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

FORM 10-K

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_x") 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 ("SO₃") 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_x 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 ("SO₂") and other acid gases such as SO₃ 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_x 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_x 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 SO₃ 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 SO₂, SO₃, HCl, NO_x, 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:

	Years Ended December		
	31,		
(in thousands)	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 CO₂ 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. 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. 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 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;

• Establish advance notice requirements for submitting nominations for election to the Board and for proposing matters that can be acted upon by stockholders at a meeting; and

• Require the affirmative vote of the "disinterested" holders of a majority of our common stock to approve certain business combinations involving an "interested stockholder" or its affiliates, unless either minimum price criteria or procedural requirements are met, or the transaction is approved by a majority of our "continuing directors" (known as "fair price provisions").

These provisions, alone or in combination with each other, may discourage transactions involving actual or potential changes of control, including transactions that otherwise could involve payment of a premium over prevailing market prices to holders of our common stock, or could limit the ability of our stockholders to approve transactions that they may deem to be in their best interest.

We may require additional funding for our growth plans, and such funding may require us to issue additional shares of our common stock, resulting in a dilution of your investment.

We estimate our funding requirements in order to implement our growth plans. If the funding requirements required to implement growth plans should exceed these estimates significantly or if we come across opportunities to grow through expansion plans which cannot be predicted at this time, and our funds generated from our operations prove insufficient for such purposes, we may need to raise additional funds to meet these funding requirements.

These additional funds may be raised by issuing equity or debt securities or by borrowing from banks or other resources. We cannot assure you that we will be able to obtain any additional financing on terms that are acceptable to us, or at all. If we fail to obtain additional financing on terms that are acceptable to us, we will not be able to implement such plans fully. Such financing even if obtained, may be accompanied by conditions that limit our ability to pay dividends or require us to seek lenders' consent for payment of dividends, or restrict our freedom to operate our business by requiring lender's consent for certain corporate actions. Further, if we raise additional funds through the issuance of new shares of our common stock, any shareholders who are unable or unwilling to participate in such an additional round of fund raising may suffer dilution of their investment.

Item 1B. Unresolved Staff Comments

None.

Item 2. Properties

Office and Warehouse Leases

As of December 31, 2017, we lease approximately 9,785 square feet of office space in Highlands Ranch, Colorado, which serves as our corporate headquarters. This lease was effective February 28, 2017 and expires on May 31, 2020.

As of December 31, 2017, we lease approximately 7,559 square feet of warehouse space in Highlands Ranch, Colorado, which expires in February 2019 and contains an option to renew for two additional five-year periods.

Item 3. Legal Proceedings

From time to time, we are involved in various litigation matters arising in the ordinary course of our business.

Information with respect to this item may be found in Note 4 "Commitments and Contingencies" to the consolidated financial statements included in Item 8 of this Report.

Item 4. Mine Safety Disclosures

Not applicable.

PART II

Item 5. Market for Registrant's Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities

Market for Our Common Stock

As of December 31, 2017, our common stock was quoted on the NASDAQ Global Market under the symbol "ADES." The table below sets forth the price range of our common stock for each quarter of 2017 and 2016, as well as dividends per common share declared in such quarter.

	High	Low	Dividends	
2017				
First quarter	\$12.08	\$9.19	\$	—
Second quarter	9.99	8.19	0.25	
Third quarter	11.21	9.02	0.25	
Fourth quarter	12.01	8.02	0.25	
2016				
First quarter	\$8.18	\$3.27	\$	—
Second quarter	8.19	6.20	—	
Third quarter	8.60	6.40	—	
Fourth quarter	9.89	7.53	—	

For the period beginning February 3, 2015 through July 6, 2016, our common stock traded on the OTC Pink[®] Marketplace - Limited Information Tier ("OTC") under the symbol ADES. The OTC quotations for this period reflected inter-dealer prices, without retail mark-up, markdown or commissions, and, as such, were not necessarily representative of actual transactions or the value of our common stock.

The trading volume for our common stock is relatively limited. There is no assurance that an active trading market will provide adequate liquidity for our existing stockholders or for persons who may acquire our common stock in the future.

Dividends

Prior to June 2017, we had never paid dividends. In June 2017, we commenced a quarterly cash dividend program. Beginning in the June 2017 quarter, we declared quarterly cash dividends of \$0.25 per common share, which were paid on July 17, 2017, September 7, 2017 and December 6, 2017. Our ability to pay dividends in the future will be dependent upon earnings, financial condition and other factors considered relevant by the Board of Directors ("Board") and will be subject to limitations imposed under Delaware law.

We intend to continue to declare and pay a cash dividend on shares of our common stock on a quarterly basis. Whether we do, however, and the timing and amounts of dividends will be subject to approval and declaration by our Board and will depend on a variety of factors including, but not limited to, our financial results, cash requirements, financial condition, contractual restrictions and other factors considered relevant by our Board.

Performance Graph

The following performance graph illustrates a five-year comparison of cumulative total return of our common stock, the Russell 3000 Index and a select industry peer group ("Peer Group") for the period beginning on December 31, 2012 and ending on December 31, 2017. The graph assumes an investment of \$100 on December 31, 2012 and assumes the reinvestment of all dividends.

The performance graph is not intended to be indicative of future performance. The performance graph shall not be deemed "soliciting material" or to be "filed" with the SEC for purposes of Section 18 of the Exchange Act, or otherwise subject to the liabilities under that Section, and shall not be deemed to be incorporated by reference into any of the Company's filings under the Securities Act or the Exchange Act.

Five Year Cumulative Total Shareholder Return Comparison

Advanced Emissions Solutions Return Relative to the Russell 3000 Index and Select Industry Peer Group

The select industry Peer group includes the following: American Vanguard Corp., Calgon Carbon Corporation, CECO Environmental Corp., Clean Energy Fuels Corp., FutureFuel Corp., Fuel-Tech, Inc., Flotek Industries Inc., Hawkins Inc., KMG Chemicals Inc., Lydall Inc., Rentech, Inc., and TerraVia Holdings, Inc.

Holders

The number of holders of record of our common stock as of March 2, 2018 was approximately 900. The approximate number of beneficial stockholders is estimated at 4,372.

Purchases of Equity Securities by the Company and Affiliated Purchasers

In December 2017, our Board authorized a program for us to repurchase up to \$10.0 million of shares of our common stock through open market transactions at prevailing market prices. This stock repurchase program will remain in effect until December 31, 2018 unless otherwise modified by the Board. The following table summarizes the common stock repurchase activity for the three months ended December 31, 2017:

Period	(a) Total number of shares (or units) purchased	(b) Average price paid per share (or unit)	(c) Total number of shares (or units) purchased as part of publicly announced programs	(d) Maximum number (or approximate dollar value) of shares (or units) that may yet be purchased under the plans or programs (in thousands)
October 1 to 31, 2017	—	\$ —	—	\$ —
November 1 to 30, 2017	—	—	—	—
December 1 to 31, 2017	342,875	9.82	342,875	6,627
Total	342,875	\$ 9.82	342,875	\$ 6,627

Item 6. Selected Financial Data

Five-year Summary of Selected Financial Data

The following selected financial data are derived from the audited Consolidated Financial Statements for the years ended December 31, 2017, 2016, 2015, 2014 and 2013 and should be read in conjunction with Item 1A, Item 7 and our Consolidated Financial Statements and the related notes included in Item 8 of this Report.

(in thousands, except per share amounts)	Years Ended December 31,				
	2017	2016	2015	2014	2013
Statement of operations data:					
Revenues	\$35,692	\$50,622	\$62,739	\$16,923	\$13,286
Earnings from equity method investments	\$53,843	\$45,584	\$8,921	\$42,712	\$15,502
Royalties, related party	\$9,672	\$6,125	\$10,642	\$6,410	\$2,505
Income tax (benefit) expense ⁽¹⁾	\$24,152	\$(60,938)	\$20	\$296	\$463
Net income (loss) ^{(2) (3)}	\$27,873	\$97,678	\$(30,141)	\$1,387	\$(15,987)
Net income (loss), per common share, basic ⁽⁴⁾	\$1.30	\$4.40	\$(1.37)	\$0.06	\$(0.78)
Net income (loss), per common share, diluted ^{(4) (5)}	\$1.29	\$4.34	\$(1.37)	\$0.06	\$(0.78)
Dividends declared per common share	\$0.75	\$—	\$—	\$—	\$—
	As of December 31,				
(in thousands)	2017	2016	2015	2014	2013
Balance sheet data:					
Total assets	\$82,618	\$107,296	\$60,775	\$93,699	\$73,524
Total debt	\$—	\$—	\$28,025	\$15,910	\$—
Stockholders' equity (deficit)	\$73,455	\$76,165	\$(24,978)	\$(697)	\$(6,167)

(1) As described in Note 12 of the Consolidated Financial Statements included in Item 8 of this Report, during the fourth quarter of 2016, the Company released \$61.4 million of the valuation allowance related to the deferred tax assets, which resulted in an income tax benefit during 2016 of \$60.9 million. During 2017, the Company recorded an income tax expense of \$24.2 million, inclusive of the impact of the Tax Act, which increased the Company's income tax expense by \$5.8 million.

(2) As described in Note 18 of the Consolidated Financial Statements included in Item 8 of this Report, during the years ended December 31, 2016 and 2015, we recorded restructuring charges of \$1.6 million and \$10.4 million, respectively. Additionally, during the year ended December 31, 2014, we recorded restructuring charges of \$3.5 million. The restructuring charges were recorded in connection with a reduction in force, the departure of executive officers and management's further alignment of the business with strategic objectives.

(3) As described in Note 2 of the Consolidated Financial Statements included in Item 8 of this Report, on February 10, 2014, we purchased a 24.95% membership interest in RCM6, which owns a single RC facility that produces and sells RC that qualifies for Section 45 tax credits, from Tinium Group through an up-front payment of \$2.4 million and an initial note payable to Tinium Group of \$13.3 million. During the year ended December 31, 2016, the Company recognized equity method losses related to RCM6 of \$0.6 million. On March 3, 2016, the Company sold its 24.95% membership interest in RCM6 for a cash payment of \$1.8 million and assumption of the outstanding note payable made by the Company in connection with its purchase of RCM6 membership interests from Tinium Group in February 2014, resulting in a \$2.1 million gain being recognized during 2016.

(4) For the year ended December 31, 2013, the number of common shares and per common share amounts have been retroactively restated to reflect the two-for-one stock split of our common stock, which was effected in the form of a common stock dividend distributed on March 14, 2014.

(5) For the years ended December 31, 2015 and 2013, the computation of diluted net loss per common share was the same as basic net loss per common share as the inclusion of potentially dilutive securities for those years would have been anti-dilutive.

The Notes to the Consolidated Financial Statements included in Item 8 of this Report contain additional information about charges resulting from other operating expenses and other income (expense) which affects the comparability of

information presented.

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Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations

Overview

This Form 10-K for the year ended December 31, 2017 is filed by Advanced Emissions Solutions, Inc. together with its consolidated subsidiaries (collectively, "ADES," the "Company," "we," "us," or "our" unless the context indicates otherwise).

We are a leader in emissions reductions technologies and associated specialty chemicals, primarily serving the coal-fired power generation and industrial boiler industries. Our proprietary environmental technologies and specialty chemicals 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 potential emissions control ("EC") regulations. See further discussion of our business included in Item 1 - "Business" ("Item 1") of this Report. Discussion regarding segment information is included within the discussion of our consolidated results under this Item 7. Additionally, discussion related to our reportable segments is included in Item 1 and Note 13 of the Consolidated Financial Statements included in Item 8 of this Report.

Components of Revenue, Expenses and Equity Method Investees

The following briefly describes the components of revenues and expenses as presented in the Consolidated Statement of Operations. Descriptions of the revenue recognition policies are included in Note 1 to the Consolidated Financial Statements included in Item 8 of this Report.

Revenues and costs of revenue

Equipment sales

Equipment sales represent the sale of activated carbon injection ("ACI") systems to control mercury, dry sorbent injection ("DSI") systems to control SO₂, SO₃, and HCl and electrostatic precipitator ("ESP") liquid flue gas conditioning systems. Revenue from extended equipment contracts is recorded using the completed contract method of accounting.

We also enter into other non-extended equipment contracts for which we generally recognize revenues on a time and material basis as services to build equipment systems are performed or as equipment is delivered.

Chemicals

We sell proprietary chemical blends to coal-fired utilities that allow the respective utilities to comply with the regulatory emissions standards. Revenue is generally recorded upon delivery of the chemicals.

Certain chemicals customer contracts are comprised of evaluation tests of the Company's chemicals' effectiveness and efficiency in reducing emissions and entail the delivery of chemicals to the customer and the Company evaluating results of emissions reduction over the term of the contract. The Company generally recognizes revenue from these types of contracts over the duration of the contract based on the cost of chemicals consumed by the customer.

Consulting services and other

We provide consulting services to assist electric power generators and others in planning and implementing strategies to meet the new and increasingly stringent government emission standards requiring reductions in SO₂, NO_x, particulates, acid gases and mercury.

Other Operating Expenses

Payroll and benefits

Payroll and benefits costs include personnel related fringe benefits, sales and administrative staff labor costs and stock compensation expenses.

Rent and occupancy

Rent and occupancy costs include rent, insurance, and other occupancy-related expenses.

Legal and professional fees

Legal and professional costs include external legal, audit and consulting expenses.

General and administrative

General and administrative costs include director fees and expenses, bad debt expense and other general costs of conducting business.

Research and development, net

Research and development expense consists of research relating to continued product development for our ongoing business and various other projects. Historically, we have entered into reimbursement contracts with the Department of Energy ("DOE") related to certain of our research and development contracts. These contracts were best-effort-basis contracts. We have often included and continued to include industry cost-share partners to offset the costs incurred in excess of funded amounts from the DOE or from our own research and development project budgets. We recognize amounts funded by the DOE and industry partners under research-and-development-cost-sharing arrangements as an offset to our aggregate research and development expenses within the Research and development, net line in the Consolidated Statements of Operations included in Item 8 of this Report.

Depreciation and amortization

Depreciation and amortization expense consists of depreciation expense related to property and equipment and the amortization of long lived intangibles.

Other Income (Expense), net

Earnings from equity method investments

Earnings from equity method investments relates to our share of earnings (losses) related to our equity method investments.

Our equity method earnings in Tinium Group, LLC ("Tinium Group"), a related party in which we own a 42.5% equity interest and a 50% voting interest, are positively impacted when Tinium Group obtains an investor in a refined coal ("RC") facility and receives lease payments from the lessee, or purchase payments from the sale, of the RC facility. If Tinium Group operates a retained RC facility, the Company's equity method earnings will be negatively impacted as operating retained RC facilities generate operating losses. However, we benefit on an after-tax basis if we are able to utilize tax credits associated with the production and sale of RC from operation of retained RC facilities by Tinium Group. These benefits, if utilized, will increase our consolidated net income as a result of a reduction in income tax expense. In addition, our equity method earnings in Tinium Group are negatively impacted due to an annual preferred return to which one of Tinium Group's equity owners, GSFS, is entitled. Therefore, Tinium Group's equity earnings available to its common members are equal to Tinium Group's net income less the preferred return due to GSFS. In February 2018, the unrecovered investment balance associated with the preferred return was repaid in full.

Tinium Services, LLC ("Tinium Services"), a related party in which we own both a 50% equity and voting interest, operates and maintains RC facilities under operating and maintenance agreements. Tinium Group or the lessee/owner of the RC facilities pays Tinium Services, subject to certain limitations, the costs of operating and maintaining the RC facilities plus certain fees. Tinium Services also arranges for the purchase and delivery of certain chemical additives under chemical agency agreements necessary for the production of refined coal. Tinium Services consolidates certain RC facilities leased or owned by tax equity investors that are deemed to be VIE's. All net income (loss) associated with these VIE's is allocated to the noncontrolling equity holders of Tinium Services and therefore does not impact our equity earnings (loss) from Tinium Services.

On July 27, 2017, we obtained a 50% membership interest in GWN Manager, LLC ("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 Tinium Group, which owns a single RC facility that produces RC that qualifies for Section 45 tax credits. Tinium Group sold 49.9% of the subsidiary that owns the RC facility to an unrelated third party and retained ownership of the remaining 49.9%. GWN Manager is subject to monthly capital calls based on estimated working

capital needs.

Through March 3, 2016, we owned a 24.95% equity interest in RCM6, LLC ("RCM6"), a related party, which owned a single RC facility that was managed by Tinnuum Group. The economics to us were consistent with an invested facility discussed above except that we were subject to funding our share of RCM6's operating costs during 2014 and 2015 and through March 3, 2016.

Royalties, related party

We license our M-45TM and M-45-PCTM emission control technologies ("M-45 License") to Tinnuum Group and realize royalty income based upon a percentage of the per-ton, pre-tax margin as defined in the M-45 License.

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Other income (expense)

The remaining components of other income (expense) include interest income, interest expense and other miscellaneous items. For 2017, miscellaneous items included various items related to litigation accruals and settlement with a third-party service provider. For 2016, miscellaneous items included an adjustment to a litigation loss accrual and change in estimate related to royalty indemnity expense.

We record interest expense due to our share of Tinnium Group's equity method earnings for RC facility leases or sales that are treated as installment sales for tax purposes. IRS Section 453A requires taxpayers using the installment method to pay an interest charge on the portion of the tax liability that was deferred under the installment method. We refer to this as "453A interest."

Results of Operations

For comparison purposes, the following tables set forth our results of operations for the years presented in the Consolidated Financial Statements included in Item 8 of this Report. The year-to-year comparison of financial results is not necessarily indicative of financial results that may be achieved in future years.

Year ended December 31, 2017 Compared to Year ended December 31, 2016

Total Revenue and Cost of Revenue

A summary of the components of revenues and cost of revenue for the years ended December 31, 2017 and 2016 is as follows:

(Amounts in thousands except percentages)	Years Ended		Change	
	December 31, 2017	December 31, 2016	(\$)	(%)
Revenues:				
Equipment sales	\$31,401	\$46,949	\$(15,548)	(33)%
Chemicals	4,246	3,025	1,221	40%
Consulting services and other	45	648	(603)	(93)%
Total revenues	35,692	50,622	(14,930)	(29)%
Operating expenses:				
Equipment sales cost of revenue, exclusive of depreciation and amortization	28,438	37,741	(9,303)	(25)%
Chemicals cost of revenue, exclusive of depreciation and amortization	3,434	1,700	1,734	102%
Consulting services and other cost of revenue, exclusive of depreciation and amortization	13	376	(363)	(97)%

Equipment sales and Equipment sales cost of revenue

During the years ended December 31, 2017 and 2016, we entered into zero and five long-term (6 months or longer) fixed price contracts to supply ACI systems with aggregate contract values, net of change orders of \$0.1 million and \$2.9 million, respectively. During the years ended December 31, 2017 and 2016, we completed four and 17 ACI systems, recognizing revenues of \$3.4 million and \$26.9 million and cost of revenue of \$2.4 million and \$20.5 million, respectively. We recognized zero and \$0.5 million in loss provisions related to ACI system contracts during the years ended December 31, 2017 and 2016, respectively. As of December 31, 2017, all ACI system contracts are complete.

During the years ended December 31, 2017 and 2016, we did not enter into any long term (6 months or longer) fixed price contracts to supply DSI systems and other material handling equipment with contract values including associated change orders of zero and \$1.5 million, respectively. During the years ended December 31, 2017 and 2016, we completed five and 11 DSI systems, recognizing revenues of \$27.8 million and \$15.8 million and cost of revenue of \$26.0 million and \$14.8 million, respectively. During the year ended December 31, 2017, we recognized zero in loss

provisions related to DSI system contracts. During the year ended December 31, 2016, we recorded a reduction of \$0.1 million in previously recognized loss provisions included in cost of revenue related to DSI system contracts.

Additionally, in 2016, we executed sales-type lease agreements related to ACI and DSI systems and recognized revenue of \$3.4 million and cost of revenue of \$1.2 million during the year ended December 31, 2016.

The remaining changes were due to other equipment sales.

As a result of using the completed contract method for revenue recognition on long-term equipment contracts, our revenue and cost of revenue information may not be comparable to the information of our competitors who do not use the completed contract method. For example, due to the long-term revenue recognition period on certain contracts, we may recognize less revenue and related cost of revenue during a particular period, but record significant deferred revenue and deferred project costs. This impacts our outstanding backlog as is discussed in more detail in Item 1 of this Report.

Demand for ACI and DSI system contracts during 2015 and 2016 was driven by coal-fired power plant utilities that need to comply with the Mercury and Air Toxics Standards ("MATS") and the Maximum Achievable Control Technology ("MACT") standards by 2016. Revenues related to ACI and DSI system contracts have historically fluctuated due to changes in the number of contracts entered into as well as the long duration of completing certain contracts, which involve long-lead time requirements for manufacturing, installation and testing of the equipment. As the deadline for these standards has now passed, we do not anticipate entering into long-term fixed price contracts for ACI or DSI systems in the future.

Chemicals and Chemical cost of revenue

During the years ended December 31, 2017 and 2016, revenues increased year over year primarily due to an overall increase in pounds of our chemicals sold. Gross margins on sales of chemicals for the year ended December 31, 2017 were lower than 2016 due to price compression in the EC consumables market and increased field testing of our M-Prove™ ("M-Prove") consumable, which results in significantly lower gross margins compared to recurring sales. Future period revenues are expected to be negatively impacted by a major customer who is not expected to purchase chemicals going forward, as well as the effects of continued price compression compared to historical periods. As we continue to expand our customer base and attempt to increase the volume, size and duration of chemical sale arrangements, we are faced with the challenge of a competitive market with a long lead-to-sale cycle. Increasing future sales of chemicals is our primary focus of the EC business at this time.

Consulting services and other and Consulting services cost of revenue

We reported minimal revenue related to consulting services for the year ended December 31, 2017. Due to diminishing market demand related to historical services provided, we do not believe this revenue component will be material in the near term. We also provide consulting services related to emissions regulations. Additional information related to revenue concentrations and contributions by class and reportable segment can be found within the segment discussion below and in Note 14 to the Consolidated Financial Statements included in Item 8 of this Report.

Other Operating Expenses

A summary of the components of our operating expenses, exclusive of cost of revenue items (presented above), for the years ended December 31, 2017 and 2016 is as follows:

(in thousands, except percentages)	Years Ended		Change	
	2017	2016	(\$)	(%)
Operating expenses:				
Payroll and benefits	\$7,669	\$12,390	\$(4,721)	(38)%
Rent and occupancy	795	2,168	(1,373)	(63)%
Legal and professional fees	4,354	8,293	(3,939)	(47)%
General and administrative	3,857	3,721	136	4%
Research and development, net	157	(648)	805	(124)%
Depreciation and amortization	789	979	(190)	(19)%
	\$17,621	\$26,903	\$(9,282)	(35)%

Payroll and benefits

Payroll and benefits expenses decreased in 2017 compared to 2016 primarily due to a decrease in average headcount of approximately 40% during 2017. Additionally, restructuring expenses decreased during the year ended December 31, 2017 compared to 2016 in connection with the departure of certain executive officers and management's alignment of the business with strategic objectives in 2016. During the years ended December 31, 2017 and December 31, 2016, we recorded net restructuring charges of zero and \$1.6 million, respectively. In addition, bonuses and stock-based compensation decreased by \$1.4 million in 2017 compared to 2016.

Rent and occupancy

Rent and occupancy expenses decreased in 2017 compared to 2016 primarily due to lower rent and occupancy expense in 2017 as a result of the relocation of our corporate headquarters in the first quarter of 2017 and the acceleration of deferred rent and tenant improvement allowances recorded in 2017 associated with the termination of the lease agreement of our former corporate headquarters.

Legal and professional fees

Legal and professional fees expenses decreased in 2017 compared to 2016 as a result of a reduction in the professional resources deployed to address the restatement of our consolidated financial statements, including litigation associated with such restatement. Expenses related to the restatement during the year ended December 31, 2017 and 2016 were zero and \$2.0 million, respectively. Additional decreases during the year ended December 31, 2017 were driven by a decrease in costs related to outsourced shared service costs, including accounting consultants, legal fees and audit fees.

General and administrative

General and administrative expenses remained relatively flat in 2017 compared to 2016 as we began to experience normalization of our operating expenses in most categories following our cost-containment initiatives implemented in 2016. During the year ended December 31, 2017, we incurred expenses related to the implementation of a new enterprise resource planning ("ERP") system and a \$0.4 million reserve on an asset related to a letter of credit asset draw made by a former customer that we are contesting and pursuing legal actions. These increases were offset by decreases in travel and professional expenses. During the year ended December 31, 2016, we recognized impairment charges on property and equipment and inventory of \$0.5 million, as projected future cash flows from operations related to such property and equipment and inventory did not support the carrying value of these assets.

Research and development, net

Research and development expense increased in 2017 compared to 2016 primarily due to the reimbursements of research and development expense recognized in 2016 from final billings to the DOE on one research and development contract, which resulted in negative research and development expense for 2016, and an increase in research and development activities during 2017 incurred in pursuit of the expansion of potential product offerings within the emissions reduction consumables market to complement our existing chemicals solutions. The net increase in 2017 was offset by a decrease in our asset retirement obligation estimate, which was primarily driven by a reduction in the scope of the obligation.

Depreciation and amortization

Depreciation and amortization expense decreased in 2017 compared to 2016 primarily due to higher depreciation recorded in 2016 as a result of the acceleration of depreciation on certain fixed assets that were disposed of in 2016 in connection with our corporate office relocation, which resulted in a lower depreciable base in 2017. Additionally, during 2016, we terminated a technology license arrangement, which resulted in approximately \$0.1 million decrease in the related amortization expense. in 2017.

Other Income (Expense), net

A summary of the components of our other income (expense), net for the years ended December 31, 2017 and 2016 is as follows:

(Amounts in thousands, except percentages)	Years Ended		Change	
	December 31, 2017	December 31, 2016	(\$)	(%)
Other income (expense):				
Earnings from equity method investments	\$53,843	\$45,584	\$8,259	18 %
Royalties, related party	9,672	6,125	3,547	58 %
Interest income	54	268	(214)	(80)%

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Interest expense	(3,024)	(5,066)	2,042	(40)%
Litigation settlement and royalty indemnity expense, net	3,269		3,464		(195) (6)%
Other	2,025		2,463		(438) (18)%
Total other income	\$65,839		\$52,838		\$13,001	25 %

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Earnings in equity method investments

The following table presents the equity method earnings, by investee, for the years ended December 31, 2017 and 2016:

(in thousands)	Years Ended December 31,		Change	
	2017	2016	(\$)	(%)
Earnings from Tinum Group	\$48,875	\$41,650	\$7,225	17 %
Earnings from Tinum Services	4,963	4,491	472	11 %
Earnings (losses) from other	5	(557)	562	(101)%
Earnings from equity method investments	\$53,843	\$45,584	\$8,259	18 %

Earnings from equity method investments, and changes related thereto, are impacted by our most significant equity method investees: Tinum Group and Tinum Services. Earnings from equity method investments increased during the year ended December 31, 2017 compared to 2016 primarily as a result of an increase in cash distributions due to the addition of four invested facilities, three of which were fully invested by third parties during 2017. See the discussion below regarding the accounting of earnings from Tinum Group.

During the year ended December 31, 2017, we recognized \$48.9 million in equity earnings from Tinum Group compared to our proportionate share of Tinum Group's net income of \$46.6 million for the year. During the year ended December 31, 2016, we recognized \$41.7 million in equity earnings from Tinum Group compared to our proportionate share of Tinum Group's net income of \$35.0 million for the year. The difference between our pro-rata share of Tinum Group's net income and our earnings from our Tinum Group equity method investment as reported on the Condensed Consolidated Statements of Operations relates to us receiving cumulative distributions in excess of the carrying value of the investment, and therefore recognizing such excess distributions as equity method earnings in the period the distributions occur, as discussed in more detail below.

As a result of cash flows from invested RC facilities, Tinum Group distributions to us during the year ended December 31, 2017 were \$48.9 million, which exceeded our pro-rata share of Tinum Group's net income, resulting in us having cumulative cash distributions that exceeded our cumulative pro-rata share of Tinum Group's net income as of December 31, 2017.

The following table for Tinum Group presents our investment balance, equity earnings, cash distributions received and cash distributions in excess of the investment balance for the years ended December 31, 2017 and 2016 (in thousands).

