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Advanced Emissions Solutions, Inc.  
Form 10-K  
March 12, 2018  
United States  
SECURITIES AND EXCHANGE COMMISSION  
Washington, D.C. 20549

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FORM 10-K

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ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934  
For the fiscal year ended December 31, 2017

or  
 TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF  
1934

Commission File Number: 001-37822

Advanced Emissions Solutions, Inc.  
(Name of registrant as specified in its charter)

Delaware 27-5472457  
(State of incorporation) (IRS Employer  
Identification No.)

640 Plaza Drive, Suite 270, Highlands Ranch, CO, 80129  
(Address of principal executive offices) (Zip Code)  
(Registrant's telephone number, including area code): (720) 598-3500

Securities registered under Section 12(b) of the Act:

Title of each class	Name of each exchange on which registered
Common Stock, \$0.001 par value	NASDAQ Global Market

Securities registered under Section 12(g) of the Act: None

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act.  Yes  No

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or 15(d) of the Act.  Yes  No

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days.  Yes  No

Indicate by check mark whether the registrant has submitted electronically and posted on its corporate Web site, if any, every Interactive Data File required to be submitted and posted pursuant to Rule 405 of Regulation S-T during the preceding 12 months (or for such shorter period that the registrant was required to submit and post such files).  Yes  No

Indicate by check mark if disclosure of delinquent filers in response to Item 405 of Regulation S-K is not contained herein, and will not be contained, to the best of registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K.

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer or a smaller reporting company. See definition of "large accelerated filer," "accelerated filer" and "smaller reporting company" in Rule 12b-2 of the Exchange Act.

Large accelerated filer  Accelerated filer

Non-accelerated filer  Smaller Reporting Company

Emerging growth company

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Act.)  Yes  No

The aggregate market value of the voting stock held by non-affiliates of the registrant was approximately \$114.3 million based on the last reported bid price of the Common Stock on the NASDAQ Global Market on June 30, 2017. The number of shares outstanding of the registrant's Common Stock, par value \$0.001 per share, as of March 2, 2018 was 20,752,939.

Indicate the number of shares outstanding of each of the registrant's classes of common stock, as of the latest practicable date.

#### Documents Incorporated By Reference

Portions of Part III of this Form 10-K are incorporated by reference from the Registrant's definitive proxy statement to be filed with the Securities and Exchange Commission no later than 120 days after the end of the Registrant's fiscal year.

ADVANCED EMISSIONS SOLUTIONS, INC.  
ANNUAL REPORT ON FORM 10-K  
FOR THE FISCAL YEAR ENDED DECEMBER 31, 2017

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## PART I

### Item 1. Business

#### General

ADA-ES, Inc. ("ADA"), a Colorado corporation, was incorporated in 1997. Pursuant to an Agreement and Plan of Merger ("Reorganization"), effective July 1, 2013, Advanced Emissions Solutions, Inc. ("ADES"), a Delaware company incorporated in 2011, replaced ADA as the publicly-held corporation and ADA became a wholly-owned subsidiary of ADES. Each outstanding share of ADA's common stock automatically converted into one share of common stock of ADES and the shareholders of ADA became stockholders of ADES on a one-for-one basis, holding the same number of shares in and the same ownership percentage of ADES after the reorganization as they held in and of ADA prior to the reorganization. ADES's common stock became listed on the NASDAQ Capital Market under the symbol, "ADES," ADA's previous symbol, and ADA's stock ceased trading on the NASDAQ Capital Market on July 1, 2013. From March 30, 2015 through July 6, 2016, ADES's common stock was traded on the OTC Pink® Marketplace - Limited Information Tier under the trading symbol "ADES." Effective, July 7, 2016 ADES's common stock began trading on the NASDAQ Global Market under the symbol, ADES. This Annual Report on Form 10-K is referred to as the "Form 10-K" or the "Report."

As this filing pertains to the year ended December 31, 2017, the terms the "Company," "we," "us" and "our" means ADA and its consolidated subsidiaries for the periods through and including the period ended June 30, 2013 and ADES and its consolidated subsidiaries for the dates or periods after July 1, 2013.

As of December 31, 2017 and 2016, we held equity interests of 42.50% and 50.00% in Tinum Group, LLC ("Tinum Group") and Tinum Services, LLC ("Tinum Services"), respectively, and each of their operations significantly impacted our financial position and results of operations for the years ended December 31, 2017, 2016 and 2015. We account for Tinum Group and Tinum Services under the equity method of accounting.

On July 27, 2017, the Company obtained a 50% membership interest in GWN Manager in exchange for a capital contribution of \$0.1 million. GWN Manager subsequently purchased a 0.2% membership interest in a subsidiary of Tinum Group.

#### Business Purpose and Strategy

We provide emissions solutions to customers in the coal-fired power generation and industrial boiler processes. We provide environmental control chemicals, equipment and technologies to our primary market that consists of approximately 650 coal-fired electrical generation units located in the United States.

Through our subsidiaries and joint ventures, we are a leader in emissions control ("EC") technologies and associated equipment, chemicals and services. Our proprietary environmental technologies enable our customers to reduce emissions of mercury and other pollutants, maximize utilization levels and improve operating efficiencies to meet the challenges of existing and pending EC regulations.

Our major activities include:

Development and sale of specialty chemicals, equipment, consulting services and other products designed to reduce emissions of mercury, acid gases, metals and other pollutants, and the providing of technology services in support of our customers' emissions compliance strategies; and

Through Tinum Group, an unconsolidated entity, reduction of mercury and nitrogen oxide ("NO<sub>x</sub>") emissions at select coal-fired power generators through the production and sale of Refined Coal ("RC") that qualifies for tax credits under the Internal Revenue Code ("IRC") Section 45 - Production Tax Credit ("Section 45 tax credits"). We benefit from Tinum Group's production and sale of RC, which generates tax credits, as well as the revenue from selling or leasing RC facilities to tax equity investors. See the separately filed financial statements of Tinum Group included in Item 15 - "Exhibits, Financial Statement Schedules" ("Item 15") of this Report.

#### Markets for Our Products and Services

We expect that the share of coal-fired power generation as a percentage of U.S. electricity generation to be more stable compared to previous years when many coal-fired generating units were shut down in response to low gas prices and increasingly stringent environmental regulations. Further, we believe that coal-fired power generation will remain a significant component of the U.S. power generation mix for many years, given coal's abundance, affordability, reliability and availability as a domestic fuel source. Currently, the Energy Information Administration

("EIA") estimates coal makes up 30% of the

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United States electric generation. In its Annual Energy Outlook for 2017, the EIA projects that coal will provide between 24% and 33% of electricity generation in 2040 depending on whether the Clean Power Plan ("CPP") of the U.S. Environmental Protection Agency ("EPA"), which addresses limiting greenhouse gas emissions, is or is not implemented. The primary drivers for many of our products and services are environmental laws and regulations impacting the electric power generation industry and other coal users. These regulations include the Mercury and Air Toxics Standards ("MATS"), a U.S. federal regulation requiring all existing and any new coal-fired electric generating units to control mercury emissions, acid gases, and particulate matter, as well as various state regulations and permitting requirements for coal-fired electric generating units. In addition to the federal MATS rule, certain states have their own mercury rules that are similar to, or more stringent than, MATS, and many coal-fired electric generating units around the country have agreed to consent decrees, which require pollution controls that, in some cases, are more restrictive than the existing regulations. We continue to believe the MATS regulation as well as certain state regulations create a market for our RC and EC products.

In general, coal is a low cost, stable and reliable source of domestic energy that, unlike many other forms of energy, can be easily stored in large quantities. We believe coal is critical to ensuring the U.S. has a secure and stable source of energy. With current environmental regulations, we believe it is unlikely that any new coal-fired electric generating units will be financed or constructed, which suggests that the average coal-fired electric generating unit age in 2040 will be 64 years old. However, following the retirement of many of the less efficient and generally smaller coal-fired electric generating units over the past few years, and the announcement from the EPA on October 10, 2017 of their proposal to repeal the CPP, we believe that the amount of electricity generated from coal will remain relatively steady in the near term.

While the long-term future is uncertain, and as coal assets continue to age, we expect a continued purchasing trend towards variable cost products and integrated solutions with low capital expenditure requirements and away from large capital equipment and other fixed cost solutions that are less likely to have costs recovered.

