40	-	-	-
Accrued interest	273,877	337,99	169,20	-	-	-
Equipment note payable	-	-	111,144	143,13	167,65	120,361
TOTAL LIABILITIES	**6,830,155**	**21,909,306**	**20,260,367**	**19,535,966**	**16,480,868**	**16,595,370**
Common stock	35,299	40,228	47,194	73,510	76,246	76,246
Additional paid-in-capital	13,789,473	19,113,724	25,008,016	49,838,469	42,165,620	42,721,987
Accumulated deficit	(18,731,120)	(23,738,677)	(38,000,208)	(54,883,223)	(46,666,652)	(50,914,629)
Total Stockholders' Equity	**(4,906,348)**	**(4,584,725)**	**(12,944,998)**	**(4,971,244)**	**(4,424,786)**	**(8,116,396)**
TOTAL LIABILITIES & STOCKHOLDERS' EQUITY	**1,923,807**	**17,324,581**	**7,315,369**	**14,564,722**	**12,056,082**	**8,478,974**
Shares outstanding	35,299,429	40,228,123	47,194,118	73,509,663	76,246,113	76,246,113

PROJECTED INCOME STATEMENT

Midwest Energy Emissions Corp.

Income Statement

Period ending	2013 12/31/2013	2014 12/31/2014	2015 12/31/2015	2016 12/31/2016	2017 12/31/2017	2018 E 12/31/2018
Revenues	**1,668,472**	**2,794,206**	**12,631,919**	**32,345,540**	**27,499,080**	**11,708,123**
Costs and operating expenses:						
Cost of goods sold	370,635	1,483,379	8,629,570	23,030,404	19,016,932	8,766,095
Operating expenses	886,949	904,914	1,812,355	-	-	-
License maintenance fees	1,075,000	300,000	300,000	-	-	-
Marketing and development	338,379	-	-	-	-	-
Selling, general & administrative exp.	1,622,657	2,208,546	2,967,146	5,185,828	5,585,083	6,575,443
Settlement charges	-	-	1,335,394	-	-	-
Depreciation and amortization	176,394	387,123	390,828	913,000	1,354,000	-
Professional fees	565,851	678,725	672,269	-	-	-
Stock-based compensation	855,256	3,318,759	213,273	1,158,617	1,532,013	-
Impairment of fixed assets	-	-	-	-	-	-
Impairment of goodwill	-	-	-	-	-	-
Total operating expenses	**5,891,121**	**9,281,446**	**16,320,835**	**30,287,849**	**27,488,028**	**15,341,538**
Operating gain (loss)	**(4,222,649)**	**(6,487,240)**	**(3,688,916)**	**2,057,691**	**11,052**	**(3,633,415)**
Other income (expense):						
Interest (expense)	(711,647)	(2,724,506)	(6,213,897)	(3,816,855)	(2,154,570)	(1,040,669)
Letter of credit (fees)	-	-	-	(226,000)	(219,333)	(29,000)
Gain (loss) on disposal of fixed assets	-	-	-	-	-	-
Gain (loss) on forgiveness of liabilities	80,656	-	-	-	-	-
Gain (loss) on debt restructuring	-	-	-	(14,105,076)	-	-
Change in value of warrant liability	-	4,204,189	(3,194,189)	-	-	-
Debt conversion costs	-	-	(1,123,380)	-	-	-
Other income (expense)	-	-	-	-	-	-
Total other income (expense)	**(630,991)**	**1,479,683**	**(10,531,466)**	**(18,147,931)**	**(2,373,903)**	**(1,069,669)**
Net loss before taxes	**(4,853,640)**	**(5,007,557)**	**(14,220,382)**	**(16,090,240)**	**(2,362,851)**	**(4,703,084)**
Income tax benefit (expense)	-	-	(41,149)	472,669	(540,422)	0
Net Gain (Loss) from Continuing Ops.	**(4,853,640)**	**(5,007,557)**	**(14,261,531)**	**(15,617,571)**	**(2,903,273)**	**(4,703,084)**
Net gain (loss) from discontinued ops.	-	-	-	-	-	-
Net Income (Loss)	**(4,853,640)**	**(5,007,557)**	**(14,261,531)**	**(15,617,571)**	**(2,903,273)**	**(4,703,084)**
Net loss per share:						
Basic and diluted loss per share	**(0.14)**	**(0.13)**	**(0.32)**	**(0.31)**	**(0.04)**	**(0.06)**
Wgted avg. shares - basic & diluted	34,283,631	39,140,243	44,160,298	50,646,328	75,061,800	76,246,113
Adjusted EBITDA	**N/A**	**N/A**	**(1,200,000)**	**4,129,000**	**2,897,000**	**(2,358,000)**