Description	Date(s)	Investment balance	ADES equity earnings (loss)	Cash distributions	Memorandum Account: Cash distributions and equity loss in (excess) of investment balance
Total investment balance, equity earnings (loss) and cash distributions	12/31/2015	\$ —	\$—	\$ —	\$(3,263)
ADES proportionate share of net income from Tinum Group ⁽¹⁾	2016 activity	35,019	35,019	—	—
Recovery of cash distributions in excess of investment balance (prior to cash distributions)	2016 activity	(3,263)	(3,263)	—	3,263
Cash distributions from Tinum Group	2016 activity	(41,650)	—	41,650	—
		9,894	9,894	—	(9,894)

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Adjustment for current year cash distributions in excess of investment balance	2016 activity					
Total investment balance, equity earnings (loss) and cash distributions	12/31/2016	—	41,650	41,650	(9,894)
ADES proportionate share of net income from Tinium Group ⁽¹⁾	2017 activity	46,551	46,551	—	—	
Recovery of cash distributions in excess of investment balance (prior to cash distributions)	2017 activity	(9,894	(9,894	)	—	9,894
Cash distributions from Tinium Group	2017 activity	(48,875	—	48,875	—	
Adjustment for current year cash distributions in excess of investment balance	2017 activity	12,218	12,218	—	(12,218)
Total investment balance, equity earnings and cash distributions	12/31/2017	\$ —	\$ 48,875	\$ 48,875	\$ (12,218)

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(1) The amounts of our 42.5% proportionate share of net income as shown in the table above differ from mathematical calculations of the Company's 42.5% equity interest in Tinum Group multiplied by the amounts of Net Income available to Class A members as shown in the table above of Tinum Group results of operations due to adjustments related to the Class B preferred return and the elimination of Tinum Group's earnings attributable to RCM6, of which we owned 24.95%, for the period from January 1 to March 3, 2016.

Tinum Group's consolidated financial statements as of December 31, 2017 and 2016, and for the years ended December 31, 2017, 2016 and 2015 are included in Item 15 of this Report.

Equity earnings from our interest in Tinum Services increased by \$0.5 million in 2017 compared to 2016. As of December 31, 2017 and 2016, Tinum Services provided operating and maintenance services to 16 and 13 RC facilities, respectively. However, the weighted-average number of RC facilities for which Tinum Services provided operating and maintenance services, based upon the number of months each facility was operated during the respective years, did not change year over year. Tinum Services derives earnings from both fixed-fee arrangements as well as fees that are tied to actual RC production, depending upon the specific RC facility operating and maintenance agreement.

On March 3, 2016, we sold our 24.95% membership interest in RCM6 for a cash payment of \$1.8 million and assumption of a note payable (the "RCM6 Note Payable") made by us in connection with our purchase of the RCM6 membership interest from Tinum Group in February 2014. Through March 3, 2016, we recognized equity losses related to our investment in RCM6 of \$0.6 million.

On July 27, 2017, we 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, which owns a single RC facility that produces RC that qualifies for Section 45 tax credits. Tinum Group sold 49.9% of the subsidiary that owns the RC facility to an unrelated third party and retained ownership of the remaining 49.9%. We are subject to monthly capital calls to GWN Manager based on estimated working capital needs. Our investment in GWN Manager as of December 31, 2017, was \$0.1 million. Equity earnings from our interest in GWN Manager included our share of net income from inception to December 31, 2017.

Additional information related to equity method investments can be found in Note 2 to the Consolidated Financial Statements included in Item 8 of this Report.

Tax Credits

We earned the following tax credits that may be available for future benefit related to the production of RC from the operation of retained RC facilities under the Internal Revenue Code ("IRC") Section 45 - Production Tax Credit ("Section 45 tax credits"):

	Years Ended	
	December 31,	
(in thousands)	2017	2016
Section 45 tax credits earned	\$3,496	\$2,956

The increase in the Section 45 tax credits earned during the year ended December 31, 2017 compared to December 31, 2016 was collectively due to our membership interest in GWN Manager and Tinum Group's ownership in the single RC facility that is generating tax credits.

As discussed in Item 1 of this Report, Tinum Group operates and leases or sells facilities used in the production and sale of RC to third party tax equity investors. All dispositions of such facilities are treated as sales for federal income tax purposes at Tinum Group. The resulting gain from these sales is reported by Tinum Group pursuant to the installment method under IRC Section 453. Under IRC Section 453A ("453A"), taxpayers using the installment method for income tax purposes are required to pay interest ("453A interest") calculated on the portion of the tax liability that is deferred under the installment method. As of December 31, 2017, ADES's allocable share of the gross deferred installment gain from Tinum Group to be recognized in future years was approximately \$202 million. Due to the production and sale of RC from the operation of retained RC facilities, Tinum Group has generated production tax credits ("PTCs") that qualify as General Business Credits ("GBCs"). These GBC's are allocated to the owners of Tinum Group, including us, who may benefit to the extent that the GBC's are realized from the operation of retained RC facilities. As of December 31, 2017, we had approximately \$100.2 million in GBC carryforwards.

In the hypothetical event of an ownership change, as defined by IRC Section 382, utilization of the GBC's generated prior to the change would be subject to an annual limitation imposed by IRC Section 383 for GBC's. The results of a recent analysis indicated that we had not experienced an ownership change as of December 31, 2017, as defined by IRC Section 382. Such analysis for the period from January 1, 2018 through the date of this Report has not been completed. Therefore, it is possible that we experienced an ownership change between January 1, 2018 and the date of this filing, thus subjecting our GBC

carryforwards to limitation. Should a limitation exist, however, we would likely be in a position to substantially increase the limitation amount by virtue of our approximately \$202 million deferred installment sale gain at Tinuum Group.

Specifically, IRC Section 382 provides that a corporation with a net unrealized built-in gain ("NUBIG") immediately before an ownership change may increase its limitation by the amount of recognized built-in gain ("RBIG") arising from the sale of a built-in gain asset during a recognition period, which is generally the five-year period immediately following an ownership change. Built-in gain reported on the installment sale method that is attributable to assets sold by the corporation before or during the recognition period may increase the corporation's limitation during and after the recognition period. Therefore, it is likely that any IRC Section 382 limitation imposed upon an ownership change may be increased by our share of RBIG from Tinuum Group's installment sale gain attributable to RC facilities sold before or during the period in which the change in ownership occurred.

There are numerous assumptions that must be considered in calculating the RBIG related to Tinuum Group and the increase to our IRC Section 383 limitation. Assuming the following assumptions below, we may be able to increase the total limitation by approximately \$202 million over the duration of the installment sale. As of December 31, 2017, after increasing the total hypothetical limitation, we would likely not have been able to utilize approximately \$41.0 million of tax credits.

• The Tinuum Group RBIG is a result of the sale of RC facilities by Tinuum Group and its election to utilize the installment sale method for tax purposes;

• Investors in RC facilities will not terminate existing contracts as completion of an installment sale transaction is necessary to realize RBIG;

• We have no net unrealized built-in loss to offset the NUBIG from Tinuum Group;

• Our RBIG is equal to the deferred gain allocated from Tinuum Group or, approximately \$202 million;

• We will have a NUBIG immediately before a hypothetical ownership change such that the Tinuum Group RBIG is available to increase the IRC Section 382 limitation;

• We will continue our historic business operations for at least two years following a hypothetical ownership change; and

• A second ownership change does not occur.

The annual limitation will be increased by the amount of RBIG that is included in taxable income each year.

Royalties, related party

Royalty income increased in 2017 compared to 2016 primarily due to obtaining additional tax equity investors for four incremental new facilities during 2017 compared to 2016, all of which use our M-45 License. The total facilities that use our M-45 License increased from six facilities in 2016 to 10 facilities in 2017. The increase in facilities resulted in an increase in rental and sales payments to Tinuum Group and an increase in the related tons produced and sold subject to the M-45 License. During the years ended December 31, 2017 and 2016, there were 22.6 million tons and 16.2 million tons, respectively, of RC produced using the M-45 License.

Interest expense

Interest expense decreased in 2017 compared to 2016 primarily due to interest expense incurred in 2016 related to a credit agreement for a \$15.0 million short-term loan with a related party (the "Credit Agreement"), which was terminated in June 2016 and resulted in a decrease of \$2.1 million. In addition, interest expense decreased in 2017 compared to 2016 by \$0.3 million related to the RCM6 Note Payable, which was eliminated in March 2016.

Offsetting these decreases in interest expense was an increase of \$0.1 million related to 453A, which was primarily due to an increase in 2017 in the aggregate deferred tax liability, which was primarily driven by an increase in invested RC facilities in which Tinuum Group recognized as installment sales for tax purposes from 13 as of December 31, 2016 to 17 as of December 31, 2017.

The following table shows the balance of the tax liability that has been deferred and the applicable interest rate to calculate 453A interest:

As of December 31,

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(in thousands)	2017	2016
Tax liability deferred on installment sales ⁽¹⁾	\$70,739	\$71,559
Interest rate	4.00 %	4.00 %

(1) Represents the approximate tax effected liability utilizing the federal tax rate in effect for the applicable years ended related to the deferred gain on installment sales (approximately \$202 million as of December 31, 2017).

Based on the interest rate in effect as of the date of this filing, the 453A interest rate for the year ended December 31, 2018 is expected to be 5%.

Revision of estimated litigation settlement and royalty indemnity expense, net

During the years ended December 31, 2017 and 2016, management revised its estimate for future Royalty Award (as defined in Note 4 to the Consolidated Financial Statements included in Item 8 of this Report) payments based in part on updated forecasts provided to us by ADA Carbon Solutions, LLC ("Carbon Solutions"). As discussed in Note 4 to the Consolidated Financial Statements, we were required to pay additional damages related to certain future revenues generated from Carbon Solutions. These forecasts provided in 2017 and 2016 included a material reduction in estimated future revenues generated at the specific activated carbon plant from which the royalties are generated.

In December 2017, we, Carbon Solutions and the parent company of Carbon Solutions agreed to terminate certain provisions of the Indemnity Settlement Agreement (the "Indemnity Termination Agreement"). Pursuant to an agreement executed concurrently with the Indemnity Termination Agreement, the Company, Norit and an affiliate of Norit (collectively referred to as "Norit") agreed to a final payment in the amount of \$3.3 million (the "Settlement Payment") to settle all outstanding royalty obligations owed under the terms of the Norit Settlement Agreement. This amount was paid by the Company on December 29, 2017. As a result of changes in estimates and the final Settlement Payment, the Litigation settlement and royalty indemnity expense, net line item was positively impacted by \$3.3 million and \$3.5 million during the years ended December 31, 2017 and 2016, respectively.

Other

The components of Other income (expense) include the following significant items:

Settlement with service provider

In November 2017, we entered into a settlement agreement with a former third-party service provider and as part of the settlement we received cash in the amount of \$3.5 million. Cash from this settlement was received in December 2017.

Advanced Emission Solutions, Inc. Profit Sharing Retirement Plan

The Advanced Emissions Solutions, Inc. Profit Sharing Retirement Plan (the "401(k) Plan") is subject to the jurisdiction of the Internal Revenue Service ("IRS") and the Department of Labor ("DOL"). The DOL opened an investigation into the 401(k) Plan, and we are responding to all requests for documents and information from the DOL. The DOL has not issued any formal findings as of the date of this Report. Although we believe there has been no breach of fiduciary duty with respect to the 401(k) Plan, we believe a liability for contributions to the 401(k) Plan is probable and estimable and, as such, should be accrued for in the amount of \$1.0 million as of December 31, 2017. The liability is recorded in the Other current liabilities line item on the Consolidated Balance Sheets. The expense recognized related to this accrual is included in the Other line item in the Consolidated Statements of Operations for the year ended December 31, 2017.

Impairment of cost method investment

In November 2014, we acquired an 8% ownership interest in the common stock of Highview ("Highview"), a London, England based development stage company specializing in power storage. We accounted for our investment in Highview (the "Highview Investment") under the cost method. As of September 30, 2017, we recorded an impairment charge of \$0.5 million for the Highview Investment based on an estimated fair value of £1.00 compared to the estimated carrying value prior to the impairment charge of £2.00 per share. As of December 31, 2017, the estimated fair value of the Highview Investment was based on an equity raise that commenced during the third quarter of 2017 at a price of £1.00 per share. The impairment charge is included in the Other line item in the Consolidated Statements of Operations for the year ended December 31, 2017.

As of December 31, 2016, we recorded an impairment charge of \$1.8 million for the Highview Investment based on an estimated fair value of £2.00 per share compared to the estimated carrying value prior to the impairment charge of £4.25 per share. The impairment charge is included in the Other line item in the Consolidated Statements of Operations for the year ended December 31, 2016.

Gain on sale of equity method investment

On March 3, 2016, we sold our 24.95% membership interest in RCM6 for a cash payment of \$1.8 million and the assumption, by the buyer, of the RCM6 Note Payable. The outstanding balance on the RCM6 Note Payable at the time of the sale was \$13.2 million. With the sale of our membership interest in RCM6, we recognized a gain on the sale of \$2.1 million, which is included within the Other line item in the Consolidated Statements of Operations for the year ended December 31, 2016.

Gain on settlement of note payable

During the first quarter of 2016, we entered into an agreement to settle the remaining amounts owed to the former owner of the DSI equipment assets that we acquired in 2014 (the "DSI Business Owner"), resulting in a gain of approximately \$0.9 million, which is included in the Other line item in the Consolidated Statements of Operations for the year ended December 31, 2016.

Gain on settlement of licensed technology obligation

On June 15, 2016, we entered into an agreement with Highview to terminate a license agreement (the "Highview License") in exchange for a one-time payment by us of £0.2 million (approximately \$0.2 million). According to the agreement, this payment will only be made upon the sale of our shares in Highview to satisfy the liability. As a result of terminating the Highview License, we eliminated the licensed technology asset, reduced the corresponding long-term liability to the amount of the one-time payment, and recognized a gain of approximately \$0.2 million, which is included in the Other line item in the Consolidated Statements of Operations for the year ended December 31, 2016.

Gain on lease termination

On September 30, 2016, we and the lessee terminated a sale-type lease, and we recorded a lease termination fee of \$3.6 million, which was in excess of the carrying value of the net investment in sales-type lease of \$2.7 million. As a result of this lease termination, we recognized a gain of \$0.9 million, which is included in the Other line item in the Consolidated Statements of Operations for the year ended December 31, 2016.

Income tax expense (benefit)

New Tax Legislation

On December 22, 2017 (the "Enactment Date"), the U.S. government enacted comprehensive tax legislation commonly referred to as the Tax Cuts and Jobs Act (the "Tax Act"). The Tax Act makes broad and complex changes to the U.S. tax code and key provisions applicable, or that may be applicable, to us or certain of Tinnium Group's existing or potential customers for 2018 include the following: (1) reduction of the U.S. federal corporate tax rate from 35 percent to 21 percent; (2) elimination of the corporate alternative minimum tax (AMT); (3) a new limitation on deductible interest expense; (4) limitations on the deductibility of certain executive compensation; (5) limitations on the use of foreign tax credits ("FTCs") to reduce the U.S. income tax liability; (6) limitations on net operating losses ("NOL's") generated after December 31, 2017 to 80 percent of taxable income; and (7) the introduction of the Base Erosion Anti-Abuse Tax ("BEAT") for tax years beginning after December 31, 2017.

Concurrent with the enactment of the Tax Act, in December 2017, the SEC staff issued Staff Accounting Bulletin 118 ("SAB 118"), which provides guidance on accounting for the tax effects of the Tax Act. SAB 118 provides a measurement period that should not extend beyond one year from the Enactment Date for companies to complete the accounting under Accounting Standards Codification 740 - Income Taxes ("ASC 740"). In accordance with SAB 118, a company must reflect the income tax effects of those aspects of the Tax Act for which the accounting under ASC 740 is complete. To the extent that an entity's accounting for certain income tax effects of the Tax Act is incomplete but it is able to determine a reasonable estimate, it must record a provisional estimate in the financial statements. If a company cannot determine a provisional estimate to be included in the financial statements, it should continue to apply ASC 740 on the basis of the provisions of the tax laws that were in effect immediately before the enactment of the Tax Act.

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 SAB 118, and as such, we recorded an adjustment to our recorded deferred tax assets and deferred tax liabilities as of the Enactment Date from 35 percent to 21 percent. Accordingly, we have recorded a reduction of \$5.8 million to our net deferred tax assets as of December 22, 2017 with a corresponding entry to deferred tax expense for the year ended December 31, 2017 for those temporary differences expected to reverse after the Enactment Date. This adjustment is reflected in our income tax

expense for the year ended December 31, 2017 and was the primary factor that increased our effective income tax rate to 46% for 2017. We do not anticipate any other accounting impacts of the Tax Act during the period within one year from the Enactment Date, however, we will continue to assess any potential impact from the Tax Act through this period.

Beginning January 1, 2018, our effective income tax rate for 2018 and future years will be substantially lower as a result of the lowering of the U.S. federal corporate tax rate to 21%, however, this decrease in tax rate may also result in decreased utilization of deferred tax assets prior to their expiration.

For the year ended December 31, 2017, we recorded income tax expense of \$24.2 million compared to an income tax benefit of \$60.9 million for 2016. The federal income tax expense for the year ended December 31, 2017 includes \$5.8 million associated with the reduction of our net deferred tax asset as of the Enactment Date of the Tax Act. Excluding the impact of the Tax Act,

we would have recorded a tax benefit of approximately \$14.0 million during the fourth quarter of 2017 due to a reduction in the valuation allowance recorded against our deferred tax assets. However, after the impact of the Tax Act, we recorded tax expense of \$11.5 million. The income tax benefit for 2016 primarily reflects a \$61.4 million reversal of the valuation allowance of our deferred tax assets. As of December 31, 2017 and 2016, we had a valuation allowance recorded of \$75.4 million and \$75.9 million, respectively, against our deferred tax assets.

Accounting for income taxes requires that companies assess whether a valuation allowance should be recorded against their deferred tax asset based on an assessment of the amount of the deferred tax asset that is "more likely than not" to be realized. Valuation allowances are established, when necessary, to reduce deferred tax assets to the amount that is more likely than not to be realized.

We assess the valuation allowance recorded against deferred tax assets at each reporting date. The determination of whether a valuation allowance for deferred tax assets is appropriate requires the evaluation of positive and negative evidence that can be objectively verified. Consideration must be given to all sources of taxable income available to realize the deferred tax asset, including, as applicable, the future reversal of existing temporary differences, future taxable income forecasts exclusive of the reversal of temporary differences and carryforwards, taxable income in carryback years and tax planning strategies. In estimating taxes, we assess the relative merits and risks of the appropriate tax treatment of transactions taking into account statutory, judicial, and regulatory guidance.

As of December 31, 2017, we concluded it is more likely than not we will generate sufficient taxable income within the applicable NOL and tax credit carry-forward periods to realize \$38.7 million of our net deferred tax assets, and therefore, reversed \$0.5 million of the valuation allowance. In reaching this conclusion, we most significantly considered: (1) forecasts of continued future taxable income, (2) changes to the current deferred tax asset ("DTA") balances related to the effects of the Tax Act, (3) changes to forecasts of future utilization of DTA's related to the effects of the Tax Act, and (4) impacts of additional RC invested facilities during 2017.

Prior to 2016, we had recorded a valuation allowance for all of our deferred tax assets, primarily due to our historical three-year cumulative loss position. However, as of December 31, 2016, we concluded it was more likely than not that we would generate sufficient taxable income within the applicable NOL and tax credit carry-forward periods to realize \$61.4 of our net deferred tax assets, and therefore, reversed \$61.4 million of the valuation allowance, after utilizing \$11.0 million during 2016. This conclusion was reached after weighing all of the evidence and determining that the positive evidence outweighed the negative evidence. The positive evidence considered by management in arriving at its conclusion to partially reverse the valuation allowance includes factors such as: (1) emergence from the previous three-year cumulative loss position during the fourth quarter of 2016, (2) completion of four consecutive quarters of profitability and (3) forecasts of continued future profitability.

The ability to recognize the remaining deferred tax assets that continue to be subject to a valuation allowance is evaluated on a quarterly basis to determine if there are any significant events that would affect the ability to utilize those deferred tax assets.

Our estimate of future taxable income is based on internal projections which consider historical performance, multiple internal scenarios and assumptions, as well as external data that we believe is reasonable. If events are identified that affect our ability to utilize our deferred tax assets, or if additional deferred tax assets are generated, the analysis will be updated to determine if any adjustments to the valuation allowance are required. If actual results differ negatively from the current estimates of future taxable income, even if caused by adverse macro-economic conditions, the remaining valuation allowance may need to be increased. Such an increase could have a material adverse effect on our financial condition and results of operations. Conversely, better than expected results and continued positive results and trends could result in further releases to the deferred tax valuation allowance, and any such decreases could have a material positive effect on our financial condition and results of operations.

See additional discussion in Note 12 of the Consolidated Financial Statements included in Item 8 of this Report.

Year ended December 31, 2016 Compared to Year ended December 31, 2015

Total Revenue and Cost of Revenue

A summary of the components of revenues and costs of revenue for the years ended December 31, 2016 and 2015 is as follows:

(in thousands except percentages)	Years Ended		Change	
	December 31, 2016	2015	(\$)	(%)
Revenues:				
Equipment sales	\$46,949	\$60,099	\$(13,150)	(22)%
Chemicals	3,025	888	2,137	241%
Consulting services and other	648	1,752	(1,104)	(63)%
Total revenues	50,622	62,739	(12,117)	(19)%
Operating expenses:				
Equipment sales cost of revenue, exclusive of depreciation and amortization	37,741	45,433	(7,692)	(17)%
Chemicals cost of revenue, exclusive of depreciation and amortization	1,700	601	1,099	183%
Consulting services and other cost of revenue, exclusive of depreciation and amortization	376	1,518	(1,142)	(75)%

Equipment sales and Equipment sales cost of revenue

During the years ended December 31, 2016 and 2015, we entered into five and four long-term (six months or longer) fixed price contracts to supply ACI systems with aggregate contract values including change orders of \$2.9 million and \$5.5 million, respectively. During the years ended December 31, 2016 and 2015, we completed 17 and 32 ACI systems, recognizing revenues of \$26.9 million and \$51.7 million and cost of revenue of \$20.5 million and \$38.4 million, respectively. We recognized \$0.5 million and \$0.1 million in loss provisions related to ACI system contracts during the years ended December 31, 2016 and 2015, respectively.

During the years ended December 31, 2016 and 2015, we entered into zero and one long-term (6 months or longer) fixed price contracts to supply DSI systems and other material handling equipment with contract values including associated change orders of \$1.5 million and \$2.4 million, respectively. During the years ended December 31, 2016 and 2015, we completed 11 and seven DSI systems and zero and two other material handling equipment systems, recognizing revenues of \$15.8 million and \$7.2 million and cost of revenue of \$14.8 million and \$5.9 million, respectively. During the year ended December 31, 2016, we recognized a reduction of \$0.1 million in previously recognized loss provisions included in cost of revenue related to DSI system contracts. During the year ended December 31, 2015, we recognized \$0.2 million in loss provisions included in costs of revenue related to DSI systems contracts.

Additionally, in 2016, we executed sales-type lease agreements related to ACI and DSI systems and recognized revenue of \$3.4 million and cost of revenue of \$1.2 million during the year ended December 31, 2016

The remaining changes were due to other equipment projects.

Demand for ACI and DSI system contracts during 2016 and 2015 was driven by coal-fired electric generating units that needed to comply with MATS and MACT standards by 2016. Revenues related to ACI and DSI system contracts in these years fluctuated due to changes in the number of contracts entered into as well as the long duration of completing certain contracts, which involved long-lead time requirements for manufacturing, installation and testing of the equipment.

Chemicals and Chemicals cost of revenue

During the years ended December 31, 2016 and 2015, revenues increased year over year primarily due to an overall increase in pounds of our chemicals sold, most significantly driven by higher sales of our M-Prove consumable during the second half of 2016. The increase in revenue was largely due to our increased focus on selling these products to coal-fired power plants to be in compliance with applicable regulations.

Consulting services and other and Consulting services cost of revenue

During the years ended December 31, 2016 and 2015, revenues decreased year over year due to a decrease in the number of consulting service engagements performed. The decrease in the number of consulting services engagements was due in part to us no longer performing consulting services engagements for one customer.

Additional information related to revenue concentrations and contributions by class and reportable segment can be found within the segment discussion below and in Note 13 to the Consolidated Financial Statements included in Item 8 of this Report.

Other Operating Expenses

A summary of the components of our operating expenses, exclusive of cost of revenue items (presented above), for the years ended December 31, 2016 and 2015 is as follows:

(in thousands, except percentages)	Years Ended		Change	
	December 31, 2016	December 31, 2015	(\$)	(%)
Operating expenses:				
Payroll and benefits	\$12,390	\$23,589	\$(11,199)	(47)%
Rent and occupancy	2,168	3,309	(1,141)	(34)%
Legal and professional fees	8,293	16,604	(8,311)	(50)%
General and administrative	3,721	6,104	(2,383)	(39)%
Research and development, net	(648)	5,362	(6,010)	(112)%
Depreciation and amortization	979	2,019	(1,040)	(52)%
Total operating expenses	\$26,903	\$56,987	\$(30,084)	(53)%

Payroll and benefits

Payroll and benefits expenses decreased in 2016 compared to 2015 primarily due to a decrease in restructuring expenses in connection with the departure of certain executive officers and management's alignment of the business with strategic objectives. During the years ended December 31, 2016 and December 31, 2015, we recorded net restructuring charges of \$1.6 million and \$10.4 million, respectively, including the modification and acceleration of equity awards of \$0.4 million and \$3.4 million, respectively. Additionally, we had a decrease in headcount of approximately 70% during 2016 compared to 2015 in connection with employees impacted by management's alignment of the business with strategic objectives.

Rent and occupancy

Rent and occupancy expenses decreased in 2016 compared to 2015 primarily due to the shutdown of our office and fabrication facilities located in Pennsylvania in the fourth quarter of 2015. During the first quarter of 2016, we entered into an agreement to terminate various lease agreements covering approximately 207 thousand square feet of manufacturing, warehouse and office space in Pennsylvania. As consideration for terminating the leases, we agreed to pay the lessor a termination fee of \$0.3 million in April 2016 and the same amount in April 2017. During the first quarter of 2016, we recorded a gain of \$0.2 million related to the difference between the amount accrued as of the cease-use date of December 31, 2015 and the settlement amount. In December 2016, we entered into an agreement to terminate approximately 37 thousand square feet of office space and relocate our corporate office in Colorado. In exchange for terminating the lease, we agreed to pay the lessor a termination fee of \$0.3 million. The amount was paid in full in December 2016.

Legal and professional fees

Legal and professional fees expenses decreased in 2016 compared to 2015 as a result of a reduction in the professional resources deployed to address the restatement of our consolidated financial statements, including litigation associated with such restatement. Expenses related to the restatement during the year ended December 31, 2016 and 2015 were \$2.0 million and \$9.5 million, respectively. In addition, legal and professional fees decreased as a result of a reduction

in other consulting fees during 2016.

General and administrative

General and administrative expenses decreased in 2016 compared to 2015 due to a \$0.5 million allowance recorded during 2015 against the entire principal balance of a note receivable. Additionally, during the year ended December 31, 2016, there was a decrease in expenses of \$1.6 million due to the shutdown of our Pennsylvania office and fabrication facilities in the fourth quarter of 2015. Other decreases during the year ended December 31, 2016 were due to decreases in general operating expenses, including travel and professional expenses. These decreases were partially offset by impairment charges recognized

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during the year ended December 31, 2016 on property and equipment and inventory of \$0.5 million, as projected future cash flows from operations related to such property and equipment and inventory did not support the carrying value of these assets.

Research and development, net

Research and development expense decreased in 2016 compared to 2015 primarily due to a decrease in research and development activities in 2016, as we concluded all material research and development activities except for continued product development necessary to our ongoing business. We also reduced research and development expense by \$0.8 million during the year ended December 31, 2016 due to final billings made during this period to the DOE for one research and development contract, which resulted in negative expense during 2016. Additional decreases in research and development expense were due to expenses incurred during 2015 related to our investment in ADA Analytics of \$2.6 million, of which \$1.9 million related to an impairment charge we recognized in 2015.

Depreciation and amortization

Depreciation and amortization expense decreased in 2016 compared to 2015 by approximately \$0.8 million due to the shutdown of our Pennsylvania office and fabrication facility in 2015 and by approximately \$0.2 million due to the termination of the Highview License.