We believe it is likely that many U.S. coal mines, coal-fired electric generating units, coal-centric large equipment providers and other coal-related businesses will have difficulty in adapting to industry changes expected in the coming years. However, we see opportunities for companies that can offer their customers creative and cost-effective solutions that help the U.S. coal-related businesses meet regulatory compliance, improve efficiency, lower costs and maintain reliability.

As of December 31, 2017, our primary products, services and RC technology licenses available to coal-fired electric generating units requiring solutions to assist with compliance with emissions standards included:

**Chemicals:**

Our patented M-Prove™ ("M-Prove") technology, which is also incorporated in our RC technologies, that provides a cost effective alternative to other halogen-based, oxidation chemicals used to enhance removal of mercury emissions. M-Prove technology mitigates coal treatment corrosion risks to minimize maintenance and repair costs to enhance system reliability and risks associated with bromine discharge from plant wastewater; and

Our RESPond® ("RESPond") liquid chemical additive that is a highly effective ash resistivity modifier for power plants operating cold-side electrostatic precipitators. Unlike Sulfur Trioxide ("SO<sub>3</sub>") solutions, the incumbent chemical being used to modify ash resistivity, the RESPond additive does not interfere with or reduce the effectiveness of activated carbon injected into the flue gas for purposes of reducing mercury emissions.

**RC technology licenses:**

Our patented CyClean™ ("CyClean") technology, a pre-combustion coal treatment process that provides electric power generators the ability to enhance combustion and reduce emissions of NO<sub>x</sub> and mercury from coals burned in cyclone boilers; and

Our patented M-45™ and patent pending M-45-PC™ technologies (collectively, the "M-45 Technology"), which are proprietary pre-combustion coal treatment technologies used to control emissions from circulating fluidized bed boilers and pulverized coal boilers, respectively.

**Equipment:**

Low capital expenditure mercury control technologies and systems such as Activated Carbon Injection ("ACI") systems, that effectively reduce mercury emissions over a broad range of plant configurations and coal types; Dry Sorbent Injection systems ("DSI") that reduce emissions of Sulfur Dioxide ("SO<sub>2</sub>") and other acid gases such as SO<sub>3</sub> and Hydrogen Chloride ("HCl"); and Other equipment that may be necessary for longer term storage for consumable additives as well as our patented ADAir™ Mixer in-duct technology that alters flue gas flow to improve mixing and optimize particle dispersion to reduce sorbent consumption for ACI and DSI systems.

**Consulting services and other:**

We provide general consulting services as requested by our customers related to emissions control. Additionally, we generate significant earnings from our investment in Tinum Group. As of December 31, 2017, Tinum Group, has built and placed into service a total of 28 RC facilities designed to produce RC for sale to coal-fired electric generating units. Coal-fired electric generating units use RC as one of a portfolio of tools to help comply with MATS and other environmental regulations. These RC facilities produce and sell RC that qualifies for Section 45 tax credits, including meeting the "placed in service" requirements (referred to as "placed in service"). The IRS has issued guidance regarding emissions reductions in the production of electricity by coal-fired electric generating units, including measurement and certification criteria necessary to qualify for the Section 45 tax credits. The ability to produce and sell RC, which generates Section 45 tax credits, expires 10 years after each RC facility is placed in service, but not later than December 31, 2021. Two of Tinum Group's RC facilities were placed in service in 2009 and related Section 45 tax credits for these facilities substantially expire in December 2019. The Section 45 tax credits related to the remaining RC facilities expire in 2021.

Once an RC facility is in operation, Tinum Group may lease or sell it to a tax equity investor, which we refer to as an "invested" RC facility. The tax equity investor subsequently operates the RC facility to produce and sell RC to a utility. It is financially advantageous for Tinum Group to lease or sell an RC facility as the tax equity investor assumes the operating expenses for the RC facility and pays to Tinum Group either an up-front payment to purchase or lease payments to lease the RC facility. We benefit from equity income and distributions accruing through our investment in Tinum Group. Tax equity investors may benefit from their investment in RC facilities through the realization of tax assets and credits from the production and sale of RC.

RC facilities that are producing and selling RC and have not been leased or sold, are referred to as "retained" RC facilities, whereby the RC is produced and sold by Tinum Group and, as an owner, we benefit from the related Section 45 tax benefits. As of December 31, 2017 and 2016, respectively, the Section 45 tax credits were \$6.91 and \$6.81 per ton of RC produced and sold to a utility. The value of the Section 45 tax credits is adjusted annually based on inflation adjustment factors published in the Federal Register. As of December 31, 2017, we have received, but have not been able to fully utilize, substantial tax credits and benefits from certain retained RC facilities that previously produced and sold RC for the benefit of Tinum Group. See Note 12 to our Consolidated Financial Statements included in Item 8 - "Financial Statements and Supplementary Data" ("Item 8") of this Report for additional information regarding our net operating losses, tax credits and other deferred tax assets.

As of December 31, 2017, Tinum Group had 17 invested RC facilities producing RC at utility sites and no retained RC facilities. The remaining 11 RC facilities, although placed in service, were either installed but not operating, awaiting site selection or in various other stages of contract negotiation or permanent installation.

The RC facilities producing and selling RC as of December 31, 2017 are generally operated by Tinum Services under operating and maintenance agreements with the owners or lessees of the RC facilities.

**Segment Information**

As of December 31, 2017, our operations consisted of two reportable segments: (1) RC and (2) EC.

Financial information related to each of our reportable segments is set forth in Note 13 of the Consolidated Financial Statements included in Item 8 of this Report.





(1) RC Segment

Our RC segment derives its earnings from equity method investments as well as royalty payment streams and other revenues related to reduced emissions of both NO<sub>x</sub> and mercury from coal treated with our proprietary chemicals and burned at coal-fired electric generating units. Our equity method investments related to the RC segment include Tinum Group, Tinum Services and GWN Manager.

Tinum Group owns, leases or sells facilities used in the production of RC. The RC facilities are located at coal-fired generation stations owned by regulated utilities, cooperatives, government agencies and wholesale power generators (collectively, "Generators"). The RC produced by the RC facilities is used by the Generators as fuel in the coal-fired boilers to produce electricity. For invested RC facilities, Tinum Group collects lease income from the lessee if leased, or sales proceeds from the buyer if sold. We benefit from these transactions through our equity method investment in Tinum Group. RC facilities that are producing RC, but that Tinum Group has not leased or sold, are referred to as retained RC facilities. Tinum Group produces and sells RC to Generators and the owners of Tinum Group, including us, may benefit to the extent Section 45 tax credits and other tax benefits are realized from the operation of retained RC facilities.

Tinum Services operates and maintains RC facilities under operating and maintenance agreements with Tinum Group and owners or lessees of RC facilities. Tinum Group or the owners or lessees of the RC facilities pay Tinum Services, subject to certain limitations, the costs of operating and maintaining the RC facilities plus various fees. Tinum Services also arranges for the purchase and delivery of certain chemical additives under chemical agency agreements, which include the chemicals required for our CyClean, and M-45 Technologies, necessary for the production of RC. The term of each chemical agency agreement runs concurrently with the respective RC facility's sale or lease agreement.

We also earn royalties from the licensing of our M-45 Technology ("M-45 License") to Tinum Group. Royalties are recognized based upon a percentage of the per-ton, pre-tax margin as defined in the M-45 License.

Key drivers to RC segment performance and cash distributions are the number of operating (leased or sold) versus retained RC facilities, production and sale of RC and royalty-bearing tonnage.

Refined Coal Data

The following table provides summary information related to the Company's investment in Tinum Group and the related RC facilities as of December 31, 2017 and tons of RC produced and sold for the year ended December 31, 2017:

	# of RC Facilities	Not Operating	Operating	
			Invested	Retained
RC Facilities	28	11	17	(1)—
RC tons produced and sold (000's)			46,887	1,187

(1) One RC facility is approximately 50% invested with an independent third party. The remaining approximate 50% is retained by Tinum Group and the Company.

Additional information related to RC facilities is included in Item 7 - "Management's Discussion and Analysis of Financial Condition and Results of Operations" ("Item 7") of this Report.