Midwest Energy Emissions Corp.						
Income Statement Period ending	2016 12/ 31/ 2016	1Q 2017 3/ 31/ 2017	2Q 2017 6/ 30/ 2017	3Q 2017 9/ 30/ 2017	4Q 2017 12/ 31/ 2017	2017 12/ 31/ 2017
Revenues:						
Product sales	28,920,051	5,284,234	7,112,722	8,075,510	5,577,566	26,050,032
Equipment sales	2,699,051	7,160	776,946	2,975	7,125	794,206
Demonstration and consulting services	726,438	136,000	41,500	369,482	107,860	654,842
Total revenues	**32,345,540**	**5,427,394**	**7,931,168**	**8,447,967**	**5,692,551**	**27,499,080**
Costs and operating expenses:						
Cost of goods sold	23,030,404	3,785,922	4,995,776	5,509,204	4,726,030	19,016,932
Selling, general & administrative expenses	7,257,445	2,694,282	2,313,357	1,910,020	1,553,437	8,471,096
Settlement charges	-	-	-	-	-	-
Total operating expenses	**30,287,849**	**6,480,204**	**7,309,133**	**7,419,224**	**6,279,467**	**27,488,028**
Operating gain (loss)	**2,057,691**	**(1,052,810)**	**622,035**	**1,028,743**	**(586,916)**	**11,052**
Other income (expense):						
Interest (expense)	(3,816,855)	(540,475)	(544,918)	(541,855)	(527,322)	(2,154,570)
Letter of credit fees	(226,000)	(60,000)	(60,667)	(52,667)	(45,999)	(219,333)
Gain (loss) on disposal of fixed assets	-	-	-	-	-	-
Gain (loss) on forgiveness of liabilities	-	-	-	-	-	-
Gain (loss) on debt restructuring	(14,105,076)	-	-	-	-	-
Change in value of warrant liability	-		-	-	-	-
Debt conversion costs	-	-	-	-	-	-
Gain on legal settlements	-	-	-	379,000	-	-
Other income (expense)	-	-	-	-	-	-
Total other income (expense)	**(18,147,931)**	**(600,475)**	**(605,585)**	**(215,522)**	**(573,321)**	**(2,373,903)**
Net loss before taxes	**(16,090,240)**	**(1,653,285)**	**16,450**	**813,221**	**(1,160,237)**	**(2,362,851)**
Income tax benefit (expense)	472,669	0	0	0	(540,422)	(540,422)
Net Gain (Loss) from Continuing Ops.	**(15,617,571)**	**(1,653,285)**	**16,450**	**813,221**	**(1,700,659)**	**(2,903,273)**
Net gain (loss) from discontinued ops.	-	-	-	-	-	-
Net Income (Loss)	**(15,617,571)**	**(1,653,285)**	**16,450**	**813,221**	**(1,700,659)**	**(2,903,273)**
Net loss per share:						
Basic and diluted loss per share	**(0.31)**	**(0.02)**	**0.00**	**0.01**	**(0.02)**	**(0.04)**
Wgted avg. shares - basic & diluted	50,646,328	73,585,727	74,493,909	75,865,678	76,624,335	75,061,800
Adjusted EBITDA	**4,129,000**	**152,000**	**1,232,000**	**1,572,000**	**(59,000)**	**2,897,000**

Midwest Energy Emissions Corp.						
Income Statement Period ending	2017 12/ 31/ 2017	1Q 2018 3/ 31/ 2018	2Q 2018 6/ 30/ 2018	3Q 2018 9/ 30/ 2018	4Q E 2018 12/ 31/ 2018	Estimate 2018 12/ 31/ 2018
Revenues:						
Product sales	26,050,032	2,059,819	2,414,951	4,113,890	2,841,368	11,430,028
Equipment sales	794,206	9,146	0	28,252	0	37,398
Demonstration and consulting services	654,842	52,147	36,600	66,950	85,000	240,697
Total revenues	**27,499,080**	**2,121,112**	**2,451,551**	**4,209,092**	**2,926,368**	**11,708,123**
Costs and operating expenses:						
Cost of goods sold	19,016,932	1,708,315	1,882,612	3,009,656	2,165,512	8,766,095
Selling, general & administrative expenses	8,471,096	1,781,368	1,709,763	1,364,312	1,720,000	6,575,443
Settlement charges	-	-	-	-	-	-
Total operating expenses	**27,488,028**	**3,489,683**	**3,592,375**	**4,373,968**	**3,885,512**	**15,341,538**
Operating gain (loss)	**11,052**	**(1,368,571)**	**(1,140,824)**	**(164,876)**	**(959,144)**	**(3,633,415)**
Other income (expense):						
Interest (expense)	(2,154,570)	(513,501)	(516,082)	(471,086)	460,000	(1,040,669)
Letter of credit fees	(219,333)	(29,000)	0	0	0	(29,000)
Gain (loss) on disposal of fixed assets	-	-	-	-	-	-
Gain (loss) on forgiveness of liabilities	-	-	-	-	-	-
Gain (loss) on debt restructuring	-	-	(44,036)	-	-	-
Change in value of warrant liability	-	-	-	-	-	-
Debt conversion costs	-	-	-	-	-	-
Gain on legal settlements	-	-	-	-	-	-
Other income (expense)	-	-	-	-	-	-
Total other income (expense)	**(2,373,903)**	**(542,501)**	**(560,118)**	**(471,086)**	**460,000**	**(1,069,669)**
Net loss before taxes	**(2,362,851)**	**(1,911,072)**	**(1,700,942)**	**(635,962)**	**(499,144)**	**(4,703,084)**
Income tax benefit (expense)	(540,422)	0	0	0	0	0
Net Gain (Loss) from Continuing Ops.	**(2,903,273)**	**(1,911,072)**	**(1,700,942)**	**(635,962)**	**(499,144)**	**(4,703,084)**
Net gain (loss) from discontinued ops.	-	-	-	-	-	-
Net Income (Loss)	**(2,903,273)**	**(1,911,072)**	**(1,700,942)**	**(635,962)**	**(499,144)**	**(4,703,084)**
Net loss per share:						
Basic and diluted loss per share	**(0.04)**	**(0.03)**	**(0.02)**	**(0.01)**	**(0.01)**	**(0.06)**
Wgted avg. shares - basic & diluted	75,061,800	76,246,113	76,246,113	76,246,113	76,246,113	76,246,113
Adjusted EBITDA	**2,897,000**	**(847,000)**	**(908,000)**	**97,000**	**(700,000)**	**(2,358,000)**

HISTORICAL STOCK PRICE



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