Other Income (Expense), net

A summary of the components of our other income (expense), net for the years ended December 31, 2016 and 2015 is as follows:

(in thousands, except percentages)	Years Ended		Change	
	December 31, 2016	December 31, 2015	(\$)	(%)
Other income (expense):				
Earnings from equity method investments	\$45,584	\$8,921	\$36,663	411 %
Royalties, related party	6,125	10,642	(4,517)	(42)%
Interest income	268	24	244	*
Interest expense	(5,066)	(8,402)	3,336	(40)%
Litigation settlement and royalty indemnity expense, net	3,464	—	3,464	*
Other	2,463	494	1,969	399 %
Total other income	\$52,838	\$11,679	\$41,159	352 %

Earnings in equity method investments

The following table shows the equity method earnings, by investee, for the years ended December 31, 2016 and 2015:

(in thousands)	Years Ended		Change	
	December 31, 2016	December 31, 2015	(\$)	(%)
Earnings from Tinum Group	\$41,650	\$8,651	\$32,999	381 %
Earnings from Tinum Services	4,491	4,838	(347)	(7)%
Earnings (losses) from other	(557)	(4,568)	4,011	(88)%
Earnings from equity method investments	\$45,584	\$8,921	\$36,663	411 %

Earnings from equity method investments, and changes related thereto, were impacted by our equity method investees: Tinum Group, Tinum Services and RCM6 (through the date of the sale of our interest in RCM6 on March 3, 2016). Earnings from equity method investments increased during the year ended December 31, 2016 compared to 2015 primarily as a result of an increase in cash distributions, as Tinum Group did not invest significant capital expenditures related to the installation of RC facilities or incur significant costs to operate retained RC facilities during 2016 as they had done during 2015. See discussion below regarding the accounting of earnings from Tinum Group.

During the year ended December 31, 2016, we recognized \$41.7 million in equity earnings from Tinum Group compared to our proportionate share of Tinum Group's net income of \$35.0 million for the year. During the year ended December 31, 2015, we recognized \$8.7 million in equity earnings from Tinum Group compared to our proportionate share of Tinum Group's net income of \$35.3 million for the year. The difference between our pro-rata share of Tinum Group's net income and our earnings recognized from our Tinum Group equity method investment as reported on the Condensed Consolidated Statements of Operations relates to us receiving cumulative distributions in excess of the carrying value of the investment, and therefore

recognizing such excess distributions as equity method earnings in the period the distributions occur, as discussed in more detail below.

The following table for Tinum Group shows our investment balance, equity earnings, cash distributions received and cash distributions in excess of the investment balance for the years ended December 31, 2016 and 2015 (in thousands):

Description	Date(s)	Investment balance	ADES equity earnings (loss)	Cash distributions	Memorandum
					Account: Cash distributions and equity loss in (excess) of investment balance
Beginning balance	12/31/2014	\$ —	\$ —	\$ —	\$(29,877)
ADES proportionate share of net income from Tinum Group ⁽¹⁾	2015 activity	35,265	35,265	—	—
Recovery of cash distributions in excess of investment balance (prior to cash distributions)	2015 activity	(29,877)	(29,877)	—	29,877
Cash distributions from Tinum Group	2015 activity	(8,651)	—	8,651	—
Adjustment for current year cash distributions in excess of investment balance	2015 activity	3,263	3,263	—	(3,263)
Total investment balance, equity earnings (loss) and cash distributions	12/31/2015	\$ —	\$ 8,651	\$ 8,651	\$(3,263)
ADES proportionate share of net income from Tinum Group ⁽¹⁾	2016 activity	35,019	35,019	—	—
Recovery of cash distributions in excess of investment balance (prior to cash distributions)	2016 activity	(3,263)	(3,263)	—	3,263
Cash distributions from Tinum Group	2016 activity	(41,650)	—	41,650	—
Adjustment for current year cash distributions in excess of investment balance	2016 activity	9,894	9,894	—	(9,894)
Total investment balance, equity earnings (loss) and cash distributions	12/31/2016	\$ —	\$ 41,650	\$ 41,650	\$(9,894)

(1) The amounts of our 42.5% proportionate share of net income as shown in the table above differ from mathematical calculations of the Company's 42.5% equity interest in Tinum Group multiplied by the amounts of Net Income available to Class A members as shown in the table above of Tinum Group results of operations due to adjustments related to the Class B preferred return and the elimination of Tinum Group earnings attributable to RCM6, of which we owned 24.95%, for the period from January 1 to March 3, 2016 and for the year ended December 31, 2015.

Equity earnings from our interest in Tinum Services decreased by \$0.3 million in 2016 compared to 2015 primarily due to a decrease in the number of RC facilities being operated by Tinum Services throughout the year. The weighted-average number of RC facilities for which Tinum Services provided operating and maintenance services, based upon the number of months each facility was operated during the respective years, decreased year over year. As of December 31, 2016 and 2015, Tinum Services provided operating and maintenance services to 13 and 14 RC facilities, respectively. Tinum Services derives earnings from both fixed-fee arrangements as well as fees that are tied

to actual RC production, depending upon the specific RC facility operating and maintenance agreement. The reduction in operating facilities during the year ended December 31, 2016 compared to the year ended December 31, 2015 was due to suspending operations on retained facilities to reduce operating expenses.

Equity losses from our interest in RCM6 decreased during the year ended December 31, 2016 compared to the year ended December 31, 2015 due to the sale of our 24.95% membership interest in RCM6 on March 3, 2016.

Tax credits

We earned the following tax credits that may be available for future benefit related to the production of RC from the operation of retained RC facilities:

	Years Ended	
	December 31,	
(in thousands)	2016	2015
Section 45 tax credits earned	\$2,956	\$38,998

The decrease in production and sale of RC, and the related tax credits earned during the year ended December 31, 2016 compared to December 31, 2015 was due to the suspension of retained RC facilities, as described above.

Royalties, related party

Royalty income decreased in 2016 compared to 2015 primarily due to a decrease from 2015 to 2016 in the number of RC facilities and related tons of RC produced using the M-45 License, which resulted in 16.2 million and 22.0 tons produced during 2016 and 2015, respectively. The decrease in tonnage was primarily due to the suspension of retained operations at facilities during the fourth quarter of 2015 and the first quarter of 2016 to reduce operating expenses. The decrease in royalties we earned in 2016 was also the result of higher Tinum Group operating expenses in 2016 due to higher payments made to secure the location for an RC facility in advance of securing a lease or a sale with a tax equity investor.

Interest expense

Interest expense decreased in 2016 compared to 2015 due to a decrease in 453A interest and the elimination of the RCM6 Note Payable. These decreases were \$2.1 million and \$2.2 million, respectively, for the year ended December 31, 2016 compared to 2015. These decreases were offset by an increase in interest expense in 2016 of \$0.7 million related to the Credit Agreement, which was entered into during the fourth quarter of 2015 and was paid off as of June 30, 2016.

During the year ended December 31, 2016 compared to 2015, there was an increase in RC facilities from 12 to 13 in which Tinum Group recognized installment sales for tax purposes and are therefore subject to 453A interest.

The following table shows the balance of the tax liability that has been deferred and the applicable interest rate to calculate section 453A interest:

(in thousands)	As of December 31,			
	2016	2015		
Tax liability deferred on installment sales ⁽¹⁾	\$71,559	\$111,905		
Interest rate	4.00	%	4.00	%

(1) Represents the approximate tax effected liability utilizing the federal tax rate in effect for the applicable years ended related to the deferred gain on installment sales (approximately \$204 million as of December 31, 2016).

Revision of estimated litigation settlement and royalty indemnity expense, net

During the fourth quarter of 2016, management revised its estimate for future Royalty Award payments based on an updated forecast provided to the Company by a former equity method investment for which we are required to pay additional damages related to certain future revenues generated from the former equity method investment. This forecast included a material reduction in estimated future revenues generated at the specific activated carbon plant from which the royalties are generated. Based primarily on the updated forecast, management recorded a \$4.0 million reduction to its Royalty Award accrual as of December 31, 2016.

During the year ended December 31, 2016, we recorded an expense for the estimated payment of monetary penalties in connection with litigation in the amount of \$0.5 million.

Other

Gain on sale of equity method investment

On March 3, 2016, we sold our 24.95% membership interest in RCM6 for a cash payment of \$1.8 million and the assumption, by the buyer, of the RCM6 Note Payable. The outstanding balance on the RCM6 Note Payable at the time of the sale was \$13.2 million. With the sale of our membership interest in RCM6, we recognized a gain on the sale of \$2.1 million, which is included within the Other line item in the Consolidated Statements of Operations for the year ended December 31, 2016.

Gain on settlement of note payable

In February 2016, we entered into an agreement with the DSI Business Owner to settle the remaining amounts owed (the "DSI Business Owner Note Payable") of approximately \$1.1 million for a one-time payment of \$0.3 million. The one-time payment was made during the first quarter of 2016, and we recognized a gain of approximately \$0.9 million, which is included in the Other line item in the Consolidated Statements of Operations for the year ended December 31, 2016.

Gain on settlement of licensed technology obligation

On June 15, 2016, we entered into an agreement with Highview to terminate the Highview License in exchange for a one-time payment by us of £0.2 million (approximately \$0.2 million). According to the agreement, this amount is only payable upon the

sale of our shares in Highview to satisfy the liability. As a result of terminating this license agreement, we eliminated the licensed technology asset, reduced the corresponding long-term liability to the amount of the one-time payment, and recognized a gain of approximately \$0.2 million, which is included in the Other line item in the Consolidated Statements of Operations for the year ended December 31, 2016.

Impairment of cost method investment

As of December 31, 2016, we estimated the fair value of the Highview Investment based upon an anticipated equity raise by Highview at a price of £2.00 per share, which was less than our cost per share of £4.25. As a result, we recorded an impairment charge of \$1.8 million, which is included in the Other line item in the Consolidated Statements of Operations for the year ended December 31, 2016.

Gain on lease termination

In 2016, we and the lessee terminated a sale-type lease, and we recorded a lease termination fee of \$3.6 million, which was in excess of the carrying value of the net investment in sales-type lease of \$2.7 million. As a result of this lease termination, we recognized a gain of \$0.9 million, which is included in the Other line item in the Consolidated Statements of Operations for the year ended December 31, 2016.

Income tax expense (benefit)

As of December 31, 2016 and 2015, we had a valuation allowance recorded of \$75.9 million and \$148.3 million, respectively, against our deferred tax assets. During 2016, we recorded an income tax benefit of \$60.9 million compared to income tax expense of zero for 2015. The income tax benefit for 2016 primarily reflects a \$61.4 million reversal of the valuation allowance of our deferred tax assets. Historically, we had recorded a valuation allowance for all of our deferred tax assets primarily due to a historical three-year cumulative loss position. However, as of December 31, 2016, we concluded that it was more likely than we will generate sufficient taxable income within the applicable NOL and tax credit carry-forward periods to realize \$61.4 million of our net deferred tax assets and, therefore, reversed the valuation allowance by this amount. This conclusion was reached after weighing all of the evidence and determining that the positive evidence outweighed the negative evidence. The positive evidence considered by management in arriving at its conclusion to partially reverse the valuation allowance included factors such as the emergence from the previous three-year cumulative loss position during the fourth quarter of 2016, achievement of four consecutive quarters of profitability and forecasts of continued future profitability under several potential scenarios derived from currently contracted business within the RC segment. We believed these factors supported the partial utilization of deferred tax assets attributable to temporary differences that do not expire and NOL's and tax credits prior to their expiration between 2031 through 2036.

Business Segments

As of December 31, 2017, we have two reportable segments: (1) RC; and (2) EC.

The business segment measurements provided to and evaluated by our chief operating decision maker ("CODM") are computed in accordance with the principles listed below:

• The accounting policies of the operating segments are the same as those described in the summary of significant accounting policies except as described below.

• Segment revenues include equity method earnings and losses from our equity method investments. Segment revenue also includes royalty earnings from Tinum Group and income related to sales-type leases.

• Segment operating income (loss) includes segment revenues, gains related to sales of equity method investments and allocation of certain "Corporate general and administrative expenses," which include Payroll and benefits, Rent and occupancy, Legal and professional fees, and General and administrative.

• RC segment operating income includes interest expense directly attributable to the RC segment.

The principal products and services of our segments are:

1.

RC - Our RC segment derives its earnings from equity method investments as well as royalty payment streams and other revenues related to enhanced combustion of and reduced emissions of both NO_x and mercury from the burning of RC. Our equity method investments related to the RC segment include Tinum Group, Tinum Services as well as other immaterial equity method investments. Segment revenues include equity method earnings (losses) from our equity method investments and royalty earnings from Tinum Group. These earnings are included within the Earnings from equity method investments and Royalties, related party line items in the Consolidated Statements of Operations included in Item 8 of this Report. Key drivers to RC segment performance are operating and retained produced and

sold RC, royalty-bearing tonnage, and the number of operating (leased or sold) and retained RC facilities. These key drivers impact our earnings and cash distributions from equity method investments.

EC - Our EC segment includes 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 power generation and industrial boiler industries. These amounts are included within the respective revenue and cost of revenue line items in the Consolidated Statements of Operations included in Item 8 of this Report.

Management uses segment operating income (loss) to measure profitability and performance at the segment level. Management believes segment operating income (loss) provides investors with a useful measure of our operating performance and underlying trends of the businesses. Segment operating income (loss) may not be indicative of our overall consolidated performance and therefore, should be read in conjunction with our Consolidated Results of Operations.

The following table presents our operating segment results for the years ended December 31, 2017, 2016 and 2015:

(in thousands)	Years Ended December 31,			Change	
	2017	2016	2015	(\$)	(\$)
Revenues:					
Refined Coal:					
Earnings in equity method investments	\$53,843	\$45,584	\$8,921	\$8,259	\$36,663
Consulting services	—	—	55	—	(55)
Royalties, related party	9,672	6,125	10,642	3,547	(4,517)
	63,515	51,709	19,618	11,806	32,091
Emissions Control:					
Equipment sales	31,401	46,949	60,099	(15,548)	(13,150)
Chemicals	4,246	3,025	888	1,221	2,137
Consulting services	45	648	1,697	(603)	(1,049)
	35,692	50,622	62,684	(14,930)	(12,062)
Total segment reporting revenues	\$99,207	\$102,331	\$82,302	\$(3,124)	\$20,029
Adjustments to reconcile to reported revenues:					
Refined Coal:					
Earnings in equity method investments	\$(53,843)	\$(45,584)	\$(8,921)	(8,259)	(36,663)
Royalties, related party	(9,672)	(6,125)	(10,642)	(3,547)	4,517
	(63,515)	(51,709)	(19,563)	(11,806)	(32,146)
Total reported revenues	35,692	50,622	62,739	(14,930)	(12,117)
Segment operating income (loss)					
Refined Coal ⁽¹⁾	\$59,908	\$51,264	\$12,131	\$8,644	\$39,133
Emissions Control ⁽²⁾	379	7,334	(7,583)	(6,955)	14,917
Total segment operating income	\$60,287	\$58,598	\$4,548	\$1,689	\$54,050

(1) Included within the RC segment operating income for the year ended December 31, 2016 is a \$2.1 million gain on the sale of RCM6 and for the years ended December 31, 2017, 2016 and 2015 453A interest expense of \$2.6 million, \$2.5 million and \$4.6 million, respectively, and interest expense related to the RCM6 Note Payable of zero, \$0.3 million, and \$2.5 million, respectively.

(2) Included within the EC segment operating income for the year ended December 31, 2016 is a \$0.9 million gain related to a termination of a sales-type lease.

A reconciliation of segment operating income to consolidated net income (loss) is included in Note 13 of the Consolidated Financial Statements included in Item 8 of this Report.

RC

The following table details the segment revenues of our respective equity method investments for the years ended December 31, 2017, 2016 and 2015:

(in thousands)	Year ended December 31,		
	2017	2016	2015
Earnings from Tinum Group	\$48,875	\$41,650	\$8,651
Earnings from Tinum Services	4,963	4,491	4,838
Earnings (losses) from other	5	(557)	(4,568)
Earnings from equity method investments	\$53,843	\$45,584	\$8,921

RC earnings increased primarily due to increased equity earnings from Tinum Group during the year ended December 31, 2017 compared to the year ended December 31, 2016, as presented above. Our equity earnings increased primarily due to an increase in cash distributions from Tinum Group due to the addition of four invested facilities, three of which were fully invested by third parties, as discussed in the consolidated results above. For the year ended December 31, 2017, Tinum Group's consolidated earnings increased \$26.6 million from the comparable December 31, 2016 period due to an increase in lease revenues driven by significant sales of facilities to third-party investors.

As discussed above and in Note 2 of the Consolidated Financial Statements included in Item 8 of this Report, our earnings in Tinum Group may not equal our pro-rata share due to the accounting related to our equity method investment. As such, our earnings in Tinum Group increased by \$7.2 million during the year ended December 31, 2017 compared to the year ended December 31, 2016 in part due to \$48.9 million of cash distributions received that were in excess of our pro-rata share of cumulative earnings in Tinum Group.

RC operating income in 2017 was also positively impacted for the following:

- The sale of RCM6 in 2016, which had incurred losses from inception;
- An increase in earnings from Tinum Services, which was primarily due to an increase in the number of RC facilities operated by Tinum Services during 2017;
- An increase in M-45 royalties earned as a result of increased tonnage; and
- A decrease in 453A interest expense as a result of the declining deferred tax liability.

EC

Discussion of revenues derived from our EC segment and costs related thereto are included within our consolidated results in Item 8 of this Report.

EC segment operating income decreased during the year ended December 31, 2017 compared to 2016 primarily due to the decrease in revenues year over year, as discussed within the consolidated results. The decrease in EC segment operating income was offset by decreases in segment operating expenses. Specifically, Payroll and benefits decreased year over year by \$1.2 million, primarily due to a decrease in severance expense of \$1.0 million. Additional decreases in segment operating expenses were primarily due to a decrease in impairment charges of \$1.3 million related to the Highview investment. Offsetting the net decrease in segment operating expenses was the \$0.9 million gain on settlement recognized in 2016 of the DSI Business Owner Note Payable as well as a \$0.4 million reserve recorded in 2017 on an asset related to a letter of credit asset draw made by a former customer that we are contesting and pursuing legal actions.

Liquidity and Capital Resources

Overview of Factors Affecting Our Liquidity

During 2017, our liquidity position was positively affected primarily due to distributions from Tinum Group and Tinum Services and borrowing availability under our bank ("Lender") line of credit (the "Line of Credit"). As a result, our working capital position as of December 31, 2017 improved by \$14.8 million compared to December 31, 2016.

Our principal sources of liquidity currently include:

- cash on hand;
- distributions from Tinum Group and Tinum Services;
- royalty payments from Tinum Group; and
- the Line of Credit.

Our principal uses of liquidity during the year ended December 31, 2017 included:

- payment of dividends;
- repurchases of shares of common stock pursuant to a modified Dutch Auction tender offer ("Tender Offer");
- repurchases of shares of common stock pursuant to a stock repurchase program by which the Company may repurchase up to \$10.0 million of the Company's outstanding common stock, from time to time;
- our business operating expenses, including federal and state tax payments;
- delivering on our existing contracts and customer commitments; and
- repayments on the Line of Credit.

The following table summarizes the cash distributions from our equity method investments, which most significantly impact our consolidated cash flow results, for the years ended December 31, 2017, 2016 and 2015:

(in thousands)	Year ended December 31,		
	2017	2016	2015
Tinum Group	\$48,875	\$41,650	\$8,651
Tinum Services	4,638	4,500	5,019
Other	—	—	—
Distributions from equity method investees	\$53,513	\$46,150	\$13,670

On May 5, 2017, our Board authorized the commencement of the Tender Offer to purchase for cash up to 925,000 shares of our common stock at a price per share of not less than \$9.40 nor greater than \$10.80, for a maximum aggregate purchase price of \$10.0 million, with an option to purchase an additional 2% of the outstanding shares of common stock if the Tender Offer was oversubscribed. The Tender Offer expired on June 6, 2017 and a total of 2,858,425 shares were validly tendered and not properly withdrawn at or below the final purchase price of \$9.40 per share.

Because the Tender Offer was oversubscribed, we purchased a prorated portion of the shares properly tendered by each tendering stockholder (other than "odd lot" holders whose shares were purchased on a priority basis) at the final per share purchase price. Accordingly, we acquired 1,370,891 shares of our common stock ("Tendered Shares") at a price of \$9.40 per share, for a total cost of approximately \$12.9 million, excluding fees and other expenses related to the Tender Offer. The Tendered Shares represented approximately 6.2% of our outstanding shares of our common stock prior to the Tender Offer. The Tendered Shares include the 925,000 shares we initially offered to purchase and 445,891 additional shares that we elected to purchase pursuant to our right to purchase up to an additional 2% of our outstanding shares of common stock.

During December 2017, our Board authorized the repurchase of up to \$10.0 million of outstanding common stock in open market transactions. As of December 31, 2017, we had purchased 342,875 shares of common stock for cash payments of \$3.4 million, inclusive of commissions and fees.

Our Board declared quarterly cash dividends of \$0.25 per share on the outstanding shares of our common stock on each of June 14, 2017, August 7, 2017, and November 6, 2017, payable to stockholders of record as of the close of business on June 28, 2017, August 21, 2017, and November 17, 2017, respectively. The payments of \$5.2 million,

\$5.3 million and \$5.2 million were subsequently made in July, September, and December 2017, respectively. The total amount of dividends paid by the Company during the twelve months ended December 31, 2017 was \$15.7 million. Dividends in the amount of \$0.1 million

have been accrued and represent dividends accumulated on nonvested shares of our common stock held by our employees and directors that contain dividend rights that are forfeitable and not payable until the underlying shares vest.

During the third quarter of 2017, we amended the Line of Credit ("Eleventh Amendment") with the Lender. The Eleventh Amendment decreased the Line of Credit to \$10.0 million due to decreased collateral requirements for the Company's outstanding letters of credit ("LC's"), extended the maturity date of the Line of Credit to September 30, 2018, and permitted the Line of Credit to be used as collateral (in place of restricted cash) for LC's up to \$8.0 million related to equipment projects, the remaining estimated payments due under the Royalty Award and certain other agreements. Additionally, under the Eleventh Amendment there is no minimum balance requirement based on the Company meeting certain conditions and maintaining minimum trailing twelve-month EBITDA (earnings before interest, taxes, depreciation and amortization as defined in the Eleventh Amendment) of \$24.0 million.

As of December 31, 2017, there were no outstanding borrowings under the Line of Credit, however, LC's in the aggregate amount of \$3.5 million related to obligations due under the Royalty Award ("Royalty Award LC's") were secured under the Line of Credit, resulting in borrowing availability of \$6.5 million. On December 29, 2017, pursuant to the execution of the Indemnity Termination Agreement on December 29, 2017, we settled all remaining obligations due under the Royalty Award in exchange for the Settlement Payment of \$3.3 million resulting in remaining LC availability of \$4.5 million. Pursuant to the Indemnity Settlement Agreement, the LC's were terminated in January 2018.

As of December 31, 2016, we had Royalty Award LC's totaling \$7.2 million outstanding that were collateralized by restricted cash.

During March 2017, a customer drew on an LC related to an equipment system in the amount of \$0.8 million, which was funded by borrowing availability under the Line of Credit. We subsequently repaid this amount to the Lender during the three months ended March 31, 2017. We are contesting the draw on this LC and are pursuing actions to recover this amount from the customer.

Our ability to continue to generate sufficient cash flow required to meet ongoing operational needs and obligations, as well as future expected dividend payments and potential future share repurchases, depends upon several factors, including executing on our contracts and initiatives, receiving royalty payments from Tinum Group and distributions from Tinum Group and Tinum Services, and increasing our share of the market for EC products, and, in particular EC chemicals sales. Increased distributions from Tinum Group will likely be dependent upon both preserving existing contractual relationships and the securing of additional tax equity investors for those Tinum Group facilities that are currently not operating.

Sources and Uses of Cash

Year ended December 31, 2017 Compared to Year ended December 31, 2016

Cash, cash equivalents and restricted cash increased from \$26.9 million as of December 31, 2016 to \$30.7 million as of December 31, 2017, an increase of \$3.7 million. The following table summarizes our cash flows for the years ended December 31, 2017 and 2016, respectively.

(in thousands)	Years Ended		
	December 31,		
	2017	2016	Change
Cash provided by (used in):			
Operating activities	\$(11,748)	\$(18,257)	\$6,509
Investing activities	48,386	39,899	8,487
Financing activities	(32,889)	(15,671)	(17,218)
Net change in Cash and Cash Equivalents and Restricted Cash	\$3,749	\$5,971	\$(2,222)
Cash flows from operating activities			

Cash flows from operating activities for the year ended December 31, 2017 increased by \$6.5 million compared to the year ended December 31, 2016 and were positively impacted primarily by the following: (1) a decrease in deferred tax

benefit of \$60.9 million, which was recorded in 2016 as a result of the release of a portion of our valuation allowance on our deferred tax assets; (2) a decrease in deferred tax assets during 2017 of \$23.2 million as a result of utilization in 2017 as we generated taxable income; (3) net changes in working capital and other liabilities of \$10.6 million, primarily due to significant reductions to Accounts payable, Accrued payroll, Other current liabilities and Other long-term liabilities that occurred in 2016 as a result of the Company becoming current on, or settling, significant amounts related to these liabilities. Offsetting these increases to operating cash flows were primarily the following: (1) a decrease in net income of \$69.8 million, which was primarily due to

the deferred tax benefit recorded in 2016; (2) an increase in earnings from equity method investees of \$8.3 million; (3) a net decrease in the Royalty Award of \$7.6 million in 2017 as a result of the final payments and settlement of all remaining royalties due; and (4) a decrease in cash distributions from equity method investees, return on investment of \$3.3 million, primarily from a decrease in cash distributions received from Tinuum Group, as all of its cash distributions for 2017 were reported as distributions in excess of cumulative earnings within Investing cash flows.

Cash flows from investing activities

Distributions from equity method investees

Our cash flows from investing activities are significantly impacted by cash distributions from equity method investees that represent a return in excess of cumulative earnings, which increased from \$38.3 million in 2016 to \$48.9 million in 2017. All of these cash distributions were received from Tinuum Group. During the year ended December 31, 2016, Tinuum Group distributions of \$3.4 million were reported within operating cash flows, and \$38.3 million were reported within investing cash flows.

Equity method investment

Cash flows from investing activities for the year ended December 31, 2017 also decreased as a result of the cash proceeds received of \$1.8 million from the sale of RCM6 in 2016, as discussed in Note 2 of the Consolidated Financial Statements included in Item 8 of this Report.

Cash flows from financing activities

Dividends Paid and Stock Repurchases

During the year ended December 31, 2017, we paid Dividends of \$15.7 million. In addition, during the year ended December 31, 2017, we repurchased 1,370,891 shares of our common stock in the amount of \$13.0 million pursuant to the Tender Offer conducted in May and June of 2017 and 342,875 shares of our common stock in the amount of \$3.4 million in open market transactions that occurred in December 2017.

Short term borrowings

During the year ended December 31, 2016, we repaid all principal amounts due under the Credit Agreement of \$13.3 million, including the pay-off amount of \$9.9 million, which occurred as a result of the termination of the Credit Agreement on June 30, 2016. During the year ended December 31, 2016, we paid \$0.8 million in debt issuance costs related to the Second Amendment of the Credit Agreement and amendment fees related to the Line of Credit. Additionally, during the year ended December 31, 2016, we paid a debt prepayment penalty of \$0.2 million for the pay-off the Credit Agreement prior to maturity. During the year ended December 31, 2017, we paid fees in connection with amendments to the Line of Credit of approximately \$0.1 million.

Notes payable activity

During the year ended December 31, 2016, we repaid \$1.2 million of principal on the RCM6 and the DSI Business Owner Notes Payable.

Equity Award Activity

During the years ended December 31, 2017 and 2016, we used cash of \$0.6 million and \$0.2 million, respectively, for the repurchase of shares to satisfy tax withholdings upon the vesting of equity-based awards.

Year ended December 31, 2016 Compared to Year ended December 31, 2015

Cash, cash equivalents and restricted cash increased from \$21.0 million as of December 31, 2015 to \$26.9 million as of December 31, 2016, an increase of \$6.0 million.