(2) EC Segment

(a) Systems & Equipment- Activated Carbon Injection, Dry Sorbent Injection System and Other Systems

Historically, our EC segment included revenues and related expenses from the sale of ACI and DSI equipment systems, chemical sales, consulting services and other sales related to the reduction of emissions in the coal-fired electric generation process and the electric utility industry. Demand for ACI and DSI system contracts historically was driven by coal-fired power plant utilities that needed to comply with MATS and Maximum Achievable Control Technology Standards ("MACT"). As the deadline for these standards has passed, and customers have now implemented ACI, DSI and other large equipment systems as a component of their strategies to comply with applicable regulations, the Company does not anticipate entering into future long-term fixed price contracts for ACI or DSI systems. However, we may continue to provide smaller scale equipment products that may be needed by power generation units as part of their ongoing operations.

Currently, we are transforming ourselves into a consumable products-focused company to provide customers with emission reduction solutions within the mercury control consumables market.

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(b) Chemicals

Current mercury control options include consumables that utilize powdered activated carbon ("PAC"), halogen and re-emissions technologies. These options provide coal-powered utilities and industrial boilers with mercury control solutions working in conjunction with ACI and DSI systems and other pollution control equipment, generally without the requirement for significant ongoing capital outlays. Our current proprietary chemical portfolio generally provides customers with halogen and flue gas conditioning technology options, which include M-Prove and RESPond, respectively. Currently, sales of these products comprise a small piece of the consumables market. Our current and future focus is to increase our market share within the consumables market, both organically and through potential acquisition(s).

Our patented M-Prove pre-combustion coal treatment technology involves the application of chemicals to coal. This technology substantially reduces mercury emissions and also can reduce the amount of activated carbon or other sorbents used to meet regulatory mercury emission limits. The power industry is beginning to experience corrosion and wastewater issues in their plants that they attribute to the use of bromine to enhance the capture of mercury.

We believe the key benefits of the M-Prove additive are as follows:

- effective at extremely low treatment rates;
- significantly reduces "balance-of-plant" risks attributed to other halogen-based coal treatments, including corrosion to air pre-heater baskets;
- minimizes ancillary halogen emissions in the stack as well as fly ash and wastewater;
- reduces sorbent consumption for ACI systems;
- facilitates enhanced mercury removal by downstream pollution control devices;
- supports fuel flexibility and potential for fuel cost savings.

We experienced higher demand for our M-Prove Technology in 2017 and we believe that related revenues will continue to increase in 2018 as plants gain experience with their mercury control systems and begin to optimize their strategy to reduce operational impacts, especially as they relate to corrosion and wastewater. In October 2012, we were awarded the first in a family of patents designed to protect this technology in the U.S., and are pursuing similar patents in various other countries.

We license certain emissions control technologies, including the M-Prove additive, to Tinum Group for the production of RC to reduce emissions of both mercury and NO<sub>x</sub> from coal-fired boilers. We licensed our patented CyClean technology to Tinum Group upon formation of the entity in 2006 for use with cyclone boilers for the life of the patents. In July 2012, we executed the M-45 License with Tinum Group, which is effective for the duration that Section 45 tax credits are available. We believe these licenses will leverage Tinum Group's operating expertise and allow it the ability to provide and use either the CyClean or M-Prove Technologies to produce RC. Later in 2012, we made a technological advancement in the M-Prove Technology, which was incorporated in the M-45 License and allows it to be effective in "pulverized coal" ("PC") boilers. In addition to the royalty payments we receive from Tinum Group, the use of M-Prove Technology in the production of RC provides valuable operating data and validates the effectiveness of the M-Prove Technology in a range of coal-fired boilers. We expect this information will help in our sales process for the M-Prove Technology. We are in the early stages of selling M-Prove into the EC market and a portion of our current revenues in this offering include application tests of M-Prove at customer sites.

We have deployed technologies for conditioning flue gas streams from coal-fired combustion sources and maybe used as an alternative to other mercury control products. Our flue gas conditioning chemicals, sold under the trade name RESPond®, allow existing air pollution control devices, such as electrostatic precipitators ("ESPs"), to operate more efficiently without the use of traditional SO<sub>3</sub> additives, which have been shown to be detrimental to effective mercury control by partially negating the effectiveness of certain sorbents used to absorb mercury, including activated carbon. Such treatment of the flue gas stream allows for effective collection of fly ash particles that would otherwise escape into the atmosphere. The use of the proprietary chemical blends may help existing marginally sized ESPs continue to operate effectively when applied exclusively, or in combination with other chemicals such as hydrated lime, activated carbon products, or other high-resistivity materials.

(c) Consulting Services

Historically, we have provided consulting services to assist electric power generators, the electric utility industry and others in planning and implementing strategies to meet the new and increasing government emission standards

requiring reductions in SO<sub>2</sub>, SO<sub>3</sub>, HCl, NO<sub>x</sub>, particulates, acid gases and mercury. We anticipate that consulting services revenue will continue to diminish as we shift our focus to selling in the emissions reduction consumables market.

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The following table shows the amount of total revenue by type:

(in thousands)	Years Ended December		
	2017	2016	2015
Revenues:			
Equipment sales	\$31,401	\$46,949	\$60,099
Chemicals	4,246	3,025	888
Consulting services and other	45	648	1,752
Total revenues	\$35,692	\$50,622	\$62,739

#### Legislation and Environmental Regulations

##### U.S. Federal Mercury and Air Toxic Standards ("MATS") Affecting Electric Utility Steam Generating Units

On December 16, 2011, the U.S. EPA issued the final "MATS Rule," which took effect in April 2012. The EPA structured the MATS Rule as a MACT-based hazardous pollutant regulation applicable to coal and oil-fired Electric Utility Steam Generating Units ("EGU"), which generate electricity via steam turbines and have a capacity of 25 megawatts or greater, and provide for, among other provisions, control of mercury and particulate matter and control of acid gases such as HCl and other Hazardous Air Pollutants ("HAPs"). Approximately 1,260 units were coal-fired EGUs. According to our estimates, the standard sets a limit that we believe requires the capture of up to 80-90% of the mercury in the coal burned in electric power generation boilers as measured at the exhaust stack outlet for most plants. The MACT standards are also known as National Emission Standards for Hazardous Air Pollutants ("NESHAP"). Plants generally had four years to comply with the MATS Rule, and we estimate that, based on data reported to the EPA and conversations with plant operators, most plants were required to comply by April 2016 and implementation of the MATS Rule is largely complete. We estimate that 48% of the coal-fired EGUs that were operating in December 2011, when the MATS rule was finalized, have been permanently shut down, leaving approximately 650 EGUs in operation at the end of 2017.

In April 2017, a review by the U.S. Court of Appeals for the D.C. Circuit of a "supplemental finding" associated with the cost benefit analysis of the MATS Rule conducted by EPA was stayed at the request of the current Administration. The court case continues to be stayed indefinitely, but the MATS Rule is still in force until the issue is resolved. The EPA has not issued any further official proceedings regarding MATS Rule.

##### State Mercury and Air Toxics Regulations Affecting EGUs

In addition, certain states have their own mercury rules that are similar to or more stringent than the MATS Rule, and coal-fired electric generating units around the country are subject to consent decrees that require the control of acid gases and particulate matter, in addition to mercury emissions. Twenty-three states have mercury-specific rules that affect more than 283 generating units and more than 100 GW of generating capacity that were still operating at the end of 2017.

##### Effluent Limitation Guidelines

On September 30, 2015, the EPA set the first federal limits on the levels of toxic metals in wastewater that can be discharged from power plants. The final rule requires, among other things, zero discharge for fly ash transport water, and limits on mercury, arsenic, selenium, and nitrate from flue gas desulfurization ("FGD") wastewater (also known as "legacy wastewater"). In April 2017 the EPA Administrator announced his decision to reconsider the Effluent Limitations Guidelines ("ELG") Rule, and the U.S. Court of Appeals Fifth Circuit granted the motion to reconsider and placed the case in abeyance, which delayed the earliest compliance date from November 2018 to November 2020. In September 2017, the EPA indicated that plants would not need to comply before November 2020, with a possible extension of up to five years with state approval. Although halogens are not directly regulated in the effluent guidelines, some halogens may impact the effectiveness of biological wastewater treatment systems that are often used for the removal of selenium. We are evaluating whether the potential market opportunity supports our development of new products to help plants comply with these rules, as well as how these rules may affect our current product offerings.