(in thousands)	Years Ended		
	December 31,		Change
	2016	2015	
Cash provided by (used in):			
Operating activities	\$(18,257)	\$(29,869)	\$11,612

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Investing activities	39,899	4,334	35,565
Financing activities	(15,671)	10,029	(25,700)
Net change in Cash and Cash Equivalents and Restricted Cash	\$5,971	\$(15,506)	\$21,477

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Cash flows from operating activities

Cash flows from operating activities for the year ended December 31, 2016 increased by \$11.6 million compared to the year ended December 31, 2015 and were positively impacted primarily by the following: (1) an increase in net income, which was \$97.7 million for the year ended December 31, 2016, compared to a net loss of \$30.1 million in 2015; (2) an increase in cash distributions from equity method investees, return on investment of \$2.9 million; and (3) net changes in working capital and other liabilities, primarily due to significant reductions as a result of a reduction in the professional resources deployed to address the restatement. Offsetting these increases to operating cash flows were primarily the following: (1) a decrease in deferred tax benefit of \$61.4 million, which was a result of the release of a portion of our valuation allowance on our deferred tax assets; (2) an increase in earnings from equity method investees of \$36.7 million, primarily received from Tinum Group; and (3) deferred revenue and project costs resulted in a change in a use of operating cash flows on a net basis of \$6.0 million due to production of ACI and DSI equipment systems.

Cash flow from investing activities

Distributions from equity method investees

Our cash flows from investing activities are significantly impacted by cash distributions from equity method investees that represent a return in excess of cumulative earnings, which increased from \$8.7 million in 2015 to \$36.3 million in 2016. All of these cash distributions were received from Tinum Group.

Maturity of investments in securities, restricted

During 2016, we ceased to pledge investments to support letters of credit and instead used restricted cash as necessary.

Acquisition and disposal of property and equipment, net

Acquisitions of property and equipment were \$0.3 million and \$0.5 million for the years ended December 31, 2016 and December 31, 2015, respectively.

Proceeds from the sale of property and equipment, net

Proceeds from the sale of property and equipment were \$0.1 million and \$0.9 million for the years ended December 31, 2016 and December 31, 2015, respectively. During 2015, we disposed of property and equipment related to the termination of manufacturing operations at our Pennsylvania fabrication facility.

Advance on note receivable

In December 2014, we loaned \$0.5 million to an independent third party to provide financing for the pursuit of emissions technology projects, bearing annual interest of 8%. Interest and principal were payable at maturity of the agreement in June 2015. In March 2015, we loaned an additional \$0.5 million to the third party, also bearing annual interest at 8%. All interest and principal payments under both loans were then deferred until March 2018.

Acquisition of a business

During March 2015, we acquired certain assets of Clearview Monitoring Solutions Ltd. ("Clearview"), which operated as ADA Analytics, for \$2.4 million cash, \$2.1 million of which was paid during 2015. We acquired the in-process research and development assets of Clearview in order to potentially commercialize and expand our analytics services available to customers. However, in August 2015, as part of a broader strategic restructuring of our business to simplify our operating structure in a manner to increase customer focus, better support sales and product delivery and also align our cost structure as the EC market shifted towards compliance solutions for MATS, our management approved an action to wind down operations of ADA Analytics.

Equity method investment

On February 10, 2014, we purchased a 24.95% membership interest in RCM6, which owned a single RC facility that produced RC that qualified for Section 45 tax credits. As part of the purchase, we were subject to quarterly capital

calls and variable payments based upon differences in originally forecasted RC production as of the purchase date and actual quarterly production. During the years ended December 31, 2016 and 2015, we funded capital calls and made variable payments of \$0.2 million and \$2.4 million, respectively. We sold our investment in RCM6 in March 2016 and received proceeds from the sale of \$1.8 million in cash and the assumption, by the buyer, of all unpaid amounts outstanding under the RCM6 Note Payable.

Cash flow from financing activities

Short term borrowings

During the year ended December 31, 2016, we repaid all principal amounts due under the Credit Agreement of \$13.3 million, including the pay-off amount of \$9.9 million, which occurred as a result of the termination of the Credit Agreement on June 30, 2016. During the year ended December 31, 2016, we paid \$0.8 million in debt issuance costs related to the Second Amendment of the Credit Agreement and amendment fees related to the Line of Credit. Additionally, during the year ended December 31, 2016, we paid a debt prepayment penalty of \$0.2 million for the pay-off the Credit Agreement prior to maturity.

Notes payable activity

During the year ended December 31, 2016 and 2015 we used \$1.2 million and \$1.5 million cash, respectively, for repayments of principal on the RCM6 and the DSI Business Owner Notes Payable,

Contractual Obligations

Our contractual obligations as of December 31, 2017 are as follows:

(in thousands)	Total	Payment Due by Period			
		Less than 1 year	1-3 years	4-5 years	After 5 years
Operating leases	\$585	\$298	\$287	\$—	—
	\$585	\$298	\$287	\$—	—

We have not included obligations related to 453A interest payments due to uncertainty of amounts payable in future periods relating to matters impacting future obligations such as the deferred tax liability balance under the installment method at each future balance sheet date and changes in interest rates. If no additional RC facilities become invested in the future, the deferred liability balance would decrease and interest payments, assuming no changes in the applicable tax and interest rates, would also decrease throughout the periods in the table above.

Outstanding letters of credit were issued in connection with equipment sales agreements, collateral support for future obligations due under the Royalty Award and other items. A summary of the information related to our letters of credit is as follows:

(in thousands)	2017	Expiration of Letters of Credit as of December 31, 2017			
		Less than 1 year	1-3 years	4-5 years	After 5 years
LC's	\$ 3,500	\$3,500	\$—	\$—	—

Additional information related to the letters of credit is included in Note 4 to the Consolidated Financial Statements included in Item 8 of this Report.

Off-Balance Sheet Arrangements

During 2017, 2016 and 2015, we did not engage in any off-balance sheet financing activities other than those included in the "Contractual Obligations" discussion above and those reflected in Note 4 to the Consolidated Financial Statements included in Item 8 of this Report.

Critical Accounting Policies and Estimates

Our significant accounting policies are discussed in Note 1 to the Consolidated Financial Statements included in Item 8 of this Report. In presenting our financial statements in conformity with accounting principles generally accepted in the United States ("U.S. GAAP"), we are required to make estimates and assumptions that affect the amounts reported

therein. Several of the estimates and assumptions we are required to make relate to matters that are inherently uncertain as they pertain to future events. Our estimates are based on historical experience and other assumptions believed to be reasonable under the circumstances, and we evaluate these estimates on an ongoing basis. Actual results may differ from these estimates under different assumptions or conditions.

We believe that the accounting estimates discussed below are critical to understanding our historical and future performance, as these estimates relate to the more significant areas involving management's judgments and estimates.

Revenue Recognition

We recognize revenue when: (i) persuasive evidence of a customer arrangement exists; (ii) the price is fixed or determinable; (iii) collectability is reasonably assured; and (v) product delivery has occurred or services have been rendered and it is probable that performance guarantees, if any, will be met.

Equipment sales

We have entered into contracts that require, over a period of months, the design and construction of emissions control systems ("extended equipment contracts"). Revenue from such extended equipment contracts is recorded using the percentage of completion, cost to cost method based on costs incurred to date compared with total estimated contract costs. However, if there is not sufficient information to estimate costs for extended equipment contracts at the time the contract was entered into, the completed contract method is used.

Under the completed contract method, revenues and costs from extended equipment contracts are deferred and recognized when contract obligations are substantially complete. We define substantially complete as delivery of equipment and start-up at the customer site, and, as applicable to DSI systems, the completion of any major warranty service. Such costs are accumulated in the Costs in excess of billings on uncompleted contracts line item in the Consolidated Balance Sheets included in Item 8 of this Report and typically include direct materials, direct labor and subcontractor costs, and indirect costs related to contract performance, such as indirect labor, supplies, tools and repairs. Based on the above factors, for each of the years ended December 31, 2017, 2016 and 2015, we recognized revenue under the completed contract method in which revenues and costs were deferred until the equipment was placed into service and contract obligations were substantially complete.

When multiple contracts exist with a single counterparty, we evaluate revenue recognition on a contract by contract basis. Provisions for estimated losses on uncompleted contracts are recognized when it has been determined that a loss is probable.

Costs of revenue include all labor, fringe benefits, subcontract labor, chemical and coal costs, materials, equipment, supplies, travel costs and any other costs and expenses directly related to the production of revenue. To the extent that they occur, we recognize estimated loss provisions related to contracts in the period that the potential loss is identified. In addition, warranty costs for ACI equipment systems are estimated based on historical experience and are recorded as a percentage of revenue when the equipment is substantially complete. Warranty costs, comprised of the cost of replacement materials and direct labor, are included within the Equipment sales cost of revenue line of the Consolidated Statements of Operations included in Item 8 of this Report.

Warranty costs for DSI equipment systems could not be estimated at the time the contracts were entered into due to a lack of historical experience manufacturing DSI systems and the resulting claims history, if any, needed to determine an appropriate warranty cost estimate. As warranty claims are incurred, such costs have been deferred within the Costs in excess of billings on uncompleted contracts line item in the Consolidated Balance Sheets included in Item 8 of this Report until such time that revenue and cost of revenue are recognized.

Demand for ACI and DSI system contracts was historically driven by coal-fired electric generating units that needed to comply with MATS and MACT. As the deadline for these standards has passed, we do not expect to enter into any future extended equipment contracts for ACI and DSI systems.

Additional details related to long-term equipment revenues, and the expected impact to the Company's consolidated financial statements upon the adoption of the FASB's ASC 606 - Revenue from Contracts with Customers ("ASC 606"), which we will adopt effective January 1, 2018, are described in Note 1 of the Consolidated Financial Statements included in Item 8 of this Report.

Royalty Award

During 2015, 2016 and 2017, we estimated future obligations due under the Royalty Award, which represented significant liabilities to us. Our estimates of amounts due under the Royalty Award were based upon projections of future revenues, as provided by Carbon Solutions. During the years ended December 31, 2017 and 2016, we revised our estimates and recorded reductions of \$3.4 million and \$4.0 million to the Royalty Award liability. In December 2017, we settled all future obligations due under the Royalty Award through the execution of the Indemnity Termination Agreement and the related Settlement Payment of \$3.3 million. Refer to Note 4 of our Consolidated Financial Statements included in Item 8 of this Report for additional information regarding the Royalty Award.

Stock-Based Compensation Expense

We grant certain executives stock options that generally vest based on performance measures and the grantee's continuous service with us. Compensation expense is recognized for these options on a straight-line basis over the estimated service period based on the estimated fair value at the date of grant using a Black-Scholes model. Different estimates of key inputs in the Black-Scholes model such as the expected term of an option and the expected volatility of our stock price, the estimate of dividends, as well as our estimate of the service period, could impact the share-based compensation expense we would recognize over the award period in our Consolidated Statements of Operations. Refer to Note 6 of our Consolidated Financial Statements included in Item 8 of this Report for additional information regarding our stock option awards.

Estimated Company Contribution to the 401(k) Plan

As part of an ongoing investigation of our 401(k) Plan by the Department of Labor ("DOL"), we have estimated and recorded a liability in the amount of \$1.0 million for a potential contribution we may need to make to the 401(k) Plan. The estimate is based on information currently available to us and involves elements of judgment and significant uncertainties. The DOL has not issued any formal findings as of the date of this Report and, although we believe there has been no breach of fiduciary duty with respect to the 401(k) Plan, we believe that it is probable that the DOL will require us to make some contribution to the 401(k) Plan in order to close the investigation. We have determined that this amount is both probable and reasonably estimable and, as such, we have recorded a liability and related expense of \$1.0 million as of December 31, 2017 and for the year ended December 31, 2017, respectively. Refer to Note 4 of our Consolidated Financial Statements included in Item 8 of this Report for additional information regarding this matter.

Income Taxes

We account for income taxes as required by U.S. GAAP, under which management judgment is required in determining income tax expense and the related balance sheet amounts. This judgment includes estimating and analyzing historical and projected future operating results, the reversal of taxable temporary differences, tax planning strategies, and the ultimate outcome of uncertain income tax positions. Actual income taxes paid may vary from estimates, depending upon changes in income tax laws, actual results of operations, and the final audit of tax returns by taxing authorities. Tax assessments may arise several years after tax returns have been filed. Changes in the estimates and assumptions used for calculating income tax expense and potential differences in actual results from estimates could have a material impact on our results of operations and financial condition.

Deferred tax assets and liabilities are determined on the basis of the differences between the financial statements and tax basis of assets and liabilities using enacted tax rates in effect for the year in which the differences are expected to reverse. The effect of a change in tax rates on deferred tax assets and liabilities is recognized in income in the period that includes the enactment date.

We recognize deferred tax assets to the extent that we believe these assets are more likely than not to be realized. In making such a determination, we consider all available positive and negative evidence, including future reversals of existing taxable temporary differences, projected future taxable income, tax-planning strategies, and results of recent operations.

We establish a valuation allowance against our deferred tax assets when, based upon the weight of all available evidence, we believe it is more likely than not that some portion or all of the deferred tax assets will not be realized. As of December 31, 2017 and 2016, we have established valuation allowances for our deferred tax assets that in our judgment will not be realized. In making this determination, we have considered the relative impact of all of the available positive and negative evidence regarding future sources of taxable income and tax planning strategies. However, there could be a material impact to our effective tax rate if there is a significant change in our estimates of future taxable income and tax planning strategies. If and when our estimates change, or there is a change in the gross balance of deferred tax assets or liabilities causing the need to reassess the realizability of deferred tax assets, then the valuation allowances are adjusted through the provision for income taxes in the period in which this determination is made. Refer to Note 12 of our Consolidated Financial Statements included in Item 8 of this Report for additional information regarding our net deferred tax assets and related income tax expense (benefit).

Recently Issued Accounting Standards

Refer to Note 1 of the Consolidated Financial Statements included in Item 8 of this Report for information regarding recently issued accounting standards.

Item 7A. Quantitative and Qualitative Disclosures About Market Risk

Interest Rate Risk

We are exposed to market risk from changes in interest rates. Our assets include cash equivalents subject to variable interest rates. As of December 31, 2017, \$30.7 million of cash was earning interest at 0.35%.

We are exposed to interest rate risk related to our obligations to pay 453A interest to the IRS. As of December 31, 2017, the applicable 453A interest rate, which, according to the applicable rules is rounded to the nearest full percentage to determine interest due, which as of December 31, 2017 was 4.00%. A change of 1% in the applicable interest rate during the year ended December 31, 2017 would have caused a change in pretax income of \$0.6 million. We are also exposed to interest rate risk in connection with the Line of Credit, if amounts are drawn, which bears interest at a variable rate, which is the higher of 5% or the "Prime Rate" plus 1%. As of December 31, 2017 the Prime Rate was 4.50%, but no amounts were outstanding on the Line of Credit.

Using the December 31, 2017 cash balances, a 10% proportionate increase in short-term interest rates on an annualized basis compared to the actual interest rates as of December 31, 2017, and a corresponding and parallel shift in the remainder of the yield curve, would result in an increase to pretax income of \$12 thousand. Conversely, a corresponding decrease in interest rates would result in a comparable decrease to pretax income. Actual interest rates could change significantly more than 10%. There are inherent limitations in the sensitivity analysis presented, primarily due to the assumption that interest rate movements are not linear and instantaneous. As a result, the analysis is unable to reflect the potential effects of more complex market changes that could arise, which may positively or negatively affect pretax income.

Commodity Price Risk

In the normal course of our business, we are exposed to market risk or price fluctuations related to the goods we procure related to our revenue-producing activities. 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 chemicals that are used at a customer's power plant, which 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. We do not engage in commodity hedging transactions for raw materials, though we have committed and will continue to commit to purchase certain materials for specified periods of time. Significant increases in the prices of our products due to increases in our suppliers' cost of discrete chemicals could have a negative effect on demand for products and on profitability. We may not be able to pass cost increases on to our customers, and our margins maybe negatively impacted given the competitive prices of other products within the mercury control market.

Item 8. Financial Statements and Supplementary Data

Advanced Emissions Solutions, Inc.

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Advanced Emissions Solutions, Inc.

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Report of Independent Registered Public Accounting Firm

To the Stockholders and the Board of Directors of
Advanced Emissions Solutions, Inc. and Subsidiaries

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheet of Advanced Emissions Solutions, Inc. and subsidiaries (the “Company”) as of December 31, 2017, the related consolidated statements of operations, stockholders’ equity and cash flows for the year then ended, and the related notes (collectively referred to as the “consolidated financial statements”). In our opinion, the consolidated financial statements present fairly, in all material respects, the consolidated financial position of the Company as of December 31, 2017, and the consolidated results of its operations and its cash flows for the year then ended, in conformity with accounting principles generally accepted in the United States of America.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (“PCAOB”), the Company’s internal control over financial reporting as of December 31, 2017, based on criteria established in Internal Control - Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission and our report dated March 12, 2018, expressed an unqualified opinion on the Company’s internal control over financial reporting.

Basis for Opinion

These consolidated financial statements are the responsibility of the Company’s management. Our responsibility is to express an opinion on the Company’s consolidated financial statements based on our audit. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud. Our audit included performing procedures to assess the risks of material misstatement of the consolidated financial statements, whether due to error or fraud, and performing procedures to respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the consolidated financial statements. Our audit also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements. We believe that our audit provides a reasonable basis for our opinion.

/s/ Moss Adams LLP

Denver, Colorado
March 12, 2018

We have served as the Company’s auditor since 2017.

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

Board of Directors and Stockholders
Advanced Emissions Solutions, Inc. and Subsidiaries

We have audited the accompanying consolidated balance sheet of Advanced Emissions Solutions, Inc. and subsidiaries as of December 31, 2016, and the related consolidated statements of operations, stockholders' equity, and cash flows for each of the two years in the period ended December 31, 2016. These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on these financial statements based on our audits.

We conducted our audits in accordance with the standards of the Public Company Accounting Oversight Board (United States). Those standards require that we plan and perform the audits to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of Advanced Emissions Solutions, Inc. and subsidiaries as of December 31, 2016, and the results of their operations and their cash flows for each of the two years in the period ended December 31, 2016, in conformity with U.S. generally accepted accounting principles.

/s/ Hein & Associates LLP

Denver, Colorado
March 13, 2017

Advanced Emissions Solutions, Inc. and Subsidiaries
Consolidated Balance Sheets

	As of December 31,	
(in thousands, except share data)	2017	2016
ASSETS		
Current assets:		
Cash and cash equivalents	\$30,693	\$13,208
Restricted cash	—	13,736
Receivables, net	1,113	8,648
Receivables, related party	3,247	1,934
Prepaid expenses and other assets	1,835	1,382
Total current assets	36,888	38,908
Property and equipment, net of accumulated depreciation of \$1,486 and \$2,920, respectively	410	735
Equity method investments	4,351	3,959
Deferred tax assets	38,661	61,396
Other assets	2,308	2,298
Total Assets	\$82,618	\$107,296
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Accounts payable	\$1,000	\$1,920
Accrued payroll and related liabilities	1,384	2,121
Billings in excess of costs on uncompleted contracts	1,830	4,947
Legal settlements and accruals	—	10,706
Other current liabilities	2,664	4,017
Total current liabilities	6,878	23,711
Legal settlements and accruals, long-term	—	5,382
Other long-term liabilities	2,285	2,038
Total Liabilities	9,163	31,131
Commitments and contingencies (Notes 3 and 4)		
Stockholders' equity:		
Preferred stock: par value of \$.001 per share, 50,000,000 shares authorized, none outstanding	—	—
Common stock: par value of \$.001 per share, 100,000,000 shares authorized, 22,465,821 and 22,322,022 shares issued and 20,752,055 and 22,024,675 shares outstanding at December 31, 2017 and 2016, respectively	22	22
Treasury stock, at cost: 1,713,766 and zero shares as of December 31, 2017 and 2016, respectively	(16,397)	—
Additional paid-in capital	105,308	119,494
Accumulated deficit	(15,478)	(43,351)
Total stockholders' equity	73,455	76,165
Total Liabilities and Stockholders' Equity	\$82,618	\$107,296
See Notes to the Consolidated Financial Statements.		

Advanced Emissions Solutions, Inc. and Subsidiaries
Consolidated Statements of Operations

(in thousands, except per share data)	Years Ended December 31,		
	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
Operating expenses:			
Equipment sales cost of revenue, exclusive of depreciation and amortization	28,438	37,741	45,433
Chemicals cost of revenue, exclusive of depreciation and amortization	3,434	1,700	601
Consulting services and other cost of revenue, exclusive of depreciation and amortization	13	376	1,518
Payroll and benefits	7,669	12,390	23,589
Rent and occupancy	795	2,168	3,309
Legal and professional fees	4,354	8,293	16,604
General and administrative	3,857	3,721	6,104
Research and development, net	157	(648)	5,362
Depreciation and amortization	789	979	2,019
Total operating expenses	49,506	66,720	104,539
Operating loss	(13,814)	(16,098)	(41,800)
Other income (expense):			
Earnings from equity method investments	53,843	45,584	8,921
Royalties, related party	9,672	6,125	10,642
Interest income	54	268	24
Interest expense	(3,024)	(5,066)	(8,402)
Litigation settlement and royalty indemnity expense, net	3,269	3,464	—
Other	2,025	2,463	494
Total other income	65,839	52,838	11,679
Income (loss) before income tax expense	52,025	36,740	(30,121)
Income tax expense (benefit)	24,152	(60,938)	20
Net income (loss)	\$27,873	\$97,678	\$(30,141)
Earnings (loss) per common share (Note 1):			
Basic	\$1.30	\$4.40	\$(1.37)
Diluted	\$1.29	\$4.34	\$(1.37)
Weighted-average number of common shares outstanding:			
Basic	21,367	21,931	21,773
Diluted	21,413	22,234	21,773
Cash dividends declared per common share outstanding:	\$0.75	\$—	\$—
See Notes to the Consolidated Financial Statements.			

Advanced Emissions Solutions, Inc. and Subsidiaries
Consolidated Statements of Changes in Stockholders' Equity (Deficit)

(in thousands, except share data)	Common Stock		Treasury Stock		Additional Paid-in Capital	Accumulated Deficit	Total Stockholders' Equity (Deficit)
	Shares	Amount	Shares	Amount			
Balances, January 1, 2015	21,853,263	\$ 22	—	\$—	\$ 110,169	\$(110,888)	\$ (697)
Stock-based compensation	127,867	—	—	—	6,462	—	6,462
Clawback of equity awards	(20,656)	—	—	—	(325)	—	(325)
Repurchase of shares to satisfy tax withholdings	(16,602)	—	—	—	(277)	—	(277)
Net loss	—	—	—	—	—	(30,141)	(30,141)
Balances, December 31, 2015	21,943,872	\$ 22	—	\$—	\$ 116,029	\$(141,029)	\$ (24,978)
Stock-based compensation	405,354	—	—	—	2,762	—	2,762
Repurchase of shares to satisfy tax withholdings	(27,204)	—	—	—	(196)	—	(196)
Reclassification and settlement of equity awards	—	—	—	—	899	—	899
Net income	—	—	—	—	—	97,678	97,678
Balances, December 31, 2016	22,322,022	\$ 22	—	\$—	\$ 119,494	\$(43,351)	\$ 76,165
Stock-based compensation	199,734	—	—	—	2,209	—	2,209
Repurchase of shares to satisfy tax withholdings	(55,935)	—	—	—	(566)	—	(566)
Dividends declared on common stock	—	—	—	—	(15,829)	—	(15,829)
Repurchase of common shares	—	—	(1,713,766)	(16,397)	—	—	(16,397)
Net income	—	—	—	—	—	27,873	27,873
Balances, December 31, 2017	22,465,821	\$ 22	(1,713,766)	\$(16,397)	\$ 105,308	\$(15,478)	\$ 73,455

See Notes to the Consolidated Financial Statements.

Advanced Emissions Solutions, Inc. and Subsidiaries
Consolidated Statements of Cash Flows

(in thousands)	Years Ended December 31,		
	2017	2016	2015
Cash flows from operating activities			
Net income (loss)	\$27,873	\$97,678	\$(30,141)
Adjustments to reconcile net income (loss) to net cash used in operating activities:			
Deferred tax benefit from release of valuation allowance	(474)	(61,396)	—
Depreciation and amortization	789	979	2,019
Debt prepayment penalty and amortization of debt issuance costs	109	1,380	987
Impairment of property, equipment, inventory, intangibles and cost method investment	464	2,280	2,087
Provision for accounts receivable and other receivables	385	13	633
Interest costs added to principal balance of notes payable	—	—	923
Share-based compensation expense, net	2,209	2,868	6,879
Earnings from equity method investments	(53,843)	(45,584)	(8,921)
Gain on sale of equity method investment	—	(2,078)	—
Gain on settlement of note payable, licensed technology, and sales-type lease	—	(1,910)	—
Other non-cash items, net	44	35	285
Changes in operating assets and liabilities, net of effects of acquired businesses:			
Receivables	6,743	(301)	8,361
Related party receivables	(1,313)	(16)	(479)
Prepaid expenses and other assets	(351)	1,195	(107)
Costs incurred on uncompleted contracts	27,048	29,623	6,492
Deferred tax asset, net	23,208	—	—
Other long-term assets	41	961	205
Accounts payable	(920)	(4,254)	(1,340)
Accrued payroll and related liabilities	(738)	(2,887)	(102)
Other current liabilities	(1,586)	(3,105)	(812)
Billings on uncompleted contracts	(30,140)	(32,272)	(15,186)
Advance deposit, related party	—	(2,980)	(3,544)
Other long-term liabilities	154	(2,175)	595
Legal settlements and accruals	(16,088)	(4,211)	(3,722)
Distributions from equity method investees, return on investment	4,638	7,900	5,019
Net cash used in operating activities	(11,748)	(18,257)	(29,869)

(in thousands)	Years Ended December 31,		
	2017	2016	2015
Cash flows from investing activities			
Distributions from equity method investees in excess of cumulative earnings	48,875	38,250	8,651
Maturity of investment securities, restricted	—	336	—
Acquisition of property and equipment	(485)	(289)	(507)
Proceeds from sale of property and equipment	57	52	942
Advance on note receivable	—	—	(500)
Acquisition of business	—	—	(2,124)
Purchase of and contributions to equity method investee	(61)	(223)	(2,128)
Proceeds from sale of equity method investment	—	1,773	—
Net cash provided by investing activities	48,386	39,899	4,334
Cash flows from financing activities			
Borrowings on Line of Credit	808	—	—
Repayments on Line of Credit	(808)	—	—
Short-term borrowings	—	—	13,539
Repayments on short-term borrowings and notes payable, related party	—	(14,496)	(3,234)
Short-term borrowing loan costs and debt prepayment penalty	(236)	(979)	—
Repurchase of shares to satisfy tax withholdings	(566)	(196)	(276)
Dividends paid	(15,690)	—	—
Repurchase of common shares	(16,397)	—	—
Net cash (used in) provided by financing activities	(32,889)	(15,671)	10,029
Increase (Decrease) in Cash and Cash Equivalents and Restricted Cash	3,749	5,971	(15,506)
Cash and Cash Equivalents and Restricted Cash, beginning of year	26,944	20,973	36,479
Cash and Cash Equivalents and Restricted Cash, end of year	\$30,693	\$26,944	\$20,973
Supplemental disclosure of cash flow information:			
Cash paid for interest	\$3,644	\$3,647	\$6,274
Cash paid for income taxes, net of refunds received	\$1,672	\$541	\$29
Supplemental disclosure of non-cash investing and financing activities:			
Settlement of RCM6 note payable	\$—	\$13,234	\$—
Non-cash reduction of equity method investment	\$—	\$11,156	\$—
Stock award reclassification (liability to equity)	\$—	\$899	\$—
Dividends payable	\$139	\$—	\$—
See Notes to the Consolidated Financial Statements.			

Advanced Emissions Solutions, Inc. and Subsidiaries
Notes to Consolidated Financial Statements

Note 1 - Summary of Operations and Significant Accounting Policies

Nature of Operations

Advanced Emissions Solutions, Inc. ("ADES" or the "Company") is a Delaware corporation with its principal office located in Highlands Ranch, Colorado. The Company is principally engaged in emissions control ("EC") technologies and associated equipment, consumables and services. Our proprietary environmental technologies enable 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. The Company generates substantial earnings and tax credits under Section 45 ("Section 45 tax credits") of the Internal Revenue Code ("IRC") from its equity investments in certain entities and royalty payment streams related to technologies that are licensed to Tinum Group, LLC, a Colorado limited liability company ("Tinum Group"). Such technologies allow Tinum Group to provide their customers with various solutions to enhance combustion and reduced emissions of nitrogen oxide ("NO_x") and mercury from coal burned to generate electrical power. The Company's sales occur principally throughout the United States. See Note 13 for additional information regarding the Company's operating segments.

Principles of Consolidation

The Consolidated Financial Statements include accounts of wholly-owned subsidiaries. All significant intercompany balances and transactions have been eliminated in consolidation.

All investments in partially owned entities for which the Company has greater-than-20% ownership are accounted for using the equity method based on the legal form of the Company's ownership percentage and the applicable ownership percentage of the entity and are included in the Equity method investments line item in the Consolidated Balance Sheets. As of December 31, 2017, the Company holds equity interests of 42.5%, 50.0% and 50.0% in Tinum Group, Tinum Services, LLC ("Tinum Services") and GWN Manager, LLC ("GWN Manager"), respectively. As discussed in Note 2, the Company purchased its interest in GWN Manager in July 2017 and sold its equity method investment in RCM6, LLC ("RCM6") in March 2016. Tinum Group is deemed to be variable interest entity ("VIE") under the VIE model of consolidation, but the Company does not consolidate Tinum Group as it is not deemed to be its primary beneficiary.

Cash and Cash Equivalents

Cash and cash equivalents include bank deposits and other highly liquid investments purchased with an original maturity of three months or less.

Restricted Cash

As of December 31, 2017, all cash and cash equivalents were unrestricted and all cash requirements for contractual performance guarantees and payments were satisfied under the borrowing availability of the 2013 Loan and Security Agreement ("Line of Credit"). As of December 31, 2016, restricted cash primarily consisted of funds withheld to provide collateral support for certain letters of credit issued to i) customers related to certain contractual performance and payment guarantees, ii) certain settlement parties to provide security for continuing royalty indemnification payments related to the settlement of certain litigation (the "Royalty Award"), and iii) minimum cash balance requirements under the Line of Credit.

Receivables and Credit Policies

Receivable balances represent unsecured, customer obligations due under trade terms typically requiring payment within 30-45 days from the invoice date and are stated net of allowance for doubtful accounts. The Company records allowances for doubtful accounts when it is probable that the accounts receivable balances will not be collected. The following tables show the receivables balances:

	As of December 31,	
(in thousands)	2017	2016
Trade receivables	\$1,240	\$4,289
Less: Allowance for doubtful accounts	(127)	(200)
Trade receivables, net	1,113	4,089

Other receivables ⁽¹⁾	—	4,559
Total	\$1,113	\$8,648

(1) As of December 31, 2016, Other receivables included settlement amounts subsequently funded by the Company's insurance carriers for legal proceedings described in Note 4.

Advanced Emissions Solutions, Inc. and Subsidiaries
Notes to Consolidated Financial Statements

During the years ended December 31, 2017, 2016 and 2015, the Company recognized zero, zero and \$0.1 million, respectively, of bad debt expense related to the write-off of specific accounts whose ultimate collection was in doubt. Bad debt expense is included within the General and administrative line item in the Consolidated Statements of Operations.

Notes receivable are reported at their outstanding principal balances, adjusted for any amounts determined to be uncollectible. As of December 31, 2017 and 2016, the Company had a Note Receivable outstanding in the amount of \$1.0 million, which is fully reserved as substantial doubt exists as to collectability.

Interest income is accrued and credited to income based on the unpaid principal balance outstanding. The accrual of interest is discontinued when substantial doubt exists about the ability to collect principal and interest based upon the contractual terms. Current portion of notes receivable is included within Prepaid expenses and other assets and long-term portion is included in the Other assets line item in the Consolidated Balance Sheets. Additional details regarding Note receivable balances are included in Note 10.

Inventory

Inventories are stated at the lower of cost or market and consist principally of finished goods related to the Company's chemical product offerings. The cost of inventory is determined using the first-in-first-out ("FIFO") method.

Inventories are included within the Other assets line item in the Consolidated Balance Sheets. As of December 31, 2017 and 2016, the balance of inventory was comprised of finished goods of \$0.1 million and zero, respectively.

Other Intangible Assets

Other Intangible assets consist of patents and licensed technology and are included in the Other assets line item in the Consolidated Balance Sheets.

The Company has developed technologies resulting in patents being granted by the U.S. Patent and Trademark Office. Legal costs associated with securing the patent are capitalized and amortized over the legal or useful life beginning on the patent filing date. The weighted-average amortization period for the Company's patents is 16 years.

All research and development costs associated with the technology development are expensed as incurred.

Investments

The investments in entities in which the Company does not have a controlling interest (financial or operating), but where it has the ability to exercise significant influence over operating and financial policies, are accounted for using the equity method of accounting. Whether or not the Company exercises significant influence with respect to an investee depends on an evaluation of several factors including, among others, representation on the investee company's board of directors and the Company's ownership level. Under the equity method of accounting, an investee company's accounts are not reflected within the Company's Consolidated Balance Sheets and Consolidated Statements of Operations; however, the Company's share of the earnings or losses of the investee company is reported in the Earnings from equity method investments line item in the Consolidated Statements of Operations, and the Company's carrying value in an equity method investee company is reported in the Equity method investments line in the Consolidated Balance Sheets.

When the Company receives distributions in excess of the carrying value of the investment and has not guaranteed any obligations of the investee, nor is it required to provide additional funding to the investee, the Company recognizes such excess distributions as equity method earnings in the period the distributions occur. When the investee subsequently reports income, the Company does not record its share of such income until it equals the amount of distributions in excess of carrying value that were previously recognized in income. During the years ended December 31, 2017, 2016 and 2015, the Company had no guarantees or requirements to provide additional funding to investees.

Additionally, when the Company's carrying value in an equity method investment is zero and the Company has not guaranteed any obligations of the investee, nor is it required to provide additional funding to the investee, the Company will not recognize its share of any reported losses by the investee until future earnings are generated to offset previously unrecognized losses. As a result, equity income or loss reported on the Company's Consolidated Statements of Operations for certain equity method investees may differ from a mathematical calculation of net income or loss attributable to its equity interest based upon the percentage ownership of the Company's equity interest

and the net income or loss attributable to equity owners as shown on investee company's statements of operations. Likewise, distributions from equity method investees are reported on the Consolidated Statements of Cash Flows as "return on investment" within Operating cash flows until such time as the carrying value in an equity method investee company is reduced to zero; thereafter, such distributions are reported as "distributions in excess of cumulative earnings" within Investing cash flows. See Note 2 for additional information regarding the Company's equity method investments.

Advanced Emissions Solutions, Inc. and Subsidiaries
Notes to Consolidated Financial Statements

Investments in partially-owned subsidiaries for which the Company has less-than-20% ownership are accounted for using the cost method. Cost method investments are evaluated for impairment upon an indicator of impairment such as an event or change in circumstances that may have a significant adverse effect on the fair value of the investment. If no such events or changes in circumstances have occurred, the fair value is estimated only if practicable to do so.

Royalties, Related Party

The Company licenses its M-45TM and M-45-PCTM emission control technologies ("M-45 License") to Tinum Group and realizes royalty income based upon a percentage of the per-ton, pre-tax margin as defined in the M-45 License.

Property and Equipment

Property and equipment is stated at cost less accumulated depreciation and includes leasehold improvements.

Depreciation on assets is computed using the straight-line method over the lesser of the estimated useful lives of the related assets or the lease term (ranging from 2 to 7 years). Maintenance and repairs that do not extend the useful life of the respective asset are charged to Operating expenses as incurred. When assets are retired, or otherwise disposed of, the property accounts are relieved of costs and accumulated depreciation and any resulting gain or loss is credited or charged to income. The Company performs an evaluation of the recoverability of the carrying value of its long-lived assets to determine if facts and circumstances indicate that the carrying value of assets may be impaired and if any adjustment is warranted.

Revenue Recognition

The Company recognizes revenues when: (i) persuasive evidence of a customer arrangement exists; (ii) the price is fixed or determinable; (iii) collectability is reasonable assured; and (iv) product delivery has occurred or services have been rendered and it is probable that performance guarantees, if any, will be met.

Equipment sales

The Company has entered into construction-type contracts that entail the design and construction of emissions control systems ("extended equipment contracts"). Revenues from such extended equipment contracts are recorded using the percentage of completion cost to cost method based on costs incurred to date compared with total estimated contract costs. However, if the Company does not have sufficient information to estimate either costs incurred or total estimated costs for extended equipment contracts at the time contracts are entered into, the completed contract method is used. For all of its Dry Sorbent Injection ("DSI") contracts, the Company has used the completed contract method from inception of the contract to recognize revenues and related cost of revenue.

Under the completed contract method, revenues and costs from extended equipment contracts are deferred and recognized when contract obligations are substantially complete. The Company defines substantially complete as delivery of equipment and start-up at the customer site or, as applicable to DSI systems, the completion of any major warranty service period. For each of the years ended December 31, 2017, 2016 and 2015, the Company did not have sufficient information to measure ongoing performance for its extended equipment contracts. Accordingly, the completed contract method of revenue recognition has been used for each of these years, and revenues and costs are deferred until the equipment is placed into service and contract obligations are substantially complete. For the years ended December 31, 2017 and 2016, the Company did not enter into any extended equipment contracts.

Deferred revenue and related costs are accumulated in the Costs in excess of billings on uncompleted contracts or Billings in excess of costs on uncompleted contracts line items in the Consolidated Balance Sheets, and typically include direct materials, direct labor and subcontractor costs, and indirect costs related to contract performance, such as indirect labor, supplies, tools and repairs.

When multiple contracts exist with a single counterparty, the Company evaluates revenue recognition on a contract-by-contract basis. Provisions for estimated losses on uncompleted contracts are recognized when it has been determined that a loss is probable.

The Company also enters into other non-extended equipment contracts for which the Company recognizes revenues as services to build equipment systems are performed or as equipment is delivered.

Chemicals

Revenues for direct sales of chemicals are recognized at the date of delivery to, and acceptance by, the customer.

Advanced Emissions Solutions, Inc. and Subsidiaries
Notes to Consolidated Financial Statements

Certain chemicals customer contracts are comprised of evaluation tests of the Company's chemicals' effectiveness and efficiency in reducing emissions and entail the delivery of chemicals to the customer and the Company evaluating results of emissions reduction over the term of the contract. The Company generally recognizes revenue from these types of contracts over the duration of the contract based on the cost of chemicals consumed by the customer.

Consulting services and other

The Company recognizes revenues on time and material contracts as services are performed.

Cost of Revenue

Costs of revenue include all labor, fringe benefits, subcontract labor, chemical and coal costs, materials, equipment, supplies, travel costs and any other costs and expenses directly related to the Company's production of revenues. The Company records estimated contract losses, if any, in the period they are determined.

Warranty costs for Activated Carbon Injection ("ACI") equipment systems are estimated based on historical experience and are recorded as a percentage of revenue when the equipment is substantially complete. Warranty costs, comprised of the cost of replacement materials and direct labor, are included within the Equipment sales cost of revenue line in the Consolidated Statements of Operations.

Warranty costs for DSI equipment systems have not been estimable at the time the contracts were entered into, as the Company lacked historical experience in manufacturing DSI systems and was unable to reasonably estimate costs to complete as well as warranty claims. Therefore, revenue recognition on DSI equipment systems has been deferred until the end of the warranty period, which has generally been 12 to 24 months following substantial completion. As warranty claims are incurred, such costs are deferred within the Costs in excess of billings on uncompleted contracts line item in the Consolidated Balance Sheets, until such time that revenues and cost of revenue are recognized. Subsequent to revenues being recognized, warranty claims are included within the Other long-term liabilities line item in the Consolidated Balance Sheets and within Cost of revenue line of the Consolidated Statements of Operations. The changes in the carrying amount of the Company's warranty obligations, which do not include amounts for DSI systems as revenues, are deferred until the end of the warranty period, and are disclosed in Note 10.

Payroll and Benefits

Payroll and benefits costs include direct payroll, personnel related fringe benefits, sales and administrative staff labor costs and stock compensation expense. Payroll and benefits costs exclude direct labor included in Cost of revenue.

Rent and Occupancy

Rent and occupancy costs include rent, insurance and other occupancy-related expenses.

Legal and Professional

Legal and professional costs include external legal, audit and consulting expenses.

General and Administrative

General and administrative costs include director fees and expenses, bad debt expense, impairments and other general costs of conducting business.

Research and Development Costs

Research and development costs are charged to expense in the period incurred.

Research and development expense consists of research relating to continued product development for the Company's ongoing business and various other projects including the CO₂ capture and control market. The Company historically entered into development and cost-sharing contracts with the U.S. Department of Energy (the "DOE"). These contracts were best-effort-basis contracts, and the Company generally included industry cost-share partners to offset the costs incurred that are anticipated to be in excess of funded amounts from the DOE. The Company accounts for these contracts with the DOE and industry cost-share partners by recognizing amounts funded by the DOE under research-and-development-cost-sharing arrangements as an offset to research and development expense, which is reported in the Research and development, net line in the Consolidated Statements of Operations.

Advanced Emissions Solutions, Inc. and Subsidiaries
Notes to Consolidated Financial Statements

Asset Retirement Obligations

Asset retirement obligations, or "ARO liabilities," consist of estimated costs to remove equipment and reclaim the land associated with one research and development project. The Company estimates ARO liabilities for final reclamation based upon bids obtained from independent third parties and other exit alternatives, which are adjusted for inflation and then discounted at a credit-adjusted risk-free rate. Changes in estimates could occur due to revisions of estimated costs and changes in timing and performance of the reclamation activities. ARO liabilities are included within the Other long-term liabilities line item in the Consolidated Balance Sheets and discussed further in Note 10. As of December 31, 2017 and December 31, 2016, the ARO liability was zero and \$1.3 million, respectively.

Income Taxes

The Company accounts for income taxes under the asset and liability method, which requires the recognition of deferred tax assets and liabilities for the expected future tax consequences of events that have been included in the financial statements. Under this method, deferred tax assets and liabilities are determined on the basis of the differences between the financial statements and tax basis of assets and liabilities using enacted tax rates in effect for the year in which the differences are expected to reverse. The effect of a change in tax rates on deferred tax assets and liabilities is recognized in operations in the period that includes the enactment date.

The Company recognizes deferred tax assets and liabilities and maintains valuation allowances where it is more likely than not that all or a portion of deferred tax assets will not be realized. In making such a determination, the Company considers all available positive and negative evidence, including future reversals of existing taxable temporary differences, projected future taxable income, tax-planning strategies, and results of recent operations.

The Company records uncertain tax positions on the basis of a two-step process whereby (1) the Company determines whether it is more-likely-than-not that the tax positions will be sustained on the basis of the technical merits of the position and (2) for those tax positions that meet the more-likely-than-not recognition threshold, the Company recognizes the amount of tax benefit that is more than 50 percent likely to be realized upon ultimate settlement with the related tax authority.

The Company records interest expense due to the Company's share of Tinum Group's equity method earnings for Refined Coal ("RC") facilities, in which the lease income or sale is treated as installment sales for tax purposes. IRS section 453A requires taxpayers using the installment method to pay an interest charge on the portion of the tax liability that is deferred under the installment method. The Company recognizes IRS section 453A interest ("453A interest") and other interest and penalties related to unrecognized tax benefits in the Interest expense line item in the Consolidated Statements of Operations.

Stock-Based Compensation

Stock-based compensation expense is measured at the grant date based on the estimated fair value of the stock-based award and is generally expensed on a straight-line basis over the requisite service period and/or performance period of the award. Forfeitures are recognized when incurred. These costs are recorded in the Payroll and benefits or General and administrative, for director related expense, line items in the Consolidated Statements of Operations.

Earnings (Loss) Per Share

Basic earnings (loss) per share is computed using the two-class method, which is an earnings allocation formula that determines earnings (loss) per share for common stock and any participating securities according to dividend and participating rights in undistributed earnings. The Company's restricted stock awards ("RSA's") granted prior to December 31, 2016 contain non-forfeitable rights to dividends or dividend equivalents and are deemed to be participating securities. RSA's granted subsequent to December 31, 2016 do not contain non-forfeitable rights to dividends and are not deemed to be participating securities.

Under the two-class method, net income (loss) for the period is allocated between common stockholders and the holders of the participating securities based on the weighted-average of common shares outstanding during the period, excluding participating, unvested RSA's ("common shares"), and the weighted-average number of participating, unvested RSA's outstanding during the period, respectively. The allocated, undistributed income for the period is then divided by the weighted-average number of common shares and participating, unvested RSA's outstanding during the

period to determine basic earnings per common share and participating security for the period, respectively. Pursuant to accounting principles generally accepted in the United States ("U.S. GAAP"), the Company has elected not to separately present basic or diluted earnings per share attributable to participating securities in the Consolidated Statements of Operations.

Advanced Emissions Solutions, Inc. and Subsidiaries
Notes to Consolidated Financial Statements

Diluted earnings per share is computed in a manner consistent with that of basic earnings per share, while considering other potentially dilutive securities. Potentially dilutive securities consist of both unvested, participating and non-participating RSA's, as well as outstanding options to purchase common stock ("Stock Options") and contingent performance stock units ("PSU's") (collectively, "Potential dilutive shares"). The dilutive effect, if any, for non-participating RSA's, Stock Options and PSU's is determined using the greater of dilution as calculated under the treasury stock method or the two-class method. Potential dilutive shares are excluded from diluted earnings (loss) per share when their effect is anti-dilutive. When there is a net loss for a period, all Potential dilutive shares are anti-dilutive and are excluded from the calculation of diluted loss per share for that period.

Each PSU represents a contingent right to receive shares of the Company's common stock, and the number of shares may range from zero to two times the number of PSU's granted on the award date depending upon the price performance of the Company's common stock as measured against a general index and a specific peer group index over requisite performance periods. The number of Potential dilutive shares related to PSU's is based on the number of shares of the Company's common stock, if any, that would be issuable at the end of the respective reporting period, assuming that the end of the reporting period is the end of the contingency period applicable to such PSU's. See Note 6 for additional information related to PSU's.

The following table sets forth the calculations of basic and diluted earnings (loss) per common share:

(in thousands, except per share amounts)	Years Ended December 31,		
	2017	2016	2015
Net income (loss)	\$27,873	\$97,678	\$(30,141)
Less: Dividends and undistributed income (loss) allocated to participating securities	171	1,105	(275)
Income (loss) attributable to common stockholders	\$27,702	\$96,573	\$(29,866)
Basic weighted-average number of common shares outstanding	21,367	21,931	21,773
Add: dilutive effect of equity instruments	46	303	—
Diluted weighted-average shares outstanding	21,413	22,234	21,773
Earnings (loss) per share - basic	\$1.30	\$4.40	\$(1.37)
Earnings (loss) per share - diluted	\$1.29	\$4.34	\$(1.37)

For the years ended December 31, 2017 and 2016, options to purchase 0.3 million and 0.2 million shares of common stock for each of the years presented were outstanding, but were not included in the computation of diluted net income per share because the exercise price exceeded the average price of the underlying shares and the effect would have been anti-dilutive. For the year ended December 31, 2015, 0.4 million shares of the Company's outstanding equity awards were excluded from the calculation of diluted loss per share because their inclusion would have been anti-dilutive. For the years ended December 31, 2017, 2016 and 2015, options to purchase of 0.2 million, 0.2 million and 0.1 million shares of common stock, respectively, which vest based on the Company achieving specified performance targets, were outstanding, but not included in the computation of diluted net income per share because they were determined not to be contingently issuable.

Use of Estimates

The preparation of the Company's consolidated financial statements in conformity with U.S. GAAP requires the Company's management to make estimates and assumptions that affect the amounts reported in these financial statements and accompanying notes. Actual results could differ from those estimates. The Company makes assumptions on the following significant financial statement components including:

- revenue recognition and warranty estimates accruals related to the Company's extended equipment contracts;
- the carrying value of its long-lived assets;
- the allowance for doubtful accounts receivable;
- stock compensation costs;
- estimates related to future obligations, including the Royalty Award, and other legal accruals; and
- income taxes, including the valuation allowance for deferred tax assets and uncertain tax positions.

Risks and Uncertainties

The Company's earnings are significantly affected by equity earnings it receives from Tinnuum Group. Tinnuum Group has 17 invested RC facilities of which 11 are leased to a single customer. A majority of these leases are periodically renewed and the

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Advanced Emissions Solutions, Inc. and Subsidiaries
Notes to Consolidated Financial Statements

loss of this customer by Tinnuum Group would have a significant adverse impact on its financial position, results of operations and cash flows, which in turn would have material adverse impact on the Company's financial position, results of operations and cash flows.

Reclassifications

Certain balances have been reclassified from prior years to conform to the current year presentation.

New Accounting Guidance

In May 2014, the FASB issued ASU No. 2014-09, Revenue from Contracts with Customers (Topic 606) ("ASU 2014-09"), which provides a single comprehensive model for entities to use in accounting for revenue arising from contracts with customers and supersedes current revenue recognition guidance, including industry-specific guidance. The core principle of ASU 2014-09 is that "an entity recognizes revenue to depict the transfer of promised goods or services to customers in an amount that reflects the consideration to which the entity expects to be entitled in exchange for those goods or services. ASU 2014-09 and its related amendments are effective for reporting periods (including interim periods) beginning after December 31, 2017. The standard may be applied retrospectively to each prior period presented or retrospectively with the cumulative effect recognized as of the date of adoption ("modified retrospective method"). The Company will adopt the standard under the modified retrospective method effective January 1, 2018, which will be reflected in its financial statements as of and for the three months ended March 31, 2018.

As of the date of this filing, the Company has completed its assessment of ASU 2014-09 for the impact to the financial statements as of the adoption date, completed a detailed review of individual customer contracts, completed its review of controls and procedures that will be revised or added from the adoption of the standard, and completed its documentation of the standard's financial statement impact at adoption, financial statement presentation and disclosure changes and changes to existing revenue recognition policies, controls and procedures.

As of the adoption date of ASU 2014-09, the Company has determined that deferred revenue and deferred project costs on uncompleted contracts as of December 31, 2017 related to equipment sales projects will be derecognized through a cumulative effect adjustment, which will reduce the opening balance of the Accumulated deficit in the amount of approximately \$1.7 million, net of income taxes. In addition, as of the adoption date, the Company will also derecognize deferred revenue and deferred project costs as of December 31, 2017 for a technology licensing arrangement through a cumulative effect adjustment, which will reduce the Accumulated deficit in the amount of approximately \$1.3 million, net of income taxes. Except for the reclassification of the Company's royalties received from related parties from Other income to Revenue, the Company expects that there will be no material financial statement impact as of the adoption date from other uncompleted contracts.

In January 2016, the FASB issued ASU 2016-01, Financial Instruments (Subtopic 825-10) - Overall: Recognition and Measurement of Financial Assets and Financial Liabilities ("ASU 2016-01"). This standard provides guidance on how entities measure certain equity investments and present changes in the fair value. This standard requires that entities measure certain equity investments that do not result in consolidation and are not accounted for under the equity method at fair value and recognize any changes in fair value in net income. ASU 2016-01 is effective for fiscal years beginning after December 31, 2017. The Company is currently evaluating the provisions of this guidance and assessing its impact on the Company's financial statements and disclosures. The Company does not believe this standard will have a material impact on the Company's financial statements and disclosures.

In February 2016, the FASB issued ASU 2016-02, Leases (Topic 842) ("ASU 2016-02"), which requires lessees to recognize a right of use asset and related lease liability for those leases classified as operating leases at the commencement date and have lease terms of more than 12 months. This topic retains the distinction between finance leases and operating leases. ASU 2016-02 is effective for fiscal years beginning after December 15, 2018, and interim periods within those years, and must be applied under a modified retrospective transition approach for leases existing at, or entered into after, the beginning of the earliest comparative period presented in the financial statements. The Company is currently evaluating the provisions of this guidance and assessing its impact on the Company's financial statements and disclosures.

In June 2016, the FASB issued ASU 2016-13, Financial Instruments - Credit Losses (Topic 326) Measurement of Credit Losses on Financial Instruments ("ASU 2016-13"). The main objective of ASU 2016-13 is to provide financial statement users with more decision-useful information about the expected credit losses on financial instruments and other commitments to extend credit held by a reporting entity at each reporting date. To achieve this objective, the amendments in ASU 2016-13 replace the incurred loss impairment methodology in current U.S. GAAP with a methodology that reflects expected credit losses and requires consideration of a broader range of reasonable and supportable information to inform credit loss estimates. ASU 2016-13 is effective for fiscal years beginning after December 15, 2019, including interim periods within those years, and must be adopted under a modified retrospective method approach. Entities may adopt ASU 2016-13 earlier as of the fiscal years beginning after December 15, 2018, including interim periods within those years. The Company is currently evaluating the

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provisions of this guidance and assessing its impact on the Company's financial statements and disclosures. The Company does not believe this standard will have a material impact on the Company's financial statements and disclosures.

Note 2 - Equity Method Investments

Tinum Group, LLC

As of December 31, 2017 and 2016, the Company's ownership in Tinum Group was 42.5%. Tinum Group supplies technology, equipment and technical services to cyclone-fired and other boiler users, but its primary purpose is to place into operation facilities that produce and sell RC that lower emissions and therefore qualifies for Section 45 tax credits. NexGen Refined Coal, LLC ("NexGen") and GSFS Investments I Corp. ("GSFS"), an affiliate of The Goldman Sachs Group, Inc. ("GS"), own the remaining 42.5% and 15.0%, respectively of Tinum Group. GSFS' ownership interest is in the form of Class B units which provide certain preferences over ADA and NexGen as to liquidation and profit distribution, including a guaranteed 15% annual return on GSFS' unrecovered investment balance, which is calculated as the original GSFS investment, plus a 15% annual return thereon, less any distributions, including the allocation of Section 45 tax credits to the members. Additionally, on the 10-year anniversary of the date the last RC facility owned by Tinum Group or one of its subsidiaries is placed into service, but no later than December 31, 2021, if GSFS's unrecovered investment balance has not been reduced to zero, GSFS may require Tinum Group to redeem its Class B units for an amount equal to the then unrecovered investment balance, payable within 180 days of the notice of redemption. GSFS has no further capital call requirements and does not have a voting interest, but does have approval rights over certain corporate transactions. However, the Class B units do not have voting rights and ADA and NexGen each maintain a 50% voting interest in Tinum Group. In February 2018, the unrecovered investment balance associated with the Class B units was repaid in full.

The Company has determined that Tinum Group is a VIE, however, the Company does not have the power to direct the activities that most significantly impact Tinum Group's economic performance and has therefore accounted for the investment under the equity method of accounting. The Company determined the voting partners of Tinum Group have identical voting rights, equity control interests and board control interests, and therefore, concluded that the power to direct the activities that most significantly impact Tinum Group's economic performance was shared. The following tables summarize the assets, liabilities and results of operations of Tinum Group:

	As of December 31,		
(in thousands)	2017	2016	
Current assets	\$31,068	\$24,584	
Non-current assets	\$75,592	\$83,621	
Current liabilities	\$48,280	\$43,117	
Non-current liabilities	\$8,350	\$11,456	
Redeemable Class B equity	\$821	\$18,250	
Members equity attributable to Class A members	\$40,452	\$26,475	
Noncontrolling interests	\$8,757	\$8,907	
	Years Ended December 31,		
(in thousands)	2017	2016	2015
Gross profit	\$95,552	\$92,305	\$108,416
Operating, selling, general and administrative expenses	22,958	23,662	23,405
Income from operations	72,594	68,643	85,011
Other expenses	(4,520)	(8,775)	(2,203)
Class B preferred return	(1,712)	(3,901)	(6,157)
Loss attributable to noncontrolling interest	43,474	27,234	10,675
Net income available to Class A members	\$109,836	\$83,201	\$87,326
ADES equity earnings from Tinum Group	\$48,875	\$41,650	\$8,651

As shown above, the Company reported earnings from its equity investment in Tinnuum Group of \$48.9 million, \$41.7 million and \$8.7 million for the years ended December 31, 2017, 2016 and 2015, respectively.