##### Additional U.S. Legislation and Regulations

On August 3, 2015, the EPA finalized rules to reduced greenhouse gases ("GHGs") in the form of the CPP, which established guidelines for states to follow in developing plans to reduce GHG emissions. Under the CPP, states are

required to prepare State Implementation Plans to meet state targets established based on emission reductions from affected sources. The CPP requires that the Best System of Emission Reduction ("BSER") be implemented and establishes three building blocks, which

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include heat rate improvements at affected coal-fired electric generating units, substituting coal-fired generation with less carbon-intensive EGUs such as natural gas combined cycle plants, and substituting renewable generation. The CPP has been challenged by multiple states in the U.S. Court of Appeals for the District of Columbia Circuit ("DC Circuit"). The CPP is currently stayed by the Supreme Court, and a panel of 10 judges on the DC Circuit are reviewing the CPP following a hearing in September 2016. On October 10, 2017, the EPA announced a proposal to repeal the CPP. The DC Circuit has been holding CPP litigation in abeyance since April 28, 2017.

#### International Regulations

There are various international regulations related to mercury control. In Canada, the Canada-Wide Standard ("CWS") was initially implemented in 2010, with increasingly stringent limits through 2020 and with varying mercury caps for each province. China and Germany both have limits for mercury emissions that are less stringent than U.S. limits, which are typically met using co-benefits from other installed air pollution control equipment designed to control other pollutants. In May 2017, the EU ratified the Minamata Convention on Mercury, triggering mercury control regulations with implementation starting in 2021. Specific emissions limits are currently being developed guided by the best available technologies reference ("BREF") document for limiting stack emissions and liquid effluents from industrial processes. The BREF conclusions for large coal-fired electric generating units were adopted by the European Commission in July 2017.

Based upon the existing and potential regulations, we believe the international market for mercury control products may expand in the coming years, and we are positioning our patent portfolio and existing commercial products accordingly to be prepared if an international market for our products develops.

#### Competition

In the EC consumables market, our mercury control chemicals primarily compete against the use of brominated PAC, as well as the use of bromine applied to the coal prior to combustion. Our primary competitors for our coal additives are Nalco Water, Ecolab Company, and Midwest Energy Emissions Corp ("MEEC"). As it relates to brominated PAC providers, our primary competitors include ADA Carbon Solutions, Cabot Corporation, and Calgon Carbon.

In the RC market, we believe Chem-Mod, LLC ("Chem-Mod") and licensees of the Chem-Mod technology are our principal competitors. Competition within the RC market is based primarily on price, the number of tons of coal burned at the coal-fired electric generating unit where the RC facilities are operating and the tax compliance facts associated with each RC facility. Additionally, competition for tax equity investors extends into other investment opportunities, including opportunities related to potential tax incentive transactions available to potential investors.

#### Patents

As of December 31, 2017, we held 38 U.S. patents and three international patents that were issued or allowed, 12 additional U.S. provisional patents or applications that were pending, and nine international patent applications that were either pending or filed relating to different aspects of our technology. Our existing patents generally have terms of 20 years from the date of filing, with our next patents expiring beginning in 2021. We consider many of our patents and pending patents to be critical to the ongoing conduct of our business.

#### Our Vendors and Supply of Materials

We purchase our proprietary chemicals through negotiated blending contracts that include confidentiality agreements with chemical suppliers. These arrangements attempt to assure continuous supply of our proprietary chemical blends. The manufacturing of our chemical products is dependent upon certain discrete chemicals that are subject to price fluctuations and supply constraints. In addition, the number of chemical suppliers who provide the necessary additives needed to manufacture our proprietary M-Prove and RESPond chemicals is limited. Supply agreements are generally renewed on an annual basis.

#### Seasonality of Activities

The sale of our chemical products and RC facility operation levels depend on the operations of the coal-fired electric generating units to which the applicable chemicals are provided and the location of the RC facilities, respectively. Coal-fired electric generating units routinely schedule maintenance outages in the spring and/or fall depending upon the operation of the boilers. During the period in which an outage may occur, which may range from one week to over a month, no chemicals are used or RC produced and sold, and our revenues can be correspondingly reduced. Additionally, power generation is weather dependent, with electricity and steam production varying in response to heating and cooling needs.





### Dependence on Major Customers

We depend on our customer relationships with owners and operators of coal-fired power electric generating units as well as general market demand for coal-fueled power generation. Additional information related to major customers is disclosed in Note 14 of the Consolidated Financial Statements included in Item 8 of this Report.

Through our investment in Tinum Group, we depend on our relationships with owners and operators of coal-fired power generation facilities, including various electric utilities and tax equity investors. Tinum Group is the exclusive licensee for purposes of producing RC using the CyClean and M-45 Technologies. Tinum Group depends on tax equity investors, with significant concentration within affiliates of The Goldman Sachs Group, Inc. These investors could renegotiate or terminate their leases, or the utilities where the RC facilities are installed could materially reduce their use of RC.

### Research and Development Activities

During 2017, we focused on pursuing the expansion of potential product offerings within the emissions reduction consumables market to complement our existing chemical solutions. Historically, we engaged in research and development activities that would bring the broader technologies to the EC market and expand our own offerings, including CO<sub>2</sub> capture technology. This research and development was funded, in part, under contracts and/or cost reimbursement arrangements with the U.S. Department of Energy ("DOE") and other third parties.

### Backlog

Backlog represents the dollar amount of revenues we expect to recognize in the future from fixed-price contracts, primarily for ACI and DSI systems as well as certain fixed-price chemical contracts that have been executed, but work has not commenced, and those that are currently in progress. A project is included within backlog when a contract is executed. Backlog amounts include anticipated revenues associated with the original contract amounts, executed change orders, and any claims that may be outstanding with customers. It does not include contracts that are in the bidding stage or have not been awarded. As a result, we believe the backlog figures are firm, subject to customer modifications, alterations or cancellation provisions contained in the various contracts.

Backlog may not be indicative of future operating results. Estimates of profitability could increase or decrease based on changes in direct materials, labor and subcontractor costs, and indirect costs related to contract performance, such as indirect labor, supplies, tools and repairs, and any claims with customers. Backlog is not a measure defined by accounting principles generally accepted in the United States and is not a measure of profitability. Our method for calculating backlog may not be comparable to methodologies used by other companies.

(in thousands)

Backlog as of December 31, 2016	\$49,468
New contracts	4,472
Change order and claims to existing contracts, net	(76 )
Revenues recognized	(35,616 )
Backlog as of December 31, 2017	\$18,248

Based on our adoption of ASU No. 2014-09, Revenue from Contracts with Customers (Topic 606) ("ASU 2014-09") on January 1, 2018, all the equipment system contracts that are included in backlog as of December 31, 2017, and costs related thereto, will be recognized through a balance sheet adjustment on January 1, 2018, and will not impact our earnings in 2018. All material backlog will be recognized as a balance sheet adjustment on January 1, 2018.

### Operating Locations

During the years ended December 31, 2017 and 2016, we had domestic operations located in Colorado. During 2015, we had domestic and international operations, in which the domestic operations were located in Colorado and Pennsylvania. The Pennsylvania location, used as a manufacturing facility, was closed at the end of 2015, with certain wind-down activities remaining through early 2016. The international operations, which were not material to our total revenues or long-lived assets, were closed at the end of 2015. As of December 31, 2017, Tinum Group and Tinum Services had operations in 12 and 10 states, respectively, in the United States.

### Employees

As of December 31, 2017 we employed 29 full-time and part-time personnel; all employees were employed at our offices in Colorado.

### Available Information

Our periodic and current reports are filed with the SEC pursuant to Section 13(a) of the Securities Exchange Act of 1934, as amended (the "Exchange Act") and are available free of charge within 24 hours after they are filed with, or furnished to, the SEC at the Company's website at [www.advancedemissionssolutions.com](http://www.advancedemissionssolutions.com). The filings are also available through the SEC at the SEC's Public Reference Room at 100 F Street, N.E., Washington, D.C. 20549 or by calling 1-800- SEC-0330. Alternatively, these reports can be accessed at the SEC's website at [www.sec.gov](http://www.sec.gov). The information contained on our web site shall not be deemed incorporated by reference in any filing under the Securities Act of 1933, as amended (the "Securities Act") or the Exchange Act.