As shown in the table below, the Company's carrying value in Tinnuum Group was reduced to zero for all years presented as cumulative cash distributions received from Tinnuum Group exceeded the Company's pro-rata share of cumulative earnings in

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Tinum Group. The carrying value of the Company's investment in Tinuum Group shall remain zero as long as the cumulative amount of distributions received from Tinuum Group continues to exceed the Company's cumulative pro-rata share of Tinuum Group's net income available to Class A members. For periods during which the ending balance of the Company's investment in Tinuum Group is zero, the Company only recognizes equity earnings from Tinuum Group to the extent that cash distributions are received from Tinuum Group during the period. For periods during which the ending balance of the Company's investment is greater than zero (e.g., when the cumulative earnings in Tinuum Group exceeds cumulative cash distributions received), the Company recognizes its pro-rata share of Tinuum Group's net income available to Class A members for the period, less any amount necessary to recover the cumulative earnings short-fall balance as of the end of the immediately preceding period. As of December 31, 2017, the Company's carrying value in Tinuum Group has been reduced to zero, as the cumulative cash distributions received from Tinuum Group have exceeded the Company's pro-rata share of cumulative earnings in Tinuum Group. If Tinuum Group subsequently reports net income, the Company will not record its pro-rata share of such net income until the cumulative share of pro-rata income equals or exceeds the amount of its cumulative income recognized due to the receipt of cash distributions. Until such time, the Company will only report income from Tinuum Group to the extent of cash distributions received during the period.

Thus, the amount of equity earnings or loss reported on the Consolidated Statement of Operations may differ from a mathematical calculation of earnings or loss attributable to the equity interest based upon the factor of the equity interest and the net income or loss available to Class A members as shown on Tinuum Group's statement of operations. Additionally, for periods during which the carrying value of the Company's investment in Tinuum Group is greater than zero, distributions from Tinuum Group are reported on the Consolidated Statements of Cash Flows as "Distributions from equity method investees, return on investment" within Operating cash flows. For periods during which the carrying value of the Company's investment in Tinuum Group is zero, such cash distributions are reported on the Consolidated Statements of Cash Flows as "Distributions from equity method investees in excess of investment basis" within Investing cash flows.

The following table presents the Company's investment balance, equity earnings, cash distributions and cash distributions in excess of the investment balance for the years ended December 31, 2015 through December 31, 2017 (in thousands):

Description	Date(s)	Investment balance	ADES equity earnings (loss)	Cash distributions	Memorandum Account: Cash distributions and equity loss in (excess) of investment balance
Beginning balance	12/31/2014	\$ —	\$ —	\$ —	\$ (29,877)
ADES proportionate share of net income from Tinuum Group ⁽¹⁾	2015 activity	35,265	35,265	—	—
Recovery of cash distributions in excess of investment balance (prior to cash distributions)	2015 activity	(29,877)	(29,877)	—	29,877
Cash distributions from Tinuum Group	2015 activity	(8,651)	—	8,651	—
Adjustment for current year cash distributions in excess of investment balance	2015 activity	3,263	3,263	—	(3,263)
Total investment balance, equity earnings (loss) and cash distributions	12/31/2015	\$ —	\$ 8,651	\$ 8,651	\$ (3,263)
		\$ 35,019	\$ 35,019	\$ —	\$ —

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ADES proportionate share of net income from Tinnuum Group ⁽¹⁾	2016 activity				
Recovery of cash distributions in excess of investment balance (prior to cash distributions)	2016 activity	(3,263)	(3,263)	—	3,263
Cash distributions from Tinnuum Group	2016 activity	(41,650)	—	41,650	—
Adjustment for current year cash distributions in excess of investment balance	2016 activity	9,894	9,894	—	(9,894)
Total investment balance, equity earnings (loss) and cash distributions	12/31/2016	\$ —	\$41,650	\$ 41,650	\$ (9,894)
ADES proportionate share of net income from Tinnuum Group ⁽¹⁾	2017 activity	\$46,551	\$46,551	\$ —	\$ —
Recovery of cash distributions in excess of investment balance (prior to cash distributions)	2017 activity	(9,894)	(9,894)	—	9,894
Cash distributions from Tinnuum Group	2017 activity	(48,875)	—	48,875	—
Adjustment for current year cash distributions in excess of investment balance	2017 activity	12,218	12,218	—	(12,218)
Total investment balance, equity earnings and cash distributions	12/31/2017	\$ —	\$48,875	\$ 48,875	\$ (12,218)

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(1) The amounts of the Company's 42.5% proportionate share of net income as shown in the table above differ from mathematical calculations of the Company's 42.5% equity interest in Tinum Group multiplied by the amounts of Net Income available to Class A members as shown in the table above of Tinum Group's results of operations due to adjustments related to the Class B preferred return and the elimination of Tinum Group's earnings attributable to RCM6, of which the Company owned 24.95% during the year ended December 31, 2015 and for the period from January 1 through March 3, 2016. As noted below, the Company sold its interest in RCM6 on March 3, 2016. Additional information related to Tinum Group pursuant to Regulation S-X Rule 3-09 ("Rule 3-09") of the Securities and Exchange Act of 1934 (the "Exchange Act") is included within Item 15 - "Exhibits and Financial Statement Schedules" ("Item 15") of this Form 10-K.

Tinum Services, LLC

In 2010, the Company, together with NexGen, formed Tinum Services for the purpose of operating and maintaining RC facilities, including those RC facilities leased or sold to third parties. The Company has determined that Tinum Services is not a VIE and has evaluated the consolidation analysis under the Voting Interest Model. The Company has a 50% voting and economic interest in Tinum Services, which is equivalent to the voting and economic interest of NexGen. Therefore, as the Company does not hold greater than 50% of the outstanding voting interests, either directly or indirectly, it has accounted for the investment under the equity method of accounting.

As of December 31, 2017 and 2016, the Company's 50% investment in Tinum Services was \$4.3 million and \$4.0 million, respectively.

The following tables summarize the assets, liabilities and results of operations of Tinum Services:

	As of December 31,	
(in thousands)	2017	2016
Current assets	\$546,681	\$278,001
Non-current assets	\$98,640	\$3,426
Current liabilities	\$178,376	\$97,093
Non-current liabilities	\$75,717	\$1,488
Equity	\$8,569	\$7,918
Noncontrolling interests	\$382,659	\$174,928

	Years Ended December 31,		
(in thousands)	2017	2016	2015
Gross loss	\$(64,796)	\$(54,644)	\$(42,496)
Operating, selling, general and administrative expenses	147,917	134,782	161,456
Loss from operations	(212,713)	(189,426)	(203,952)
Other expenses	(68)	(56)	(118)
Loss attributable to noncontrolling interest	222,707	198,464	213,746
Net income	\$9,926	\$8,982	\$9,676
ADES equity earnings from Tinum Services	\$4,963	\$4,491	\$4,838

Included within the Consolidated Statement of Operations of Tinum Services during the years ended December 31, 2017, 2016 and 2015 were losses related to VIE entities that are consolidated within Tinum Services of \$222.7 million, \$198.5 million and \$213.7 million, respectively. These losses do not impact the Company's equity earnings from Tinum Services as 100% of those losses are attributable to a noncontrolling interest and eliminated in the calculations of Tinum Services' net income attributable to the Company's interest.

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Other

On March 3, 2016, the Company sold its 24.95% membership interest in RCM6 for a cash payment of \$1.8 million and the assumption, by the buyer, of an outstanding note payable made (the "RCM6 Note Payable") by the Company in connection with its purchase of RCM6 membership interests from Tinum Group. In doing so, the Company recognized a gain on the sale of \$2.1 million for the year ended December 31, 2016, which is included within the Other line item in the Consolidated Statements of Operations. As a result of the sale of its ownership interest, the Company ceased to be a member of RCM6 and, as such, is no longer subject to any quarterly capital calls and variable payments to RCM6. In addition, the Company has no future obligations related to the RCM6 Note Payable. However, the Company still receives its pro-rata share of income and cash distributions through its ownership in Tinum Group based on the RCM6 lease payments made to Tinum Group.

Prior to the sale of its ownership interest, the Company recognized equity losses related to its investment in RCM6 of \$0.6 million for the three months ended March 31, 2016.

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, which owns a single RC facility that produces RC that qualifies for Section 45 tax credits. Tinum Group sold 49.9% of the subsidiary that owns the RC facility to an unrelated third party and retained ownership of the remaining 49.9%. GWN Manager is subject to monthly capital calls based on estimated working capital needs.

The Company has determined that GWN Manager is not a VIE and has evaluated the consolidation analysis under the Voting Interest Model. Because the Company does not own greater than 50% of the outstanding voting shares, either directly or indirectly, it has accounted for its investment in GWN Manager under the equity method of accounting.

As December 31, 2017, the Company's ownership in GWN Manager was 50%. The Company's investment in GWN Manager as of December 31, 2017, was \$0.1 million.

The following table details the carrying value of the Company's respective equity method investments included within the Equity method investments line item on the Consolidated Balance Sheets and indicates the Company's maximum exposure to loss:

(in thousands)	As of	
	December 31, 2017	2016
Equity method investment in Tinum Group	\$—	\$—
Equity method investment in Tinum Services	4,284	3,959
Equity method investment in other	67	—
Total equity method investments	\$4,351	\$3,959

The Company evaluates the investments for impairment whenever events or changes in circumstances indicate that the carrying amount of the investment might not be recoverable. No impairments were recorded during the years ended December 31, 2017, 2016 and 2015.

The following table details the components of the Company's respective earnings or loss from equity method investments included within the Earnings from equity method investments line item on the Consolidated Statements of Operations:

(in thousands)	Year ended December 31,		
	2017	2016	2015
Earnings from Tinum Group	\$48,875	\$41,650	\$8,651
Earnings from Tinum Services	4,963	4,491	4,838
Earnings (losses) from other	5	(557)	(4,568)
Earnings from equity method investments	\$53,843	\$45,584	\$8,921

The following table details the components of the cash distributions from the Company's respective equity method investments included within the Consolidated Statements of Cash Flows. Distributions from equity method investees

are reported on the Consolidated Statements of Cash Flows as “return on investment” within Operating cash flows until such time as the carrying value in an equity method investee company is reduced to zero; thereafter, such distributions are reported as “distributions in excess of cumulative earnings” within Investing cash flows.

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(in thousands)	Year ended December 31,		
	2017	2016	2015
Distributions from equity method investees, return on investment			
Tinuum Group ⁽¹⁾	\$—	\$3,400	\$—
Tinuum Services	4,638	4,500	5,019
Included in Operating Cash Flows	\$4,638	\$7,900	\$5,019
Distributions from equity method investees in excess of cumulative earnings			
Tinuum Group	\$48,875	\$38,250	\$8,651
Included in Investing Cash Flows	\$48,875	\$38,250	\$8,651

(1) During the three months ended March 31, 2016, the Company's cumulative share of pro-rata Tinuum Group's net income available to Class A members exceeded the amount of its cumulative earnings recognized due to cash being distributed. As such, the Company recognized \$3.4 million as "return on investment."

During the years ended December 31, 2017, 2016 and 2015, the Company, in the aggregate, made purchases of and contributions to equity method investments of \$0.1 million, \$0.2 million and \$2.4 million, respectively.

Note 3 - Borrowings

Line of Credit

In September 2013, ADA, as borrower, and the Company, as guarantor, entered into the 2013 Loan and Security Agreement with a bank (the "Lender") for an aggregate principal amount of \$10 million that was secured by certain amounts due to the Company from certain Tinuum Group RC leases (the "Line of Credit"). The Line of Credit was amended nine times from the period from December 2, 2013 through November 25, 2016, most notably to extend the maturity date with each amendment. In addition, during this period, the Lender also granted 10 waivers related to various transactions and obligations to provide financial information to the Lender. Covenants in the Line of Credit included a borrowing base limitation that was based on a percentage of the net present value of ADA's portion of payments due to Tinuum Group from the RC leases. The Line of Credit also contained other affirmative and negative covenants and customary indemnification obligations of ADA to the Lender and provided for the issuance of letters of credit ("LC's") provided that the aggregate amount of the LC's plus all advances then outstanding did not exceed the calculated borrowing base. The Company guarantees the obligations and agreements of ADA under the Line of Credit. Amounts outstanding under the Line of Credit bear interest payable monthly at a rate per annum equal to the higher of 5% or the "Prime Rate" (as defined in the Line of Credit) plus 1%. As a result of various covenant violations, the Company had no borrowing availability under the Line of Credit from inception through November 29, 2016. On November 30, 2016, ADA-ES, Inc., a wholly-owned subsidiary of the Company, as borrower, the Company, as guarantor, and a bank (the "Lender") entered into an amendment (the "Tenth Amendment") to the Line of Credit. The Tenth Amendment increased the Line of Credit to \$15.0 million, extended the maturity date of the Line of Credit to September 30, 2017 and permitted the Line of Credit to be used as collateral (in place of restricted cash) for LC's related to equipment projects, the Royalty Award, as defined in Note 4, and certain other agreements. Additionally, this amendment collateralized the Line of Credit with amounts due to the Company from an additional existing RC facility lease, which amounts also factor into the borrowing base limitation, and amended certain financial covenants. Pursuant to the Tenth Amendment, the Company was required to maintain a deposit account with the Lender, initially with a minimum balance of \$6.0 million, which was reduced to \$3.0 million based on the Company meeting certain conditions and maintaining minimum trailing twelve-month EBITDA (earnings before interest, taxes, depreciation and amortization as defined in the Tenth Amendment) of \$24.0 million. The minimum deposit balance was classified as Restricted Cash on the Consolidated Balance Sheets as of December 31, 2016.

On September 30, 2017, ADA, as borrower, the Company, as guarantor, and the Lender entered into an amendment (the "Eleventh Amendment") to the Line of Credit. The Eleventh Amendment decreased the Line of Credit to \$10.0 million due to decreased collateral requirements for the Company's outstanding LC's, extended the maturity date of the Line of Credit to September 30, 2018, and permitted the Line of Credit to be used as collateral (in place of restricted cash) for LC's up to \$8.0 million related to equipment projects, the Royalty Award and certain other

agreements. Additionally, under the Eleventh Amendment there is no minimum balance requirement based on the Company meeting certain conditions and maintaining minimum trailing twelve-month EBITDA (earnings before interest, taxes, depreciation and amortization as defined in the Eleventh Amendment) of \$24.0 million.

As of December 31, 2017, there were no outstanding borrowings under the Line of Credit, however, LC's in the aggregate amount of \$3.5 million were secured under the Line of Credit, resulting in borrowing availability of \$6.5 million and LC availability of \$4.5 million.

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Letters of Credit

The Company has LC's related to the Royalty Award (as described in Note 4), equipment projects, certain other agreements. During March 2017, a customer drew on an LC related to an equipment system in the amount of \$0.8 million ("LC Draw"), which was funded by borrowing availability under the LOC. The Company subsequently repaid the LC Draw to the Lender as of March 31, 2017. The Company is contesting the LC Draw and is pursuing legal actions to recover the entire amount of the LC Draw from the customer. The Company recorded an asset for the LC Draw net of estimated allowance of \$0.4 million, which is included in Other assets on the Consolidated Balance Sheets.

The following tables summarize the LC's outstanding and collateral, by asset type, reported on the Consolidated Balance Sheets:

	As of December 31, 2017		
(in thousands)	LC Outstanding	Utilization of LOC Availability	Restricted Cash
Royalty Award ⁽¹⁾	\$3,500	\$ 3,500	\$ —
Total LC outstanding	\$3,500	\$ 3,500	\$ —

(1) As further discussed in Note 4, the Company settled the liability related to the Royalty Award on December 29, 2017. The Company and other parties associated with the LC, executed the termination of the LC in January 2018.

	As of December 31, 2016		
(in thousands)	LC Outstanding	Utilization of LOC Availability	Restricted Cash
Contract performance - equipment systems	\$1,855	\$ 1,776	\$ 86
Royalty Award	7,150	—	7,150
Other	6,500	—	6,500
Total LC outstanding	\$15,505	\$ 1,776	\$ 13,736

The following tables summarizes the expiration periods of the LC's based on the ultimate maturity date of the LC's as of December 31, 2017:

	Expiration of Letters of Credit as of December 31, 2017			
(in thousands)	Less than 1 year	1-3 years	4-5 years	After 5 years
LC's	\$3,500	\$ —	\$ —	—

Credit Agreement

On June 30, 2016, the Company, the required lenders and the administrative agent under a \$15.0 million short-term loan (the "Credit Agreement") agreed to terminate the Credit Agreement prior to the maturity date of July 8, 2016, effective upon the Company's prepayment on June 30, 2016 of \$9.9 million, which was comprised of the total principal balance of the loan and advances made to or for the benefit of the Company, together with all accrued, but unpaid, interest and the total amount of all fees, costs, expenses and other amounts owed by the Company thereunder, including a prepayment premium.

The Lenders were beneficial owners of common stock in the Company. The Credit Agreement was approved by the Board and the Audit Committee as a related party transaction.

Tinum Group - RCM6 Note Payable

The Company acquired a 24.95% membership interest in RCM6 from Tinum Group in February 2014 through an up-front payment and the RCM6 Note Payable. Due to the payment terms of the note purchase agreement, the RCM6

Note Payable periodically added interest to the outstanding principal balance. The stated rate associated with the RCM6 Note Payable was 1.65% and the effective rate of the RCM6 Note Payable at inception was 20%. As discussed in Note 2, on March 3, 2016, the Company sold its 24.95% membership interest in RCM6 and, as a result, the Company has no future obligations related to the RCM6 Note Payable.

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DSI Business Owner

In February 2016, the Company entered into an agreement to settle an outstanding note payable of approximately \$1.1 million for \$0.3 million with the former owner of a business ("DSI Business Owner") acquired by the Company in 2012, which was paid during the first quarter of 2016. The Company recognized a gain related to the settlement of \$0.9 million, which is included in the Other line item in the Condensed Consolidated Statements of Operations for the year ended December 31, 2016.

Note 4 - Commitments and Contingencies

Legal Proceedings

The Company is from time to time subject to, and is presently involved in, various pending or threatened legal actions and proceedings, including those that arise in the ordinary course of its business. Such matters are subject to many uncertainties and to outcomes, the financial impacts of which are not predictable with assurance and that may not be known for extended periods of time. The Company records a liability in its consolidated financial statements for costs related to claims, settlements, and judgments where management has assessed that a loss is probable and an amount can be reasonably estimated. The Company's significant legal proceedings are discussed below.

Securities class action lawsuit: *United Food and Commercial Workers Union v. Advanced Emissions Solutions, Inc.*, No. 14-cv-01243-CMA-KMT (U.S. District Court, D. Colo.)

As of December 31, 2016, the Company had a recorded liability and insurance receivable of \$4.0 million in connection with this lawsuit as the losses in connection with this matter were probable and reasonably estimable under U.S. GAAP. The liability was originally recorded as of June 30, 2016 in the Legal settlements and accruals line item of the Consolidated Balance Sheet. The Company's insurance carriers funded the full settlement in November 2016. On February 10, 2017, the Company received an order and final judgment that the lawsuit was settled, and the entire case had been dismissed with prejudice.

Stockholder derivative lawsuits: *In Re Advanced Emissions Solutions, Inc. Shareholder Derivative Litigation*, No. 2014CV-30709 (District Court, Douglas County, Colorado) (consolidated actions).

As of December 31, 2016, the Company had a recorded liability and insurance receivable of \$0.6 million in connection with this lawsuit as the losses in connection with this matter were probable and reasonably estimable under U.S. GAAP. The liability was originally recorded as of June 30, 2016 in the Legal settlements and accruals line item of the Consolidated Balance Sheet. A settlement for this lawsuit was approved and the case was closed on January 4, 2017, and the Company's insurance carriers funded the full settlement in January 2017. As of March 31, 2017, the Company no longer had any amounts impacting its consolidated financial statements as the order and judgment related to the lawsuit was received during the first quarter of 2017.

SEC Inquiry

On March 29, 2017, the Company and the Securities and Exchange Commission reached a settlement to resolve a previously disclosed investigation into certain accounting issues, as described in the Company's Annual Report on Form 10-K for the fiscal year ended December 31, 2014. Without admitting or denying the SEC's allegations, the Company agreed to the terms of the settlement and agreed to pay a civil monetary penalty of \$0.5 million. The Company had fully reserved for this penalty as of June 30, 2016. The penalty was paid in the first quarter of 2017.

Settlement and Royalty Indemnity

In 2011, the Company and Norit International B.V. ("Norit") entered into a settlement agreement (the "Norit Settlement Agreement") whereby the Company paid amounts related to a non-solicitation breach of contract claim ("Norit Litigation"), and was also required to pay additional damages (the "Royalty Award") related to certain future revenues generated from an activated carbon manufacturing plant (the "Red River Plant") that the Company owned through a joint venture with ADA Carbon Solutions, LLC ("Carbon Solutions"). Payments due under the Royalty Award were due quarterly in arrears through June 2018. Additionally, in 2011, the Company entered into the Settlement Agreement Regarding ADA-ES' Indemnity Obligations (the "Indemnity Settlement Agreement") whereby the Company agreed to settle certain indemnity obligations asserted against the Company related to the Norit Litigation and relinquished all of its equity interest in Carbon Solutions.

Under the Norit Settlement Agreement, the Company was required to pledge LC's as collateral for a portion of Royalty Award future payments due. In March 2017, the Company was required to increase its LC's under the Royalty Award based on a provision that required additional amounts be pledged because the Company had achieved annual earnings in excess of \$20.0 million for the fiscal year ended December 31, 2016. Under this provision, the Company was required to provide an additional LC of \$5.0 million, which was secured under the Line of Credit in March 2017. Under a separate provision of the Norit Settlement Agreement effective during 2017, the Company was required to increase the LC's, subject to the aggregate amount of estimated future payments due related to the Royalty Award, for any dividends issued by the Company prior to January 1, 2018 in amount equal to 50% of the aggregate fair market value of such dividends (the "Dividends Provision"). Based on the

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estimated remaining future payments due under the Royalty Award, the Dividends Provision did not impact the amount of LC's pledged during 2017.

During the years ended December 31, 2017 and 2016, the Company revised its estimate for future Royalty Award payments based in part on updated forecasts provided to the Company from Carbon Solutions. These forecasts included significant reductions in estimated future revenues generated at the Red River Plant. Based primarily on these updated forecasts, the Company recorded reductions to the Royalty Award accrual of \$3.4 million and \$4.0 million for the years ended December 31, 2017 and 2016, respectively.

In December 2017, the Company, Carbon Solutions and the parent company of Carbon Solutions agreed to terminate certain provisions of the Indemnity Settlement Agreement (the "Indemnity Termination Agreement"). Pursuant to an agreement executed concurrently with the Indemnity Termination Agreement, the Company, Norit and an affiliate of Norit (collectively referred to as "Norit") agreed to a final payment in the amount of \$3.3 million (the "Settlement Payment") to settle all outstanding royalty obligations owed under the terms of the Norit Settlement Agreement. This amount was paid by the Company on December 29, 2017.

Under the Indemnity Termination Agreement, and upon payment of the Settlement Payment, the Company was relieved of certain financial and indemnity obligations required by the terms of the Norit Settlement Agreement, including the obligation to maintain LC's securing future royalty payment obligations. As of December 31, 2017, \$3.5 million in LC's related to the Royalty Award were outstanding, but were canceled by all parties in January 2018, pursuant to the Indemnity Termination Agreement.

As of December 31, 2016, the Company carried the components of the Royalty Award in Legal settlements and accruals in the Consolidated Balance Sheets of \$5.7 million, and in Legal settlements and accruals, long-term of \$5.4 million.

The following table summarizes the Company's legal settlements and accruals as described above, which are presented in the Consolidated Balance Sheets:

	As of December 31, 2016
(in thousands)	
Settlement and Royalty Indemnification	\$-5,656
Legal settlements	—5,050
Legal settlements and accruals, current	—10,706
Settlement and Royalty Indemnification, long-term	—5,382
Total legal settlements and accruals	\$-16,088

As of December 31, 2016, the receivables related to the legal settlements above are shown with the Receivables, net line item in the Consolidated Balance Sheets in the same amounts as the respective liabilities.

Advanced Emission Solutions, Inc. Profit Sharing Retirement Plan

The Advanced Emissions Solutions, Inc. Profit Sharing Retirement Plan (the "401(k) Plan") is subject to the jurisdiction of the Internal Revenue Service ("IRS") and the Department of Labor ("DOL"). The DOL opened an investigation into the 401(k) Plan, and the Company is responding to all requests for documents and information from the DOL. The DOL has not issued any formal findings as of the date of this filing. Although the Company believes there has been no breach of fiduciary duty with respect to the 401(k) Plan, the Company believes that it is probable that the DOL will require some payment to the 401(k) Plan in order to close the investigation. The Company determined that this amount is reasonably estimable and, as such, the Company has accrued \$1.0 million as of December 31, 2017. The liability was recorded in the Other current liabilities line item on the Consolidated Balance Sheets. The expense recognized related to this accrual was included in the Other line item in the Consolidated Statements of Operations for the year ended December 31, 2017. The estimate is based on information currently available and involves elements of judgment and significant uncertainties. As additional information becomes available and the resolution of the

uncertainties becomes more apparent, it is possible that actual payment may exceed the accrued amount.

Other Commitments and Contingencies

Tinuum Group

The Company also has certain limited obligations contingent upon future events in connection with the activities of Tinuum Group. The Company, NexGen and two entities affiliated with NexGen have provided GSFS with limited guaranties (the “Tinuum Group Party Guaranties”) related to certain losses it may suffer as a result of inaccuracies or breach of representations and covenants. The Company also is a party to a contribution agreement with NexGen under which any party called upon to

Advanced Emissions Solutions, Inc. and Subsidiaries
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pay on a Tinum Group Party Guaranty is entitled to receive contribution from the other party equal to 50% of the amount paid. No liability or expense provision has been recorded by the Company related to this contingent obligation as the Company believes that it is not probable that a loss will occur with respect to Tinum Group Party Guaranties.

Performance Guarantee on Equipment Systems

In the normal course of business related to ACI and DSI systems, the Company may guarantee certain performance thresholds during a discrete performance testing period that do not extend beyond six months from the initial test date, the commencement of which is determined by the customer. Performance thresholds include such matters as the achievement of a certain level of mercury removal and other emissions based upon the injection of a specified quantity of a qualified activated carbon or other chemical at a specified rate given other plant operating conditions, and availability of equipment and electric power usage. In the event the equipment fails to perform as specified during the testing period, the Company may have an obligation to correct or replace the equipment. In the event the performance thresholds are not achieved, the Company may have a “make right” obligation within the contract limits. During 2015, the Company began working to modify and correct two performance guarantee issues related to EC systems that were installed during 2015. No revenue was recognized on these two contracts until the performance guarantees were resolved and contract obligations were substantially complete. During 2016, the Company passed performance testing on both systems and revenues on both systems were recognized. As a result of the resolution of the performance guarantees, the Company incurred approximately \$0.9 million of costs on the ACI systems to pass the performance guarantees. During the year ended December 31, 2016, the Company satisfied all outstanding performance guarantees on its remaining ACI and DSI contracts and it did not incur any additional claims.

Purchase Obligations

The Company does not have any future purchase obligations as of December 31, 2017.

U.S. Department of Energy ("DOE") Audits

Certain of the Company's completed and current contracts awarded by the DOE and related industry participants remain subject to adjustments as a result of future government audits. The Company's historical experience with these audits has not resulted in significant adverse adjustments to amounts previously received; however the Company currently remains subject to audits for the years 2013 and later.

Operating Lease Obligations

The Company leases office, warehouse and laboratory space in Highlands Ranch, Colorado under operating leases. As of December 31, 2017, the Company leased approximately 17,344 square feet under two leases. Original lease terms ranged from four to seven years. Certain of these leases have options permitting renewals for additional periods. In addition to minimum fixed payments, a number of leases contain annual escalation clauses that are related to increases in the inflation index.

In December 2016, the Company entered into a lease termination related to its leased office space, in which the Company paid a \$0.3 million lease termination fee. The lease termination was effective February 2017.

Also in December 2016, the Company entered into a new office lease in Highlands Ranch, Colorado effective February 2017.

Annual minimum commitments under the leases as of December 31, 2017 are as follows:

Years Ending December 31,	Operating Lease Commitments (in thousands)
2018	\$ 298
2019	205
2020	82
2021	—
Thereafter	—
Total	\$ 585

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Rent expense incurred for the years ended is as follows:

	Years Ended		
	December 31,		
(in thousands)	2017	2016	2015
Rent expense ⁽¹⁾	\$(60)	\$847	\$1,838

(1) During the year ended December 31, 2017, the Company accelerated deferred rent and tenant improvement allowances in connection with the termination of the lease agreement of its former corporate office.

Note 5 - Stockholders Equity

The Company has two classes of capital stock authorized, common stock and preferred stock, which are described as follows:

Preferred Stock

The Board is authorized to provide out of the unissued shares of Preferred Stock and to fix the number of shares constituting a series of Preferred Stock and, with respect to each series, to fix the number of shares and designation of such series, the voting powers, if any, the preferences and relative, participating, option or other special rights, if any, and any qualifications, limitations or restrictions thereof, of the shares of such series. As of December 31, 2017 and 2016, there were no shares of Preferred Stock designated or outstanding.

Common Stock

Holders of common stock are entitled to one vote for each share held of record on all matters submitted to a vote of the stockholders. Additionally, holders of common stock are entitled to receive dividends when and if declared by the Board, subject to any statutory or contractual restrictions on payment of dividends and to any restrictions on the payment of dividends imposed by the terms of any outstanding shares of preferred stock.

Upon dissolution, liquidation or the sale of all or substantially all of the Company's assets, after payment in full of any amounts required to be paid to creditors and to the holders of preferred stock having liquidation preferences, if any, the holders of shares of common stock will be entitled to receive the Company's remaining assets for distribution on a pro rata basis.

Stock Repurchase

Tender Offer

On May 5, 2017, the Board authorized the commencement of a modified Dutch Auction tender offer ("Tender Offer") to purchase for cash up to 925,000 shares of the Company's common stock at a price per share of not less than \$9.40 nor greater than \$10.80, for a maximum aggregate purchase price of \$10.0 million, with an option to purchase an additional 2% of the outstanding shares of common stock if the Tender Offer was oversubscribed. The Tender Offer expired on June 6, 2017 and a total of 2,858,425 shares were validly tendered and not properly withdrawn at or below the final purchase price of \$9.40 per share.

Because the Tender Offer was oversubscribed, the Company purchased a prorated portion of the shares properly tendered by each tendering stockholder (other than "odd lot" holders whose shares were purchased on a priority basis) at the final per share purchase price. Accordingly, the Company acquired 1,370,891 shares of its common stock ("Tendered Shares") at a price of \$9.40 per share, for a total cost of approximately \$12.9 million, excluding fees and other expenses related to the tender offer. The Tendered Shares represented approximately 6.2% of the Company's outstanding shares prior to the tender offer. The Tendered Shares included the 925,000 shares the Company initially offered to purchase and 445,891 additional shares that the Company elected to purchase pursuant to its right to purchase up to an additional 2% of its outstanding shares of common stock. The Company recorded the Tendered Shares at cost, which included fees and expenses related to the Tender Offer, and reported the Tendered Shares as Treasury Stock on the Condensed Consolidated Balance Sheet as of December 31, 2017.

The Company's Board and executive officers did not participate in the Tender Offer, except for one director of the Board, who is a manager of a financial institution and holds dispositive powers over the shares of the Company's common stock held by the financial institution that tendered 70,178 of its shares of the Company's common stock.

Stock Repurchase Program

During December 2017, and under a stock repurchase program authorized by the Board, the Company purchased 342,875 shares of its common stock for cash of \$3.4 million, inclusive of commissions and fees, in open market transactions. Under the stock repurchase program, the Company is authorized to purchase up to \$10.0 million of its outstanding common stock. This stock repurchase program will remain in effect until December 31, 2018 unless otherwise modified by the Board.

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Quarterly Cash Dividend

Dividends declared and paid to holders of the Company's common shares during the years ended December 31, 2017, 2016 and 2015 were \$15.7 million, zero, and zero, respectively. A portion of the dividends remains accrued subsequent to the payment dates and represents dividends accumulated on nonvested shares of common stock held by employees of the Company that contain forfeitable dividend rights that are not payable until the underlying shares of common stock vest. These amounts are included in both Other current liabilities and Other long-term liabilities on the Condensed Consolidated Balance Sheet as of December 31, 2017.

Dividends declared and paid quarterly per share on all outstanding shares of common stock during the year ended December 31, 2017 were as follows:

	2017	
	Per	Date paid
	share	
Dividends declared during quarter ended:		
June 30	\$0.25	July 17, 2017
September 30	0.25	September 7, 2017
December 31	0.25	December 6, 2017
	\$0.75	

Tax Asset Protection Plan

On May 5, 2017, the Board approved the declaration of a dividend of rights to purchase Series B Junior Participating Preferred Stock for each outstanding share of common stock as part of a Tax Asset Protection Plan designed to protect the Company's ability to utilize its net operating losses and tax credits.

United States federal income tax rules, and Section 382 of the Internal Revenue Code in particular, could substantially limit the use of net operating losses and other tax assets if ADES experiences an "ownership change" (as defined in the Internal Revenue Code). In general, an ownership change occurs if there is a cumulative change in the ownership of ADES by "5 percent stockholders" that exceeds 50 percentage points over a rolling three-year period.

The Tax Asset Protection Plan is intended to act as a deterrent to any person acquiring beneficial ownership of 4.99% or more of the Company's outstanding common stock and will expire on the earlier of (a) May 4, 2018, or (b) the date of the 2018 Annual Meeting of Stockholders. The Tax Asset Protection Plan may also be terminated earlier in accordance with the terms thereof.

Note 6 - Stock-Based Compensation

The Plans

The Company currently has incentive plans, including the Amended and Restated 2010 Non-Management Compensation and Incentive Plan, as amended (the "2010 Plan") and the 2017 Omnibus Incentive Plan (the "2017 Plan") as described below. Collectively, these plans are called the "Stock Plans" and permit the Company to issue stock-based awards, including common stock, restricted stock, stock options and other rights and benefits under the plans to employees, directors and non-employees.

The 2010 Plan - During 2010, the Company adopted the 2010 Plan which permits grants of stock awards to employees, which may be shares, rights to purchase restricted stock, bonuses of restricted stock, or other rights or benefits under the plan. The Company reserved 600,000 shares of its common stock for these purposes. The Plan was amended and restated as of July 19, 2012 to make non-material changes to assure Internal Revenue Code Section 409A compliance. Upon the adoption of the 2017 Plan in June 2017, the Company no longer grants any awards from the 2010 Plan.

The 2017 Plan - During 2017, the Company adopted the 2017 Plan which permits grants of awards to employees, directors and non-employees, which may be shares, rights to purchase restricted stock, bonuses of restricted stock, or other rights or benefits under the plan. The Company reserved 2,000,000 shares of its common stock under the 2017

Plan.

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Expense

Restricted Stock - Restricted stock is typically granted with vesting terms of three or five years. The fair value of Restricted Stock Awards ("RSA's") is determined based on the closing price of the Company's common stock on the authorization date of the grant multiplied by the number of shares subject to the stock award. Compensation expense for RSA's is generally recognized over the entire vesting period on a straight-line basis.

Stock Options - Stock options generally vest over three years or upon satisfaction of performance-based conditions and have a contractual limit of five years from the date of grant to exercise. The fair value of stock options granted is determined on the date of grant using the Black-Scholes option pricing model and the related expense is recognized on a straight-line basis over the entire vesting period. The following table indicates the weighted-average assumptions that were used related to the stock options granted for the years ended December 31, 2016 and 2015, respectively. No stock options were granted during the year ended December 31, 2017.

	Years Ended	
	December 31,	
	2016	2015
Stock options granted:		
Risk-free interest rate	1.3 %	1.8 %
Dividend yield	— %	— %
Volatility	78.8%	74.5%
Expected term (in years)	2.6	5.0

The Company uses historical data to estimate inputs used in the Black-Scholes option pricing model.

Risk-free interest rate - The risk-free interest rate for stock options granted during the period was determined by using a zero-coupon U.S. Treasury rate for the periods that coincided with the expected terms listed above.

Dividends - As historically no dividends had been paid as of the date by which grants occurred, no dividend yield was included in the calculations.

Expected volatility - To calculate expected volatility, the historical volatility of the Company's common stock was used.

Expected term - The Company's expected term of options was based upon historical exercise behavior and consideration of the options' vesting and contractual terms.

Stock Appreciation Rights - Stock Appreciation Rights ("SAR's") generally vest over three years and have a contractual limit of five years from the date of grant to exercise. The fair value of SAR's granted is determined on the date of grant using the Black-Scholes option pricing model and the related expense is recognized on a straight-line basis over the derived service period of the respective awards. During 2015, the Company granted a SAR award, and as settlement of the award was out of the control of the Company, the awards were classified as liability-based equity awards and were recorded at the estimated fair value at the grant and remeasured as a liability-based award as of each reporting period. This SAR award was converted to a stock option as of June 30, 2016 as discussed below. The following table indicates the weighted-average assumptions that were used related to the awards granted for the year ended December 31, 2015. No SAR's were granted during the year ended December 31, 2017 or 2016.

Year
ended
December
31,

2015

SAR's granted:

Risk-free interest rate	1.8	%
Dividend yield	—	%
Volatility	74.5	%
Expected term (in years)	5.0	

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The Company uses historical data to estimate inputs used in the Black-Scholes option pricing model.

Risk-free interest rate - The risk-free interest rate for SAR's granted during the period was determined by using a zero-coupon U.S. Treasury rate for the periods that coincided with the expected terms listed above.

Dividends - As historically no dividends have been paid as of the date by which grants occurred, no dividend yield was included in the calculations.

Expected volatility - To calculate expected volatility, the historical volatility of the Company's common stock was used.

Expected term - The Company's expected term of SAR's was based upon consideration of the contractual term of the Company's SAR's of 5 years.

PSU's - Performance share units ("PSU's") vest based on the grantee's continuous service with the Company, performance measures or a combination of both. Each PSU represents a contingent right to receive shares of the Company's common stock if the Company meets certain performance measures over the requisite period. Vesting of the PSU's, if at all, occurs no later than January 2 after the conclusion of the third year of the performance period, subject to the grantee's continuous service and the achievement of certain pre-established performance goals. Amounts vested are measured as of December 31, immediately prior to the end of the service period, unless the PSU's vest sooner at the target amount as a result of certain transactions pursuant to Section 11 of the Amended and Restated 2007 Equity Incentive Plan, as amended ("2007 Plan").

The number of shares of common stock a participant receives will be increased (up to 200 percent of target levels) or reduced (down to zero) based on the level of achievement of performance goals. The number of PSU's that may be earned by a participant is determined at the end of the performance period based on the relative placement of the Company's total stockholder return ("TSR") for that period with approximately 75% of the award based on the relative performance of the Company's TSR performance compared to the respective TSRs of a specified group of peer companies and the remaining portion of the award based on the Company's TSR performance compared to the Russell 3000 Index.

Compensation expense is recognized for PSU awards on a straight-line basis over a 3-year service period based on the estimated fair value at the date of grant using a Monte Carlo simulation model. The following table indicates the weighted-average assumptions that were used related to the awards granted for the year ended December 31, 2015. No PSU's were granted during the years ended December 31, 2017 or 2016.

	Year Ended December 31, 2015	
PSUs granted:		
Risk-free interest rate	1.0	%
Dividend yield	—	%
Volatility	64.3	%
Performance period (in years)	3.0	

The Company uses historical data to estimate inputs used in the Monte Carlo pricing model.

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Risk-free interest rate - The risk-free interest rate for PSU's granted during the period was determined by using a zero-coupon U.S. Treasury rate for the periods that coincided with the expected terms listed above.

Dividends - As historically no dividends had been paid as of the date by which grants occurred, no dividend yield was included in the calculations.

Expected volatility - To calculate expected volatility, the historical volatility of the Company's common stock was used.

Performance period - The Company's performance period is based upon the vesting term of the Company's PSU awards.

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The Company recorded the following compensation expense related to the Stock Plans and the 2007 Plan:

(in thousands)	Years Ended		
	December 31,		
	2017	2016	2015
RSA expense	\$ 1,400	\$ 2,021	\$ 2,909
Stock option expense	672	285	658
SAR expense	—	106	742
PSU expense	137	456	2,895
Total stock-based compensation expense	\$ 2,209	\$ 2,868	\$ 7,204

The Company recorded stock-based compensation expense related to awards to Directors in the General and administrative expense line and all other awards within the Payroll and benefit expense line in the Consolidated Statements of Operations.

During the years ended December 31, 2016 and 2015, the Company modified the terms of awards granted to 27 and 37 employees, respectively, in connection with its restructuring plans and termination of the impacted employees discussed in Note 18. These modifications resulted in the accelerated vesting and incremental expense related to certain performance-based awards and restricted stock awards. As a result, during 2016 and 2015 the Company recognized incremental stock-based compensation of \$0.4 million and \$3.4 million respectively, which was included in the Payroll and benefits line item in the Consolidated Statements of Operations. There were no material modifications to awards during the year ended December 31, 2017.

The amount of unrecognized compensation cost as of December 31, 2017, and the expected weighted-average period over which the cost will be recognized is as follows:

(in thousands)	As of December 31, 2017	
	Unrecognized Compensation Cost	Expected Weighted-Average Period of Recognition (in years)
RSA expense	\$ 1,735	1.93
Stock option expense	58	0.25
PSU expense	—	0
Total unrecognized stock-based compensation expense	\$ 1,793	1.88

A summary of the status and activity of non-vested RSA's is presented in the following table:

(in thousands, except for share and per share amounts)	For the Years Ended December 31.					
	2017	2016		2015		
	Shares	Weighted-Average Grant Date Fair Value	Shares	Weighted-Average Grant-Date Fair Value	Shares	Weighted-Average Grant-Date Fair Value
Non-vested at beginning of year	297,347	\$ 8.03	134,708	\$ 8.49	209,921	\$ 13.59
Granted	191,076	\$ 9.50	363,758	\$ 7.46	127,943	\$ 14.97
Vested	(210,129)	\$ 8.03	(175,956)	\$ 11.96	(165,796)	\$ 17.51
Forfeited ⁽¹⁾	(1,687)	\$ 9.17	(25,163)	\$ 15.58	(37,360)	\$ 19.30
Non-vested at end of year	276,607	\$ 9.03	297,347	\$ 8.03	134,708	\$ 8.49

(1) Included within the 2015 forfeited / canceled units are RSA's related to a former executive that were clawed back. The Company recognized \$0.1 million within Other Income line item on the Consolidated Statement of Operations

related to these awards.

The weighted-average grant-date fair value of RSA's granted or modified during the years ended December 31, 2017, 2016, and 2015 was \$1.8 million, \$2.7 million, and \$1.9 million, respectively. The total fair value of RSA's vested during the years ended December 31, 2017, 2016 and 2015 was \$1.7 million, \$2.1 million and \$2.9 million, respectively.

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Stock Options

A summary of option activity under the Plans is presented below:

(in thousands, except for share and per share amounts)	Number of Options Outstanding and Exercisable	Weighted- Average Exercise Price	Aggregate Intrinsic Value	Weighted- Average Remaining Contractual Term (in years)
For the year ended December 31, 2015				
Options outstanding, January 1, 2015	74,200	\$ 13.76		
Options granted	56,250	\$ 13.87		
Options exercised	—	\$ —		
Options expired / forfeited	(24,200)	\$ 7.59		
Options outstanding, December 31, 2015	106,250	\$ 15.22	\$ —	3.8
Options vested and exercisable, December 31, 2015	82,915	\$ 14.04	\$ —	3.9
For the year ended December 31, 2016				
Options outstanding, January 1, 2016	106,250	\$ 15.22		
Options granted ⁽¹⁾	546,196	\$ 11.10		
Options exercised	—	\$ —		
Options expired / forfeited	(20,000)	\$ 16.90		
Options outstanding, December 31, 2016	632,446	\$ 11.61	\$ 183	4.0
Options vested and exercisable, December 31, 2016	247,780	\$ 13.30	\$ 69	3.4
For the year ended December 31, 2017				
Options outstanding, January 1, 2017	632,446	\$ 11.61		
Options granted	—	\$ —		
Options exercised	—	\$ —		
Options expired / forfeited	(10,000)	\$ 9.77		
Options outstanding, December 31, 2017	622,446	\$ 11.64	\$ 119	2.24
Options vested and exercisable, December 31, 2017	429,780	\$ 11.47	\$ 119	2.03

Included in options granted are 243,750 awards granted that were initially granted on a contingent basis and became exercisable as a result of the automatic expiration of the same number of SAR's, as a result of stockholder approval of Amendment No. 4 of the 2007 Plan. See "SAR's" section below for a discussion of the provisions of the exchange and incremental expense recognized.

The weighted-average grant-date fair value of options granted during the years ended December 31, 2017, 2016, and 2015 was zero, \$0.5 million, and \$0.8 million, respectively. There were no options exercised during the years ended December 31, 2017, 2016 and 2015. The weighted-average grant-date fair value of options vesting during the years ended December 31, 2017, 2016, and 2015 was \$0.7 million, \$0.5 million, and \$0.7 million, respectively.

Cash flows resulting from excess tax benefits, if any, are classified as part of cash flows from financing activities. Excess tax benefits are realized tax benefits from tax deductions for vested RSA's, settled PSU's and exercised options in excess of the deferred tax asset attributable to stock compensation costs for such equity awards. The Company recorded no excess tax benefits for the years ended December 31, 2017, 2016, and 2015.

During 2015, approximately \$0.5 million of stock-based compensation expense was recognized as a result of granting an executive officer stock options which were immediately vested, with an exercise price of \$13.87 per option.

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SAR's

A summary of SAR activity under the Plans is presented below:

(in thousands, except for share and per share amounts)	Number of SAR's Outstanding and Exercisable	Weighted-Average Exercise Price	Aggregate Intrinsic Value	Weighted-Average Remaining Contractual Term (in years)
For the year ended December 31, 2015				
SAR's outstanding, January 1, 2015	—	\$ —		
Granted	243,750	\$ 13.87		
Exercised	—	\$ —		
Expired / forfeited	—	\$ —		
SAR's outstanding, December 31, 2015	243,750	\$ 13.87	\$ —	—4.5
SAR's vested and exercisable, December 31, 2015	43,750	\$ 13.87	\$ —	—
For the year ended December 31, 2016				
SAR's outstanding, January 1, 2016	243,750	\$ 13.87		
Granted	—	\$ —		
Exercised	—	\$ —		
Expired / forfeited	(243,750)	\$ 13.87		
SAR's outstanding, December 31, 2016	—	\$ —	\$ —	—
SAR's vested and exercisable, December 31, 2016	—	\$ —	\$ —	—

In June 2016, the Company's stockholders approved Amendment No. 4 to the 2007 Plan, which triggered an automatic expiration of the SAR's and an equal number of stock options being exercisable and no longer granted on a contingent basis. Upon approval, all existing SAR's expired under this provision. The Company recorded incremental expense of \$0.1 million to stock-based compensation related to the change in fair value of the SAR's prior to the reclassification date. Upon reclassification, the impact to Additional paid-in capital was a \$0.9 million increase. The Company had no SAR's outstanding as of December 31, 2017.

PSU's

A summary of the status and activity of non-vested PSU's is presented in the following table:

(in thousands, except for unit and per unit amounts)	For the Years Ended December 31.					
	2017	2016		2015		
	Units	Weighted-Average Grant-Date Fair Value	Units	Weighted-Average Grant-Date Fair Value	Units	Weighted-Average Grant-Date Fair Value
Non-vested at beginning of year	49,516	\$ 25.20	169,334	\$ 26.38	142,357	\$ 30.65
Granted ⁽¹⁾	—	\$ —	—	\$ —	69,218	\$ 20.10
Vested ⁽¹⁾	(30,110)	\$ 26.87	(119,818)	\$ 26.87	(13,763)	\$ 30.52
Forfeited / Canceled ^{(1) (2)}	—	\$ —	—	\$ —	(28,478)	\$ 30.44
Non-vested at end of year	19,406	\$ 19.95	49,516	\$ 25.20	169,334	\$ 26.38

(1) The number of units shown in the table above are based on target performance. The final number of shares of common stock issued may vary depending on the achievement of market conditions established within the awards, which could result in the actual number of shares issued ranging from zero to a maximum of two times the number of units shown in the above table.

(2) Included within the 2015 forfeited / canceled units are PSU's related to a former executive that were clawed back. The Company recognized \$0.2 million within Other Income line item on the Consolidated Statement of Operations related to these awards.

The weighted-average grant date fair value of PSU's granted during the years ended December 31, 2017, 2016, and 2015 was zero, zero, and \$1.4 million, respectively. The PSU's granted will remain unvested until the third anniversary date of their

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issuance, at which time the actual number of vested shares will be determined based upon the actual price performances of the Company's common stock relative to a broad stock index and a peer group performance index. The following table shows the PSUs that were settled by issuing the Company's common stock relative to a peer group performance index and broad stock index.

	Year of Grant	Net Number of Issued Shares upon Vesting	Shares Withheld to Settle Tax Withholding Obligations	TSR Multiple Range		Russell 3000 Multiple	
				Low	High	Low	High
For the year ended December 31, 2017							
	2014	6,476	3,573	0.75	1.00	—	—
	2015	3,869	2,310	0.60	0.60	—	—
For the year ended December 31, 2016							
	2013	38,706	1,572	0.63	1.00	—	—
	2014	11,487	—	0.63	0.63	—	—
	2015	13,529	—	0.50	0.50	—	—
For the year ended December 31, 2015							
	2013	8,768	3,954	1.75	1.75	2.00	2.00
	2014	2,506	1,145	0.63	0.75	—	0.75

Note 7 - Property and Equipment

The carrying basis and accumulated depreciation of property and equipment at December 31, 2017 and 2016 are:

(in thousands)	Life in Years	As of December 31,	
		2017	2016
Machinery and equipment	2-7	\$1,429	\$1,634
Leasehold improvements	3	205	1,244
Furniture and fixtures	3-7	262	777
		1,896	3,655
Less accumulated depreciation and amortization		(1,486)	(2,920)
Total property and equipment, net		\$410	\$735

Depreciation expense for the years ended December 31, 2017, 2016 and 2015 was \$0.7 million, \$0.9 million and \$1.7 million, respectively.

During the year ended December 31, 2016, the Company recorded impairments totaling approximately \$0.5 million to reduce the carrying value of certain property and equipment that the Company intended to sell at its estimated sales value, less estimated costs to sell. The property and equipment was subsequently sold at auction. No gain or loss was recognized on the sale of the property and equipment.

During the year ended December 31, 2016, the Company accelerated depreciation of approximately \$0.2 million related to property and equipment that will be no longer be in service due to the lease termination described in Note 4.

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Note 8 - Costs and Billings on Uncompleted Contracts

Costs incurred on uncompleted contracts represent the gross costs as of the balance sheet dates. Billings on uncompleted contracts represent the gross billings as of the balance sheet dates. Costs and billings are netted on an individual contract basis, with contracts in a net cost position aggregated and presented as Costs in excess of billings on uncompleted contracts in the Consolidated Balance Sheets, and contracts in a net billing position aggregated and presented as Prepaid expenses and other assets in the Consolidated Balance Sheets. The below table shows the components of these items:

(in thousands)	As of December 31,	
	2017	2016
Costs incurred on uncompleted contracts (gross)	\$15,945	\$42,993
Billings on uncompleted contracts (gross)	(17,775)	(47,915)
	\$ (1,830)	\$ (4,922)
Included in the accompanying balance sheets under the following captions ⁽¹⁾ :		
Costs in excess of billings on uncompleted contracts ⁽²⁾	\$—	\$25
Billings in excess of costs on uncompleted contracts	(1,830)	(4,947)
	\$ (1,830)	\$ (4,922)

⁽¹⁾ Amounts presented after netting of costs and billings on an individual contract basis.

⁽²⁾ Costs in excess of billings on uncompleted contracts is included in the Prepaid expenses and other assets caption on the Consolidated Balance Sheets.

When the Company determines that a contract will ultimately be completed at a loss, the Company estimates such loss and accrues the loss as a loss contract accrual in the period that the loss determination is made. Loss contract accruals of \$0.1 million and \$0.2 million as of December 31, 2017 and 2016, respectively, are included in Other current liabilities line item in the Consolidated Balance Sheets. During the years ended December 31, 2017, 2016 and 2015, the Company recorded loss contract provisions of \$0.1 million, \$0.4 million and \$0.3 million, respectively. Loss contract provisions are included within the Equipment sales cost of revenue, exclusive of depreciation and amortization line item in the Consolidated Statements of Operations.

Note 9 - Research and Development and Government and Industry Funded Contracts

Research and development expense consists of research relating to continued product development for the Company's ongoing business and various other projects, including the CO₂ capture and control market. The Company historically entered into certain development and cost-sharing contracts with the DOE and generally included industry cost-share partners to offset the costs incurred that are anticipated to be in excess of funded amounts from the DOE. Contracts with the DOE can take the form of grants or cooperative agreements and are considered financial assistance awards. The deliverables required by the DOE agreements include various technical and financial reports that the Company submits on a prescribed schedule. The agreements require the Company to perform the negotiated scope of work in agreed phases, which includes testing and demonstration of technologies.

The Company typically invoices the DOE and industry cost-share partners monthly for labor and expenditures plus estimated overhead factors, less any cost share amounts. The contracts under which the Company has performed are subject to audit, the result of which may require the Company to reimburse the DOE for disallowed costs and other adjustments. The Company has not experienced any material adverse adjustments as a result of completed government audits. However, the potential government audits for years ended 2013 through 2015 have not yet been finalized. The following table shows the impact to Research and development expense amounts recognized in the Consolidated Statement of Operations:

(in thousands)	Years Ended		
	December 31, 2017	2016	2015
Research and development expense	\$979	\$173	\$6,737
Less:			

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Changes due to amount and timing of ARO reclamation	822	—	—
DOE funding	—	821	1,375
Research and development expense, net	\$157	\$(648)	\$5,362

Included within the above research and development expenses during 2015 is net impairment expense of \$1.9 million for the entire carrying value of the Company's ADA Analytics Israel Ltd's ("ADA Analytics") assets, as discussed in Note 17 and Note 18.

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Note 10 - Supplemental Financial Information
Supplemental Balance Sheet Information

The following table summarizes the components of Prepaid expenses and other assets and Other assets as presented in the Consolidated Balance Sheets:

(in thousands)	As of	
	2017	2016
Other current assets:		
Prepaid expenses	\$1,678	\$1,169
Inventory	74	16
Costs in excess of billings	—	25
Other	83	172
	\$1,835	\$1,382
Other long-term assets:		
Deposits	\$223	\$263
Intangibles	805	696
Cost method investment	552	1,016
Other long-term assets	728	323
	\$2,308	\$2,298

The Company's cost method investment relates to its investment in Highview Enterprises Limited ("Highview"). In November 2014, the Company acquired an 8% ownership interest in the common stock of Highview for \$2.8 million in cash (the "Highview Investment"). The Company evaluated the Highview Investment and determined that it should account for the investment under the cost method.

The Highview Investment is evaluated for impairment upon an indicator of impairment such as an event or change in circumstances that may have a significant adverse effect on the fair value of the investment. As of December 31, 2016, the Company recorded an impairment charge of \$1.8 million based on an estimated fair value of £2.00 per share, compared to the carrying value prior to the impairment charge of £4.25 per share. The estimated fair value as of December 31, 2016 was based on an equity raise that was completed during the first quarter of 2017 at a price of £2.00 per share.

During the year ended December 31, 2017, the Company recorded an impairment charge of \$0.5 million, which is included in the Other line item in the Consolidated Statement of Operations, based on an estimated fair value of £1.00 per share, compared to the carrying value prior to the impairment charge of £2.00 per share. The estimated fair value as of December 31, 2017 was based on an equity raise that commenced during the third quarter of 2017 at a price of £1.00 per share.

The following table details the components of the Company's intangible assets:

(in thousands, except years)	As of December 31,			
	2017		2016	
	Initial Cost	Net of Accumulated Amortization	Initial Cost	Net of Accumulated Amortization
Patents	\$1,079	\$ 805	\$913	\$ 696
Licensed technology	—	—	1,525	—
Total	\$1,079	\$ 805	\$2,438	\$ 696

Included in the Consolidated Statements of Operations is amortization expense related to intangible assets of \$0.1 million, \$0.1 million and \$0.4 million for the years ended December 31, 2017, 2016 and 2015, respectively. The estimated future amortization expense for existing intangible assets as of December 31, 2017 is expected to be \$0.1 million for each of the five succeeding fiscal years.