### Copies of Corporate Governance Documents

The following Company corporate governance documents are available free of charge at our website at [www.advancedemissionssolutions.com](http://www.advancedemissionssolutions.com) and such information is available in print to any stockholder who requests it by contacting the Secretary of the Company at 640 Plaza Drive, Suite 270, Highlands Ranch CO, 80129.

### ☉ Certificate of Incorporation

### ☉ Bylaws

### ☉ Code of Ethics and Business Conduct

### ☉ Insider Trading Policy

### ☉ Whistleblower Protection Policy

### ☉ Board of Directors Responsibilities

### ☉ Audit Committee Charter

### ☉ Compensation Committee Charter

### ☉ Nominating and Governance Committee Charter

#### Forward-Looking Statements Found in this Report

This Report contains forward-looking statements within the meaning of Section 27A of the Securities Act and Section 21E of the Exchange Act that involve risks and uncertainties. In particular such forward-looking statements are found in this Part I and under the heading in Part II, Item 7 below. Words or phrases such as "anticipates," "believes," "expects," "intends," "plans," "estimates," "predicts," the negative expressions of such words, or similar expressions are used in this Report to identify forward-looking statements, and such forward-looking statements include, but are not limited to, statements or expectations regarding:

- (a) the scope and impact of mercury and other regulations or pollution control requirements, including the impact of the final MATS;
- (b) the production and sale of RC by the RC facilities will qualify for Section 45 tax credits;
- (c) expected growth or contraction in and potential size of our target markets;
- (d) expected supply and demand for our products and services;
- (e) increasing competition in the emission control market;
- (f) our ability to satisfy warranty and performance guarantee provisions;
- (g) expected dissolution and winding down of certain of our wholly-owned subsidiaries;
- (h) future level of research and development activities;
- (i) the effectiveness of our technologies and the benefits they provide;
- (j) Tinuum Group's ability to profitably sell and/or lease additional RC facilities and/or RC facilities that may be returned to Tinuum Group, or recognize the tax benefits from production and sale of RC on retained RC facilities;
- (k) probability of any loss occurring with respect to certain guarantees made by Tinuum Group ("Party Guarantees");
- (l) the timing of awards of, and work and related testing under, our contracts and agreements and their value;
- (m) the timing and amounts of or changes in future revenues, royalties earned, backlog, funding for our business and projects, margins, expenses, earnings, tax rate, cash flow, royalty payment obligations, working capital, liquidity and other financial and accounting measures;
- (n) the outcome of current and pending legal proceedings;
- (o) awards of patents designed to protect our proprietary technologies both in the U.S. and other countries;
- (p) the materiality of any future adjustments to previously recorded reimbursements as a result of the DOE audits and the amount of contributions from the DOE and others towards planned project construction and demonstrations; and
- (q) whether any legal challenges or EPA actions will have a material impact on the implementation of the MATS or other regulations and on our ongoing business.

Our expectations are based on certain assumptions, including without limitation, that:

- (a) coal will continue to be a major source of fuel for electrical generation in the United States;
- (b) the IRS will allow the production and sale of RC to qualify for Section 45 tax credits;
- (c) we will continue as a key supplier of equipment, chemicals and services to the coal-fired power generation industry as it seeks to implement reduction of mercury emissions;
- (d) current environmental laws and regulations requiring reduction of mercury from coal-fired boiler flue gases will not be materially weakened or repealed by courts or legislation in the future;
- (e) we will be able to meet any performance guarantees we make and to continue to meet our other obligations under contracts;
- (f) we will be able to obtain adequate capital and personnel resources to meet our operating needs and to fund anticipated growth and our indemnity obligations;
- (g) we will be able to establish and retain key business relationships with other companies;
- (h) orders we anticipate receiving will be received;
- (i) governmental audits of our costs incurred under DOE contracts will not result in material adjustments to amounts we have previously received under those contracts;
- (j) we will be able to formulate new chemicals and blends that will be useful to, and accepted by, the coal-fired boiler power generation business;

- (k) we will be able to effectively compete against others;
- (l) we will be able to meet any technical requirements of projects we undertake;
- (m) Tinnuum Group will be able to sell or lease additional RC facilities, including RC facilities that may be returned to Tinnuum Group, to third party investors; and
- (n) we will be able to utilize our portion of the Section 45 tax credits generated by production and sale of RC from retained facilities.

The forward-looking statements included in this Report involve risks and uncertainties. Actual events or results could differ materially from those discussed in the forward-looking statements as a result of various factors including, but not limited to, timing of new and pending regulations and any legal challenges to or extensions of compliance dates of them; the U.S. government's failure to promulgate regulations or appropriate funds that benefit our business; changes in laws and regulations, accounting rules, prices, economic conditions and market demand; impact of competition; availability, cost of and demand for alternative energy sources and other technologies; technical, start up and operational difficulties; failure of the RC facilities to produce RC; termination of or amendments to the contracts for sale or lease of RC facilities; decreases in the production of RC; inability to commercialize our technologies on favorable terms; our inability to ramp up our operations to effectively address recent and expected growth in our business; loss of key personnel; potential claims from any terminated employees, customers or vendors; failure to satisfy performance guarantees; availability of materials and equipment for our businesses; intellectual property infringement claims from third parties; pending litigation; identification of additional material weaknesses or significant deficiencies; as well as other factors relating to our business, as described in our filings with the SEC, with particular emphasis on the risk factor disclosures contained in those filings and in Item 1A - "Risk Factors" of this Report. You are cautioned not to place undue reliance on the forward-looking statements made in this Report and to consult filings we have made and will make with the SEC for additional discussion concerning risks and uncertainties that may apply to our business and the ownership of our securities. The forward-looking statements contained in this Report are presented as of the date hereof, and we disclaim any duty to update such statements unless required by law to do so.

## Item 1A. Risk Factors

### Risks relating to our business

The following risks relate to our business as of the date this Report is filed with the SEC, or any alternative date specified. This list of risks is not intended to be exhaustive, but reflects what we believe are the material risks inherent in our business and the ownership of our securities as of the specified dates. A statement to the effect that the occurrence of a specified event may have a negative impact on our business, results of operations, profitability, financial condition, or the like, is intended to reflect the fact that such an event would be likely to have a negative impact on your investment in the Company, but should not imply the likelihood of the occurrence of such specified event. The order in which the following risk factors are presented is not intended as an indication of the relative seriousness of any given risk.

Demand for our products and services depends significantly on environmental laws and regulations. Uncertainty as to the future of such laws and regulations, as well as changes to such laws and regulations, or granting of extensions of compliance deadlines has had, and will likely continue to have a material effect on our business.

A significant market driver for our existing products and services, and those planned in the future, are present and expected environmental laws and regulations, particularly those addressing the reduction of mercury and other emissions from coal-fired electric generating units. If such laws and regulations are delayed, or are not enacted or are repealed or amended to be less strict, or include prolonged phase-in periods, or are not enforced, our business would be adversely affected by declining demand for such products and services. For example:

The implementation of environmental regulations regarding certain pollution control and permitting requirements has been delayed from time to time due to various lawsuits. The uncertainty created by litigation and reconsiderations of rule-making by the EPA has negatively impacted our business, results of operations and financial condition and will likely continue to do so.

To the extent federal, state, and local legislation mandating that electric power generating companies serving a state or region purchase a minimum amount of power from renewable energy sources such as wind, hydroelectric, solar and geothermal, and such amount lessens demand for electricity from coal-fired plants, the demand for our products and services would likely decrease.

Federal, state, and international laws or regulations addressing emissions from coal-fired electric generating units, climate change or other actions to limit emissions, including public opposition to new coal-fired electric generating units, has caused and could continue to cause electricity generators to transition from coal to other fuel and power sources, such as natural gas, nuclear, wind, hydroelectric and solar. The potential financial impact on us of future laws or regulations or public pressure will depend upon the degree to which electricity generators diminish their reliance on coal as a fuel source. That, in turn, will depend on a number of factors, including the specific requirements imposed by any such laws or regulations, the periods over which those laws or regulations are or will be phased in, the amount of public opposition, and the state and cost of commercial development of related technologies and processes. In addition, Public Utility Commissions ("PUCs") may not allow utilities to charge consumers for, and pass on the cost of, emission control technologies without federal or state mandate. We cannot reasonably predict the impact that any such future laws or regulations or public opposition may have on our results of operations, financial condition or cash flows.

Reduction of coal consumption by U.S. electric power generators could result in less demand for our products and services. If utilities significantly reduce the number of coal-fired electric generating units or the amount of coal burned, without a corresponding increase in the services required at the remaining units, this could reduce our revenues and materially and adversely affect our business, financial condition and results of operations.

The amount of coal consumed for U.S. electric power generation is affected by, among other things, (1) the location, availability, quality and price of alternative energy sources for power generation, such as natural gas, fuel oil, nuclear, hydroelectric, wind, biomass and solar power; and (2) technological developments, including those related to competing alternative energy sources.

Natural gas-fueled generation has been displacing and may continue to displace coal-fueled generation, particularly from older, less efficient coal-powered generators. We expect that many of the new power plants needed to meet increasing demand for electricity generation will be fueled by natural gas because the price of natural gas has remained at relatively low levels after a period of sharp decline, and use of natural gas is perceived as having a lower

environmental impact than burning coal. Natural gas-fired plants are cheaper to construct, and permits to construct these plants are easier to obtain, and ongoing costs of natural

gas-fired plants associated with meeting environmental compliance are lower. Possible advances in technologies and incentives, such as tax credits, to enhance the economics of renewable energy sources could make those sources more competitive with coal. Any reduction in the amount of coal consumed by domestic electric power generators, whether as a result of new power plants utilizing alternative energy sources or as a result of technological advances, could reduce the demand for our current products and services, thereby reducing our revenues and materially and adversely affecting our business and results of operations.

Additionally, long-term changes in environmental regulation that threaten or preclude the use of coal or other fossil fuels as a primary fuel source for electricity production, and result in the reduction or closure of a significant number of coal-fired electric generating units, may adversely affect our business, financial condition and results of operations. The ability of Tinum Group to generate revenues from the sale or lease of RC facilities to tax equity investors is not assured, and the inability to sell, lease or operate RC facilities to produce and sell RC and generate Section 45 production tax credits could adversely affect our future growth and profitability.

Except for RC facilities that Tinum Group may retain and operate permanently for its own benefit, Tinum Group is attempting to sell or lease the remaining RC facilities to third-party investors. The inability of Tinum Group to successfully lease or sell additional RC facilities to third-party tax equity investors who may receive the benefit of the Section 45 tax credits that are expected to be generated from those RC facilities, as well as RC facilities that may be returned to Tinum Group over time, would likely have an adverse effect on our future growth and profitability.

Furthermore, if, in the future, electric power generators decide to limit coal-fired generation for economic reasons and/or do not burn and use RC and instead switch to another power or fuel source, Tinum Group would likely be unable to fully produce and sell the RC and the associated Section 45 production tax credits potentially available from RC facilities over the anticipated term of the Section 45 tax credit program.

The ability to generate Section 45 tax credits from existing operating RC facilities ends in 2021, which could eliminate the desire for investors to further lease RC facilities beyond this date, which would effectively eliminate Tinum Group's operations and significantly impact our financial condition and results of operations beyond 2021. A substantial amount of our earnings and cash flows in 2017 are comprised of equity method and royalty earnings generated from Tinum Group's invested RC facilities. For the year ended December 31, 2017, our RC and EC segments generated segment operating income of \$59.9 million and \$0.4 million, respectively. As of December 31, 2017, Tinum Group has 17 invested facilities and zero retained facilities. Of the 17 invested facilities, one is currently generating Section 45 tax credits that will no longer generate Section 45 tax credits beyond 2019 and the remaining 16 are generating Section 45 tax credits that will no longer generate Section 45 tax credits beyond 2021. As a result, we believe that substantially all of the invested RC facilities will be returned to Tinum Group commensurate with the expiration of the Section 45 tax credit program. If Tinum Group elects to continue operating these RC facilities, their earnings will be significantly reduced and accordingly, our pro rata share will also be substantially reduced.

Additionally, our EC segment is currently in its infancy and must grow substantially, either organically or acquisitively, in order to replace earnings from Tinum Group that will substantially end during the 2020 to 2022-time frame. There can be no assurance that we will be able to increase our EC segment earnings during this time frame to cover our current operating expenses or to provide a return to shareholders that is comparable to the return currently provided by our RC segment. If we are not able to cover operating expenses, we could be forced to raise additional capital, significantly reduce our operating expenses or take other alternative actions.

The recent change in income tax rates may make Section 45 production tax credits less attractive, which in turn could adversely affect our results of operations or financial condition.

On December 22, 2017, the Tax Cuts and Jobs Act of 2017 (the "Tax Act") became law. The Tax Act, among other things, lowered the federal income tax rate on corporations from 35% to 21%, effective for the year beginning January 1, 2018. This change to previous higher tax rates could negatively impact tax capacity of current or potential tax equity investors making Section 45 production tax credits less attractive. At this point, we are not fully certain how the tax credit investor market's reaction to the Tax Act's rate changes and other changes could impact our businesses that produce and sell RC and generate Section 45 tax credits, which could have an adverse effect on our reported or future results of operations or financial condition.





Market uncertainty created by the lack of guidance and rulings issued by courts and the IRS related to Section 45 tax credits could inhibit Tinnuum Group's ability to lease or sell additional RC facilities or require a restructuring of, or result in the termination of, existing arrangements.

While the Tax Act did not change the provisions of Section 45, the availability of Section 45 tax credits related to the production and sale of RC to taxpayers investing in RC facilities depends upon a number of factors, including the risk assumed by the taxpayer in the RC facility investment transaction. The law addressing when a taxpayer may and may not be considered the producer and seller of RC and avail itself of Section 45 production tax credits is not fully developed and is subject to rulings by courts, interpretations by the IRS and other official pronouncements on tax credit regulations. If rulings, guidance or other pronouncements of courts or the IRS are not definitive or interpreted as allowing the IRS to restrict availability, increase the difficulty, or prohibit or limit the ability of taxpayers to be considered to be the producer and seller of RC and take advantage of Section 45 production tax credits, several aspects of our current and future RC business could be adversely affected. For example, current investors in RC facilities may decide to terminate their existing agreements, or potential investors may reduce the price they are willing to pay for an RC facility or change the structure of the investment to account for perceived risks associated with being considered the producer and seller of RC and the availability of the associated Section 45 production tax credits.

Presently, a group of related tax equity investors accounts for a substantial portion of our earnings from Tinnuum Group and any lease renegotiation or termination by these investors or any failure to continue to produce and sell RC at the related investors' RC facilities would have a material adverse effect on our business.

As of December 31, 2017, 11 of Tinnuum Group's 28 RC facilities are leased to various affiliated entities. Significant components of our total cash flows come from Tinnuum Group's distributions relating to payments received under these leases. These leases have an initial fixed period and then automatically renew, unless terminated at the option of the lessee, for successive one-year terms through 2019 or 2021. If these affiliated entities renegotiated or terminated their leases, or if the utilities where the RC facilities are installed materially reduce their use of RC, these events would have a material adverse effect on our business, results of operations or financial condition. Certain of these affiliated entities have amended their leases from time to time, with some of the amended leases including less favorable terms to Tinnuum Group.

Our RC businesses are joint ventures and managed under operating agreements where we do not have sole control of the decision making process, and we cannot mandate decisions or ensure outcomes.

We oversee our joint ventures under the terms of their respective operating agreements by participating in the following activities: (1) representation on the respective governing boards of directors, (2) regular oversight of financial and operational performance and controls and establishing audit and reporting requirements, (3) hiring of management personnel, (4) technical support of RC facilities, and (5) other regular and routine involvement with our joint venture partners. Notwithstanding this regular participation and oversight, our joint venture partners also participate in the management of these businesses and they may have business or economic interests that divert their attention from the joint venture, or they may prefer to operate the business, make decisions or invest resources in a manner that is contrary to our preferences. Since material business decisions must be made jointly with our joint venture partners, we cannot mandate decisions or ensure outcomes.

The market for chemicals and other products that provide mercury emissions reduction is highly competitive and some of our competitors are significantly larger and more established than we are, which could adversely impede our growth opportunities and financial results.

We compete against certain significantly larger and/or more established companies in the market for chemicals and other products that provide mercury emissions reduction, including Norit America, Inc., a division of Cabot Corporation, Calgon Carbon, ADA Carbon Solutions and Nalco.

We are an early-stage company in the consumables mercury emissions reduction business and our chemicals products have been introduced later to the market than many of our competitors' products. If we are not able to displace current providers of mercury emissions reduction products at coal-fired electric generating units, it would likely have a material adverse effect on our future growth opportunities and business, financial condition and results of operations.

Our dependence on certain discrete chemicals that are both limited in supply and subject to significant price fluctuations used in the manufacturing of our chemical products that we sell to our customers may cause delays in products delivered to customers, delayed revenues, loss of customers and increased costs to us.

The manufacturing of our chemical products is dependent upon certain discrete chemicals that are prone to significant price fluctuations and supply constraints. Further, there are a limited number of suppliers that provide ingredients needed to manufacture our proprietary M-Prove and RESPond chemicals that are used at a customer's coal-fired electric generating unit. This makes us vulnerable to potential price increases from our suppliers that could negatively impact our gross margins if we are unable to increase the selling price to our customers. If suppliers are unable to procure discrete chemicals needed to manufacture our chemical products or elect not to continue to do business with us, we may be delayed in fulfilling customer orders and might not be able to fill orders at all. Delays in our ability to fulfill customer orders or the loss of any of our suppliers would have a material adverse effect on our EC business, results of operations and financial condition.

The quality and effectiveness of our technologies, products and services may not meet our customers' expectations. We utilize and rely on a limited number of suppliers to manufacture our proprietary M-Prove and RESPond chemicals. If these products are not manufactured to the standards and specifications that we have promised to our customers, we may suffer damage to our reputation and our customers may seek alternative products from competitors to fulfill their emissions reductions needs. In addition, if we have flaws in our service deliverables of delivery, installation, and performance testing and in our evaluation of our technologies, we could experience the loss of customers and resultant lower revenues. Historically, we have had minimal returns of chemicals sold to our customers due to non-compliance with agreed-upon specifications. While our suppliers are responsible and liable for any costs incurred to re-supply chemical products to our customers, including liability for liquidated damages, repair, replacement or service costs and for potential damage to our reputation, we have provided warranties and performance guarantees for certain ACI and DSI systems we have sold. Under those contractual arrangements, we are responsible for repair or replacement costs and certain operating costs within the limits provided by the contracts, if the agreed specifications are not met. Our efforts to monitor, develop, modify and implement acceptable chemicals and emissions reductions solutions may not be sufficient to avoid failures and meet performance criteria that may result in dissatisfied or lost customers, damage to our reputation, each of which could have a material adverse effect on our business, results of operations or financial condition.

Failure to protect our intellectual property or infringement of our intellectual property by a third party could have an adverse impact on our financial condition.

We rely on a combination of patent, copyright and trademark laws, trade secrets, confidentiality procedures and contractual provisions to protect our proprietary rights. Such means of protecting our proprietary rights may not be adequate because they provide only limited protection or such protection may be prohibitively expensive to enforce. We also enter into confidentiality and non-disclosure agreements with our employees, consultants, and many of our customers and vendors, and generally control access to and distribution of our proprietary information.

Notwithstanding these measures, a third party could copy or otherwise obtain and use our proprietary information without authorization. We cannot provide assurance that the steps we have taken will prevent misappropriation of our technology and intellectual property, which could negatively impact our business and financial condition. In addition, such actions by third parties could divert the attention of our management from the operation of our business.

We may be subject to intellectual property infringement claims from third parties that are costly to defend and that may limit our ability to use the disputed technologies.

If our technologies are alleged to infringe the intellectual property rights of others, we may be prevented from continuing sales of existing products or services and from pursuing research, development or commercialization of new or complimentary products or services. Further, we may be required to obtain licenses to third-party intellectual property, or be forced to develop or obtain alternative technologies. Our failure to obtain a license to a technology that we may require, or the need to develop or obtain alternative technologies, could significantly and negatively affect our business.

Agreements to indemnify third-party licensees of our technologies against intellectual property infringement claims concerning our licensed technology and our products could be significant to us.

We have agreed to indemnify licensees of our technologies (including Tinum Group) and purchasers of our products and we may enter into additional agreements with others under which we agree to indemnify and hold them harmless from losses they may incur as a result of the infringement of third-party rights caused by the use of our technologies and products. Infringement claims, which are expensive and time-consuming to defend, could have a material adverse effect on our business, operating results and financial condition, even if we are successful in defending ourselves (and the indemnified parties) against them.

Our future success depends in part on our ongoing identification and development of intellectual property and our ability to invest in and deploy new products, services and technologies into the marketplace efficiently and cost effectively.

The process of identifying customer needs and developing and enhancing products, services and solutions for our business segments is complex, costly and uncertain. Any failure by us to identify and anticipate changing needs, emerging trends and new regulations could significantly harm our future market share and results of operations. Historically, our approach to technology development, implementation and commercialization of products has focused on quickly taking technology to full-scale testing and enhancing it under actual power plant operating conditions. We continue to review and adjust methods to deploy products, services and technologies to our customers. Our results are subject to risks related to our investments in new technologies, products and services, but if we are unable to develop and scale up new technologies, products or services to meet the needs of our customers, our business and financial results would be adversely affected.

The effects of Tinum Group providing payment under performance guarantees of its RC facilities are largely unknown and could adversely affect our financial condition.

Tinum Group indemnifies certain utilities and lessees of RC facilities for particular risks associated with the operations of those facilities. We have provided limited, joint and several guarantees of Tinum Group's obligations under those leases. Any substantial payments made under such guarantees could have a material adverse effect on our financial condition, results of operations and cash flows.

Material adjustments pursuant to DOE audits of our past performance could have a detrimental impact on our business.

Certain of our completed and current contracts awarded by the DOE and related industry participants remain subject to government audits. Our historical experience with these audits has not resulted in significant adverse adjustments to reimbursement amounts previously received; however audits for the years 2013 and later have not been finalized. If the results of future audits require us to repay material amounts, our results of operations and business would likely suffer material adverse impacts.

We may make future acquisitions or form partnerships and joint ventures that may involve numerous risks that could impact our financial condition, results of operations and cash flows.

Our strategy may include expanding our scope of products and services organically or through selective acquisitions, investments or creating partnerships and joint ventures. We have acquired, and may selectively acquire, other businesses, product or service lines, assets or technologies that are complementary to our business. We may be unable to find or consummate future acquisitions at acceptable prices and terms, or we may be unable to integrate existing or future acquisitions effectively and efficiently and may need to divest those acquisitions. We continually evaluate potential acquisition opportunities in the ordinary course of business. Acquisitions involve numerous risks, including among others:

- integration difficulties, including challenges and costs associated with implementing systems and processes to comply with requirements of being part of a publicly-traded company;
- diverting management's attention from normal daily operations of the business;
- entering markets in which we have no or limited direct prior experience and where competitors in such markets have stronger market positions;
- unanticipated costs and exposure to undisclosed or unforeseen liabilities or operating challenges;



potential loss of key employees and customers of the acquired businesses, product or service lines, assets or technologies;

our ability to properly establish and maintain effective internal controls over an acquired company; and

increasing demands on our operational and IT systems.

The success of acquisitions of businesses, new technologies and products, or arrangements with third parties is not always predictable and we may not be successful in realizing our objectives as anticipated. We may not be able to integrate any acquired businesses successfully into our existing businesses, make such businesses profitable, or realize anticipated cost savings or synergies, if any, from these acquisitions, which could adversely affect our results of operations and financial condition. In addition, acquisitions of businesses may require additional debt or equity financing, resulting in additional leverage or dilution of equity ownership. Our loan agreements contain certain covenants that limit, or that may have the effect of limiting, among other things, acquisitions, capital expenditures, the sale of assets and the incurrence of additional indebtedness.

An “ownership change” could limit our ability to utilize tax loss and credit carryforwards to offset future taxable income.

We have certain general business credit tax credits (“Tax Attributes”). As of December 31, 2017, we had \$100.4 million of Tax Attributes, equaling 88% of our total gross deferred tax assets. Our ability to use these Tax Attributes to offset future taxable income may be significantly limited if we experience an “ownership change” as discussed below.

On May 5, 2017, the Board of Directors (“Board”) approved the Tax Asset Protection Plan (the “Protection Plan”) and declared a dividend of one preferred share purchase right (each, a “Right”) for each outstanding share of our common stock. The Protection Plan was adopted in an effort to protect stockholder value by attempting to diminish the risk that our ability to use the Tax Attributes to reduce potential future federal income tax obligations may become substantially limited. Under the IRC and regulations promulgated by the U.S. Treasury Department, we may carry forward or otherwise utilize the Tax Attributes in certain circumstances to offset any current and future taxable income and thus reduce our federal income tax liability, subject to certain requirements and restrictions. To the extent that the Tax Attributes do not otherwise become limited, we believe that we will have available a significant amount of Tax Attributes in future years, and therefore the Tax Attributes could be a substantial asset to us. However, if we experience an “ownership change,” as defined in Section 382 of the IRC, our ability to use the Tax Attributes may be substantially limited, and the timing of the usage of the Tax Attributes could be substantially delayed, which could therefore significantly impair the value of that asset.

In general, an “ownership change” for tax purposes occurs if the percentage of stock owned by an entity’s 5% stockholders (as defined for tax purposes) increases by more than 50 percentage points over a rolling three-year period. An entity that experiences an ownership change generally will be subject to an annual limitation on its pre-ownership change tax loss and credit carryforwards equal to the equity value of the entity immediately before the ownership change, multiplied by the long-term, tax-exempt rate posted monthly by the IRS (subject to certain adjustments). The annual limitation would be increased each year to the extent that there is an unused limitation in a prior year. The limitation on our ability to utilize the Tax Attributes arising from an ownership change under Section 382 of the IRC would depend on the value of our equity at the time of any ownership change. If we were to experience an “ownership change,” it is possible that a significant portion of our tax loss and credit carryforwards could expire before we would be able to use them to offset future taxable income.

The Protection Plan is intended to act as a deterrent to any person acquiring beneficial ownership of 4.99% or more of our outstanding common stock without the approval of the Board. Stockholders who beneficially owned 4.99% or more of our outstanding common stock upon execution of the Plan will not trigger the Protection Plan so long as they do not acquire beneficial ownership of additional shares of Common Stock. The Board may, in its sole discretion, also exempt any person from triggering the Protection Plan.

Changes in taxation rules or financial accounting standards could adversely affect our results of operations or financial condition.

Changes in taxation rules and accounting pronouncements (and changes in interpretations of accounting pronouncements) have occurred and may occur in the future.

The Tax Act, among other things, reduced the U.S. federal corporate tax rate from 35 percent to 21 percent, beginning January 1, 2018. As a result, as of December 31, 2017, we reduced our net deferred tax assets for the reduction in the

federal rate in the

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amount of \$5.8 million, which increased our income tax expense by this amount for the year ended December 31, 2017. Our assessment and accounting for the income tax effects of the Tax Act affecting our consolidated financial statements is generally complete, subject to continued evaluation under the SEC Staff Accounting Bulletin 118 ("SAB 118"), which provides guidance on accounting for the tax effects of the Tax Act. We do not anticipate any other impacts to have a material adverse impact to our financial condition, results of operations and cash flows; however, our evaluation is ongoing and our conclusions are preliminary.

Information technology vulnerabilities and cyberattacks on our networks could have a material adverse impact on our business.

We rely upon information technology ("IT") to manage and conduct business, both internally and externally, with our customers, suppliers and other third parties. Internet transactions involve the transmission and storage of data including, in certain instances, customer and supplier business information. Therefore, maintaining the security of computers and other electronic devices, computer networks and data storage resources is a critical issue for us and our customers and suppliers because security breaches could result in reduced or lost ability to carry on our business and loss of and/or unauthorized access to confidential information. We have limited personnel and other resources to address information technology reliability and security of our computer networks and to respond to known security incidents to minimize potential adverse impact. Experienced hackers, cybercriminals and perpetrators of threats may be able to penetrate our network security and misappropriate or compromise our confidential information or that of third parties, create system disruptions or cause shutdowns. These perpetrators of cyberattacks also may be able to develop and deploy viruses, worms, malware and other malicious software programs that attack our information and networks or otherwise exploit any security vulnerabilities of our information and networks. Techniques used to obtain unauthorized access to or sabotage systems change frequently and often are not recognized until long after being launched against a target, and we may be unable to anticipate these techniques or to implement adequate preventative measures. A breach of our IT systems and security measures as a result of third-party action, malware, employee error, malfeasance or otherwise could materially adversely impact our business and results of operations and expose us to customer, supplier and other third-party liabilities.

Risks relating to our common stock

Our stock price is subject to volatility.

The market price of our common stock has experienced substantial price volatility in the past and may continue to do so. The market price of our common stock may continue to be affected by numerous factors, including:

- actual or anticipated fluctuations in our operating results and financial condition;
- changes in laws or regulations and court rulings and trends in our industry;
- Tinnuum Group's ability to lease or sell RC facilities;
- announcements of sales awards;
- changes in supply and demand of components and materials;
- adoption of new tax regulations or accounting standards affecting our industry;
- changes in financial estimates by securities analysts;
- perceptions of the value of corporate transactions;
- our ability to continue to be able to pay cash dividends
- the number of shares of common stock repurchased under stock repurchase programs
- the degree of trading liquidity in our common stock and general market conditions.



From January 1, 2016 to December 31, 2017, the closing price of our common stock ranged from \$3.27 to \$12.08 per share. In June 2017, we commenced a quarterly cash dividend program and paid out cash dividends in July, September and December 2017. In May 2017, we executed a modified Dutch Auction tender offer and repurchased 1,370,891 shares of our common stock. In December 2017, the Board authorized a stock repurchase program pursuant to which we may repurchase up to \$10.0 million of our outstanding common stock from time to time. As of December 31, 2017, we had purchased 342,875 shares of our common stock under this stock repurchase program. Stock price volatility over a given period may cause the average price at which we repurchase shares of our common stock to exceed the stock's price at a given point in time. We believe our stock price should reflect expectations of future growth and profitability. Future dividends are subject to declaration by the Board, and under our current stock repurchase program, we are not obligated to acquire any specific number of shares. If we fail to meet expectations related to future growth, profitability, dividends, stock repurchases or other market expectations, our stock price may decline significantly, which could have a material adverse impact on our ability to obtain additional capital, investor confidence and employee retention, and could reduce the liquidity of our common stock.

There can be no assurance that we will continue to declare cash dividends at all or in any particular amounts.

The Board first approved a \$0.25 per share of common stock quarterly dividend in June 2017. During 2017, we declared three quarterly dividends in the aggregate amount of \$15.8 million. We intend to continue to pay quarterly dividends subject to capital availability and periodic determinations by our Board that cash dividends are in the best interest of our stockholders and are in compliance with all laws and agreements applicable to the declaration and payment of cash dividends by us. Future dividends may be affected by, among other factors: our views on potential future capital requirements for investments in acquisitions; legal risks; stock repurchase programs; changes in federal and state income tax laws or corporate laws; changes to our business model; and our increased interest and principal payments required by our outstanding indebtedness and any additional indebtedness that we may incur in the future. Our dividend payments may change from time to time, and we cannot provide assurance that we will continue to declare dividends at all or in any particular amounts. A reduction in our dividend payments could have a negative effect on our stock price.

Our certificate of incorporation and bylaws contain provisions that may delay or prevent an otherwise beneficial takeover attempt of us.

Certain provisions of our certificate of incorporation and bylaws could make it more difficult for a third party to acquire us, even if doing so would be beneficial to our stockholders. These include provisions that:

• Limit the business at special meetings to the purpose stated in the notice of the meeting;

• Authorize the issuance of "blank check" preferred stock, which is preferred stock with voting or other rights or preferences that could impede a takeover attempt and that the Board can create and issue without prior stockholder approval;