During the year ended December 31, 2016, the Company entered into an agreement with Highview to terminate a license agreement (the "Highview License") to certain technology ("Licensed Technology") in exchange for a one-time payment by the Company of £0.2 million (approximately \$0.2 million). Under the termination, payment of the termination fee, if any, will only be settled by relinquishing shares of Highview currently owned by the Company equal to £0.2 million. As a result of terminating the Highview License, the Company wrote off the Licensed Technology, reduced the corresponding long-term

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liability ("Highview Obligation") to the amount of the one-time payment, and recognized a gain of approximately \$0.2 million. The gain on the settlement of the Highview Obligation is included in the Other income line on the Company's Consolidated Statement of Operations for the year ended December 31, 2016.

The following table details the components of Other current liabilities and Other long-term liabilities as presented in the Consolidated Balance Sheets:

(in thousands)	As of	
	December 31,	
	2017	2016
Other current liabilities:		
Estimated Company contribution to 401(k) Plan	\$1,000	\$—
Accrued interest	—	618
Accrued losses on equipment contracts	69	183
Taxes payable	207	244
Deferred revenue	—	76
Warranty liabilities	316	287
Deferred rent	—	369
Asset retirement obligation	—	1,312
Other	1,072	928
	\$2,664	\$4,017
Other long-term liabilities:		
Deferred revenue, related party	\$2,000	\$2,000
Deferred rent	192	38
Other long-term liabilities	93	—
	\$2,285	\$2,038

The tables below detail components of Other current liabilities as presented above:

The changes in the carrying amount of the Company's warranty obligations were as follows:

(in thousands)	As of	
	December 31,	
	2017	2016
Balance, beginning of year	\$287	\$1,197
Warranties accrued, net	580	89
Warranty claims	(635)	(899)
Change in estimate related to previous warranties accrued	84	(100)
Balance, end of year	\$316	\$287

Included within Other current liabilities is the Company's asset retirement obligation. Changes in the Company's asset retirement obligation were as follows:

(in thousands)	As of December	
	31,	
	2017	2016
Asset retirement obligation, beginning of year	\$1,312	\$1,248
Accretion	37	64
Liabilities settled	(527)	—
Changes due to scope and timing of reclamation	(822)	—
Asset retirement obligations, end of year	\$—	\$1,312

The Company settled its asset retirement obligation during the year ended December 31, 2017 for less than its estimate as the scope of the asset retirement obligation was reduced. The change in estimate was recorded within the Research and

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development, net line item of the Consolidated Statements of Operations as the asset retirement obligation related to a research project of which expenses were originally recorded within the same line item.

Supplemental Consolidated Statements of Operations Information

The following table details the components of Interest expense in the Consolidated Statements of Operations:

(in thousands)	Years Ended		
	December 31,		
	2017	2016	2015
453A interest	\$2,555	\$2,490	\$4,639
Line of Credit interest and letters of credit fees	417	89	49
Credit Agreement interest	—	2,112	1,180
Interest on RCM6 Note Payable, related party	—	263	2,468
Other	52	112	66
	\$3,024	\$5,066	\$8,402

The following table details the components of Other in the Consolidated Statements of Operations:

(in thousands)	Years Ended December		
	31,		
	2017	2016	2015
Impairment of cost method investment	\$(464)	\$(1,760)	\$—
Settlement agreement ⁽¹⁾	3,500	—	—
Estimate of Company contribution to 401(k) Plan	(1,000)	—	—
Gain on sale of equity method investment	—	2,078	—
Gain on settlement of note payable and licensed technology	—	1,019	—
Gain on termination of sales-type lease	—	891	—
Other	(11)	235	494
	\$2,025	\$2,463	\$494

(1) On November 6, 2017, the Company entered into a settlement agreement with a former third-party service provider and as part of the settlement the Company received cash in the amount of \$3.5 million. This amount was paid to the Company during the fourth quarter of 2017.

Note 11 - Fair Value Measurements

Fair Value of Financial Instruments

The carrying amounts of financial instruments, including cash and cash equivalents, accounts receivable, accounts payable, deposits and accrued expenses, approximate fair value due to the short maturity of these instruments. Accordingly, these instruments are not presented in the table below. The following table provides the estimated fair values of the remaining financial instruments:

(in thousands)	As of		As of	
	December 31, 2017		December 31, 2016	
	Carrying Value	Fair Value	Carrying Value	Fair Value
Financial Instruments:				
Highview Investment	\$ 552	\$ 552	\$1,016	\$1,016
Highview Obligation	\$ 210	\$ 210	\$207	\$207

Concentration of credit risk

As of December 31, 2017, the Company's financial instruments that are exposed to concentrations of credit risk consist primarily of cash and cash equivalents. The Company holds cash and cash equivalents at one financial institution as of December 31, 2017. If that institution was to be unable to perform its obligations, the Company would be at risk regarding the

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amount of investment in excess of the federal deposit insurance corporation limits (\$250 thousand) that would be returned to the Company.

Assets and Liabilities Measured at Fair Value on a Recurring Basis

As of December 31, 2017 and December 31, 2016, the Company had no financial instruments carried and measured at fair value on a recurring basis.

Assets and Liabilities Measured at Fair Value on a Non-Recurring Basis

As discussed in Note 10, during the years ended December 31, 2017 and 2016, the Company recorded impairment charges approximately \$0.5 million and \$1.8 million, respectively, to reduce the carrying value of the Highview Investment to its estimated fair value.

During 2016, the Company recorded impairments totaling approximately \$0.5 million to reduce the carrying value of certain property and equipment that the Company intended to sell at its estimated sales value, less estimated costs to sell. The property and equipment was subsequently sold at auction. Proceeds from the sale of the impaired assets totaled approximately \$0.1 million. No gain or loss was recognized on the sale of the property and equipment.

Additionally, the Company recorded an impairment of approximately \$0.8 million included within Equipment sales cost of revenue for the year ended December 31, 2016.

During December 2014 and March 2015, the Company loaned to an independent technology development company exploring energy storage a total of \$1.0 million to provide financing to pursue emissions technology projects. This note bore annual interest of 8%, and interest and principal were payable at maturity in March 2018. Based on uncertainty of collectability, the Company recorded an allowance against the entire principal balance reversed accrued interest and put the note on non-accrual status as of December 31, 2015.

The fair value measurements represent Level 3 measurements as they are based on significant inputs not observable in the market.

Note 12 - Income Taxes

On December 22, 2017 (the "Enactment Date"), the U.S. government enacted comprehensive tax legislation commonly referred to as the Tax Cuts and Jobs Act (the "Tax Act"). The Tax Act makes broad and complex changes to the U.S. tax code and key provisions applicable to the Company, or certain of Tinnium Group's existing or potential customers, for 2018 include the following: (1) reduction of the U.S. federal corporate tax rate from 35 percent to 21 percent; (2) elimination of the corporate alternative minimum tax (AMT); (3) a new limitation on deductible interest expense; (4) limitations on the deductibility of certain executive compensation; (5) limitations on the use of federal tax credits ("FTCs") to reduce the U.S. income tax liability; (6) limitations on net operating losses ("NOL's") generated after December 31, 2017, to 80 percent of taxable income; and the introduction of the Base Erosion Anti-Abuse Tax ("BEAT") for tax years beginning after December 31, 2017.

Concurrent with the enactment of the Tax Act, in December 2017, the SEC staff issued Staff Accounting Bulletin 118 ("SAB 118"), which provides guidance on accounting for the tax effects of the Tax Act. SAB 118 provides a measurement period that should not extend beyond one year from the Enactment Date for companies to complete the accounting under Accounting Standards Codification 740 - Income Taxes ("ASC 740"). In accordance with SAB 118, a company must reflect the income tax effects of those aspects of the Tax Act for which the accounting under ASC 740 is complete. To the extent that an entity's accounting for certain income tax effects of the Tax Act is incomplete but it is able to determine a reasonable estimate, it must record a provisional estimate in the financial statements. If a company cannot determine a provisional estimate to be included in the financial statements, it should continue to apply ASC 740 on the basis of the provisions of the tax laws that were in effect immediately before the enactment of the Tax Act.

The Company's accounting for the income tax effects of the Tax Act affecting its consolidated financial statements as of December 31, 2017 is generally complete, subject to continued evaluation under SAB 118, and as such, the Company recorded an adjustment to its recorded deferred tax assets and deferred tax liabilities as of the Enactment Date from 35 percent to 21 percent. Accordingly, the Company has recorded a reduction of \$5.8 million to its net

deferred tax asset as of December 22, 2017 with a corresponding entry to deferred tax expense for the year ended December 31, 2017 for those temporary differences expected to reverse after the Enactment Date. The Company does not anticipate any other accounting impacts of the Tax Act during the period within one year from the Enactment Date however, it will continue to assess any potential impact from the Tax Act through this period.

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The provision for income taxes consists of the following:

(in thousands, except for rate)	Years Ended December 31,		
	2017	2016	2015
Current portion of income tax expense:			
Federal	\$519	\$—	\$—
State	894	458	20
	1,413	458	20
Deferred portion of income tax (benefit) expense:			
Federal	23,003	(61,396)	—
State	(264)	—	—
	22,739	(61,396)	—
Total income tax (benefit) expense	\$24,152	\$(60,938)	\$20
Effective tax rate	46 %	(166)%	— %

A reconciliation of expected federal income taxes on income from operations at statutory rates with the expense (benefit) for income taxes is as follows:

(in thousands)	Years Ended December 31,		
	2017	2016	2015
Federal statutory rate	\$18,209	\$12,859	\$(10,542)
State income taxes, net of federal benefit	1,721	987	(781)
Permanent differences	777	84	35
Tax credits	(1,949)	(2,419)	(38,998)
Valuation allowances	(474)	(72,359)	50,066
Changes in tax rates	5,818	(125)	(243)
Stock-based compensation	303	36	487
Other	(253)	(1)	(4)
Expense (benefit) for the provision for income taxes	\$24,152	\$(60,938)	\$20

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Deferred income taxes are provided for the effects of temporary differences between the tax basis of an asset or liability and its reported amount in the accompanying Consolidated Balance Sheets. These temporary differences result in taxable or deductible amounts in future years. Details of the Company's deferred tax assets and liabilities are summarized as follows:

(in thousands)	As of December 31,	
	2017	2016
Deferred tax assets		
Tax credits	\$100,367	\$99,903
Deferred revenues and loss contract provisions	906	268
Employee related liabilities	393	3,796
Intangible assets	914	1,518
Equity method investments	8,457	12,326
Net operating loss carryforwards	2,004	13,341
Settlement and Royalty Indemnification	—	4,264
Other investments	563	680
Other	648	1,429
Total deferred tax assets	114,252	137,525
Less valuation allowance	(75,436)	(75,910)
Deferred tax assets	38,816	61,615
Less: Deferred tax liabilities		
Property and equipment and other	(155)	(219)
Total deferred tax liabilities	(155)	(219)
Net deferred tax assets	\$38,661	\$61,396

For 2017, the Company recorded an income tax expense of \$24.2 million compared to an income tax benefit of \$60.9 million for 2016. The income tax expense for the year ended December 31, 2017 was primarily related to federal and state taxes of \$19.9 million, plus the aforementioned adjustment related to the Tax Act, which increased the Company's income tax expense by \$5.8 million. The income tax benefit for the year ended December 31, 2016 was primarily due to reversals of the valuation allowance of the Company's net deferred tax assets of \$61.4 million. Accounting for income taxes requires that companies assess whether a valuation allowance should be recorded against their deferred tax asset based on an assessment of the amount of the deferred tax asset that is "more likely than not" to be realized. Valuation allowances are established, when necessary, to reduce deferred tax assets to the amount that is more likely than not to be realized.

The Company assesses the valuation allowance recorded against deferred tax assets at each reporting date. The determination of whether a valuation allowance for deferred tax assets is appropriate requires the evaluation of positive and negative evidence that can be objectively verified. Consideration must be given to all sources of taxable income available to realize the deferred tax asset, including, as applicable, the future reversal of existing temporary differences, future taxable income forecasts exclusive of the reversal of temporary differences and carryforwards, taxable income in carryback years and tax planning strategies. In estimating taxes, the Company assesses the relative merits and risks of the appropriate tax treatment of transactions taking into account statutory, judicial, and regulatory guidance.

As of December 31, 2017, the Company concluded it is more likely than not the Company will generate sufficient taxable income within the applicable NOL and tax credit carry-forward periods to realize \$38.7 million of its net deferred tax assets, and therefore, reversed \$0.5 million of the valuation allowance. In reaching this conclusion, the Company most significantly considered: (1) forecasts of continued future taxable income, (2) changes to the current DTA balances related to the effects of the Tax Act, (3) changes to forecasts of future utilization of DTA's related to the effects of the Tax Act, and (4) impacts of additional RC invested facilities during 2017.

Prior to 2016, the Company had recorded a valuation allowance for all of its deferred tax assets, primarily due to its historical three-year cumulative loss position. However, as of December 31, 2016, the Company concluded it was

more likely than not the Company would generate sufficient taxable income within the applicable NOL and tax credit carry-forward periods to realize \$61.4 million of its net deferred tax assets, and therefore, reversed \$61.4 million of the valuation allowance, after utilizing \$11.0 million during 2016. This conclusion was reached after weighing all of the evidence and determining that the positive evidence outweighed the negative evidence. The positive evidence considered by management in arriving at its conclusion to partially

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reverse the valuation allowance includes factors such as: (1) emergence from the previous three-year cumulative loss position during the fourth quarter of 2016, (2) completion of four consecutive quarters of profitability and (3) forecasts of continued future profitability.

The following table presents the approximate amount of state net operating loss carryforwards and federal tax credit carryforwards available to reduce future taxable income, along with the respective range of years that the net operating loss and tax credit carryforwards would expire if not utilized:

(in thousands)	As of December 31,		
	2017	Beginning expiration year	Ending expiration year
State net operating loss carryforwards	\$41,071	2021	2037
Federal tax credit carryforwards	\$100,367	2031	2037

The following table sets forth a reconciliation of the beginning and ending unrecognized tax benefits on a gross basis for the years ended December 31, 2017, 2016 and 2015:

(in thousands)	Years Ended		
	December 31,		
	2017	2016	2015
Balance as of January 1	\$54	\$ —	\$ —
Increases for tax positions of current year	—	54	—
Balance as of December 31	\$54	\$ 54	\$ —

The Company did not record any adjustments or recognize interest expense for uncertain tax positions for the years ended December 31, 2017, 2016 and 2015. Interest and penalties related to uncertain tax positions are accrued and included in the Interest expense line item in the Consolidated Statements of Operations. Additionally, the Company recognizes interest expense related to tax treatment of RC facilities at Tinum Group in the Interest expense line item in the Consolidated Statements of Operations. Additional information related to these interest amounts is included in Note 10.

The Company files income tax returns in the U.S. and in various states. The Company is no longer subject to U.S. federal examinations by tax authorities for years before 2014. The Company is generally no longer subject to state examinations by tax authorities for years before 2013.

Note 13 - Business Segment Information

Operating segments are defined as components of an enterprise about which separate financial information is available that is evaluated regularly by a company's chief operating decision maker ("CODM"), or a decision making group, in deciding how to allocate resources and in assessing financial performance. As of December 31, 2017, the Company's CODM was the Company's CEO. The Company's operating and reportable segments are organized by products and services provided.

As of December 31, 2016, the Company has two reportable segments: (1) Refined Coal ("RC"); and (2) Emissions Control ("EC").

The business segment measurements provided to and evaluated by the CODM are computed in accordance with the principles listed below:

The accounting policies of the operating segments are the same as those described in the summary of significant accounting policies except as described below.

Segment revenues include equity method earnings and losses from the Company's equity method investments and royalties earned from Tinum Group and income related to sales-type leases.

Segment operating income (loss) includes segment revenues, gains related to sales of equity method investments and allocation of certain "Corporate general and administrative expenses," which includes Payroll and benefits, Rent and occupancy, Legal and professional fees, and General and administrative.

RC segment operating income includes interest expense directly attributable to the RC segment.

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As of December 31, 2017 and December 31, 2016, substantially all of the Company's material assets are located in the U.S. and all significant customers are U.S. companies. The following table presents the Company's operating segment results for the years ended December 31, 2017, 2016 and 2015:

(in thousands)	Years Ended December 31,		
	2017	2016	2015
Revenues:			
Refined Coal:			
Earnings in equity method investments	\$53,843	\$45,584	\$8,921
Consulting services	—	—	55
Royalties, related party	9,672	6,125	10,642
	63,515	51,709	19,618
Emissions Control:			
Equipment sales	31,401	46,949	60,099
Chemicals	4,246	3,025	888
Consulting services	45	648	1,697
	35,692	50,622	62,684
Total segment reporting revenues	99,207	102,331	82,302
Adjustments to reconcile to reported revenues:			
Refined Coal:			
Earnings in equity method investments	(53,843)	(45,584)	(8,921)
Royalties, related party	(9,672)	(6,125)	(10,642)
	(63,515)	(51,709)	(19,563)
Total reported revenues	\$35,692	\$50,622	\$62,739
Segment operating income (loss)			
Refined Coal ⁽¹⁾	\$59,908	\$51,264	\$12,131
Emissions Control ⁽²⁾	379	7,334	(7,583)
Total segment operating income	\$60,287	\$58,598	\$4,548

(1) Included within the RC segment operating income for the year ended December 31, 2016 is a \$2.1 million gain on the sale of RCM6 and for the years ended December 31, 2017, 2016 and 2015, 453A interest expense of \$2.6 million, \$2.5 million and \$4.6 million, respectively. Also included within the RC segment operating income for the years ended December 31, 2016 and 2015 is interest expense related to the RCM6 Note Payable of \$0.3 million and \$2.5 million, respectively.

(2) Included within the EC segment operating income for the year ended December 31, 2016 is a \$0.9 million gain related to a termination of a sales-type lease.

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A reconciliation of reportable segment operating income to the Company's consolidated net income is as follows:

(in thousands)	Years Ended December 31,		
	2017	2016	2015
Segment operating income			
Total reported segment operating income	\$60,287	\$58,598	\$4,548
Adjustments to reconcile to net income (loss) attributable to the Company			
Corporate payroll and benefits	(5,565)	(9,415)	(14,842)
Corporate rent and occupancy	(293)	(1,187)	(707)
Corporate legal and professional fees	(4,010)	(8,230)	(15,199)
Corporate general and administrative	(3,400)	(3,811)	(3,640)
Corporate depreciation and amortization	(342)	(608)	(578)
Corporate interest (expense) income, net	(432)	(2,334)	24
Other income (expense), net	5,780	3,727	273
Income tax (expense) benefit	(24,152)	60,938	(20)
Net income (loss)	\$27,873	\$97,678	\$(30,141)

Corporate general and administrative expenses include certain costs that benefit the business as a whole but are not directly related to one of the Company's segments. Such costs include, but are not limited to, accounting and human resources staff, information systems costs, legal fees, facility costs, audit fees and corporate governance expenses.

A reconciliation of reportable segment assets to the Company's consolidated assets is as follows:

(in thousands)	As of December 31,	
	2017	2016
Assets:		
Refined Coal ⁽¹⁾	\$8,092	\$6,310
Emissions Control	3,755	24,551
Total segment assets	11,847	30,861
All Other and Corporate ⁽²⁾	70,771	76,435
Consolidated	\$82,618	\$107,296

(1) Includes \$4.4 million of investments in equity method investees.

(2) Included within All Other and Corporate are the Company's deferred tax assets.

Note 14 - Major Customers

Revenues from unaffiliated customers who represent 10% or more of the Company's revenues in for the years ended December 31, 2017, 2016 and 2015 were as follows:

Customer	Revenue Type	Segment(s)	Years Ended December 31,		
			2017	2016	2015
A	Equipment sales	EC	62%	21%	3%
B	Equipment sales, Consulting services	EC	—%	14%	16%
C	Consulting services	EC	—%	—%	11%
D	Equipment sales	EC	—%	—%	15%

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Note 15 - Related Party Transactions
Accounts Receivable

The following table shows the Company's receivable balance associated with related parties as of December 31, 2017 and 2016:

	As of	
	December 31,	
(in thousands)	2017	2016
Receivable from related party - Tinum Group	\$3,247	\$1,934
Other Income		

The following table shows the other income recognized with related parties during the years ended December 31, 2017, 2016 and 2015:

	Years Ended December		
	31,		
(in thousands)	2017	2016	2015
Royalties, related party - Tinum Group	\$9,672	\$6,125	\$10,642

The above Tinum Group royalties are included within the Royalties, related party line in the Consolidated Statements of Operations.

DSI Business Owner

As of December 31, 2014, the Company terminated the consulting portion of the agreements with the DSI Business Owner. However, according to the terms of the remaining agreements, the Company was required to make all remaining payments structured as a note payable (the "DSI Business Owner Note Payable") through the third quarter of 2017. In February 2016, the Company entered into an agreement with the DSI Business Owner and settled the remaining amounts owed under the DSI Business Owner Note Payable as of the date of the agreement of approximately \$1.1 million for \$0.3 million, which was paid during the first quarter of 2016. The difference between the remaining amounts owed and the settlement amount was included within the Gain on settlement of note payable and licensed technology line item in the Consolidated Statements of Operations for the year ended December 31, 2016.

Highview License

As discussed in Note 10, the Company has an obligation of £0.2 million (approximately \$0.2 million) as a result of the termination of the Highview License, which will only be settled by relinquishing shares of Highview currently owned by the Company equal to £0.2 million.

Arch Coal License

In June 2010, the Company entered into a Development and License Agreement with Arch Coal, Inc. ("Arch"), a related party as an Arch designee held a Board seat through June 2017, pursuant to which the Company licensed, on an exclusive, non-transferable basis, the use of certain of its technology to enhance coal by a proprietary treatment process. The Company received a non-refundable license fee payment from Arch in the amount of \$2.0 million and incurred non-reimbursable costs associated with this agreement in the amount of \$0.3 million.

Note 16 - Defined Contribution Savings Plan

The Company sponsors a qualified defined contribution savings plan (the "401(k) Plan") that allows participation by eligible employees who may defer a portion of their gross pay. The Company makes contributions to the 401(k) Plan based on percentages of an employee's eligible compensation as specified in the 401(k) Plan, and such employer contributions are in the form of cash.

The following table presents the amount of the Company' contributions made to the 401(k) Plan, which is reflected within the Payroll and benefits line item in the Consolidated Statements of Operations:

	Years Ended		
	December 31,		
(in thousands)	2017	2016	2015
401(k) Plan employer contributions	\$56	\$172	\$439

Due to the prior year Restructuring actions discussed in Note 18 as well as usage of forfeitures within the 401(k) Plan, there was a decrease in employer contributions made to the 401(k) Plan for the year ended December 31, 2017.

Advanced Emissions Solutions, Inc. and Subsidiaries
Notes to Consolidated Financial Statements

Note 17 - Acquisition

2015 Acquisition

In March 2015, the Company acquired the certain assets of InSyst Ltd. and ClearView Monitoring Solutions Ltd. (collectively "ClearView"), to be operated under the Company's wholly-owned subsidiary, ADA Analytics, for total cash payments of \$2.4 million, which was inclusive of value-add tax of \$0.4 million. The acquisition was accounted for under the acquisition method of accounting, which requires the total purchase consideration to be allocated to the assets acquired and liabilities assumed based on estimates of fair value. Operating results related to the acquired assets were consolidated into the Company's results of operations beginning March 6, 2015.

A summary of the purchase consideration and allocation of the purchase consideration is as follows:

	(in thousands)
Purchase consideration:	
Cash paid	\$ 2,360
Fair value of liabilities assumed:	
Accrued liabilities	10
Contingent consideration	451
Total fair value of liabilities assumed	461
Total purchase consideration	\$ 2,821
Allocation of purchase consideration	
Receivables	\$ 360
Property and equipment and other	82
Intangibles - in process research and development	2,379
Total	\$ 2,821

During August 2015, as part of a broader strategic restructuring of the Company's business, the Company's management approved an action to wind down operations of ADA Analytics. As a result of these actions, the Company fully impaired the carrying value of the assets and reversed the liability for the contingent consideration, thereby recognizing net impairment expense in the amount of \$1.9 million during 2015. As disclosed in Note 9, the impairment expense was included as a component of research and development expense for the year ended December 31, 2015.

Note 18 - Restructuring

During the year ended December 31, 2017, the Company did not record material restructuring charges.

During the year ended December 31, 2016, the Company recorded restructuring charges in connection with a reduction in force, the departure of certain executive officers and management's further alignment of the business with strategic objectives. These charges related to severance arrangements with departing employees and executives as well as non-cash charges related to the acceleration of vesting of certain stock awards.

During the year ended December 31, 2015, the Company recorded restructuring charges in connection with a reduction in force, the departure of executive officers and management's further alignment of the business with strategic objectives. These charges related to severance arrangements with departing employees and executives, including non-cash charges related to the acceleration of vesting of certain stock awards. In 2015, the charges also related to the closing of the Pennsylvania office and fabrication facility and the termination of the operations of ADA Analytics, a foreign subsidiary that was involved in the development of certain data analytics and monitoring products. Furthermore, during the fourth quarter of 2015, the Company closed its fabrication facility in Pennsylvania and recorded restructuring charges related thereto.

Advanced Emissions Solutions, Inc. and Subsidiaries
Notes to Consolidated Financial Statements

A summary of the net pretax charges incurred by segment is as follows:

(in thousands, except employee data)	Approximate Number of Employees	Pretax Charge		Total
		Re-Emissions and Control	All Other and Corporate	
Year ended December 31, 2016				
Restructuring charges	40	\$-1,164	\$ 881	\$2,045
Changes in estimates		—(210)	(276)	(486)
Total pretax charge, net of reversals		\$-954	\$ 605	\$1,559
Year ended December 31, 2015				
Restructuring charges	162	\$-5,108	\$ 5,264	\$10,372
Changes in estimates		\$-10)	\$ (2)	\$(12)
Total pretax charge, net of reversals		\$-5,098	\$ 5,262	\$10,360

The following table summarizes the Company's utilization of restructuring accruals for the years ended December 31, 2017, 2016 and 2015:

(in thousands)	Employee Severance	Facility Closures
Beginning accrual as of January 1, 2015	\$ 1,690	\$ —
Expense provision ⁽¹⁾	8,498	2,650
Cash payments and other ⁽¹⁾	(7,595)	(1,873)
Change in estimates ⁽¹⁾	(12)	—
Accrual as of December 31, 2015	2,581	777
Expense provision ⁽¹⁾	2,045	—
Cash payments and other ⁽¹⁾	(3,898)	(320)
Change in estimates ⁽¹⁾	(276)	(210)
Accrual as of December 31, 2016	452	247
Expense provision ⁽¹⁾	56	—
Cash payments and other ⁽¹⁾	(508)	(250)
Change in estimates ⁽¹⁾	—	3
Accrual as of December 31, 2017	\$ —	\$ —

(1) Included within the Expense provision and Cash payments and other line items in the above table is stock-based compensation of zero, \$0.4 million and \$3.4 million for the years ended December 31, 2017, 2016 and 2015, respectively, resulting from the accelerated vesting of modified equity-based compensation awards for certain terminated employees. Additionally, as discussed in Note 17, due to restructuring activities the Company fully impaired the carrying value of certain assets, thereby recognizing net impairment expense in the amount of \$1.9 million during the year ended December 31, 2015.

Restructuring accruals related to personnel are included within the Accrued payroll and related liabilities line item in the Consolidated Balance Sheets. Restructuring expenses related to personnel are included within the Payroll and benefits and Research and development, net line items in the Consolidated Statements of Operations. Restructuring accruals related to facilities are included within the Other current liabilities line item in the Consolidated Balance Sheets. Restructuring expenses related to facilities are included within the Rent and occupancy line item in the Consolidated Statements of Operations.

Advanced Emissions Solutions, Inc. and Subsidiaries
Notes to Consolidated Financial Statements

Note 19 - Quarterly Financial Results (unaudited)

Summarized quarterly results for the two years ended December 31, 2017 and December 31, 2016 are as follows:

(in thousands, except per share data)	For the Quarter Ended			
	December 31, 2017	September 30, 2017	June 30, 2017	March 31, 2017
Revenues	\$544	\$ 2,294	\$25,465	\$ 7,389
Cost of revenues, exclusive of operating expenses shown below	648	2,041	23,295	5,901
Other operating expenses	4,205	4,197	4,020	5,199
Operating loss	(4,309)	(3,944)	(1,850)	(3,711)
Earnings from equity method investments	17,754	12,120	10,155	13,814
Royalties, related party	3,247	2,804	1,866	1,755
Other income (expenses), net	1,831	(1,602)	(121)	2,216
Income before income tax expense	18,523	9,378	10,050	14,074
Income tax expense	11,538	(1)3,586	3,642	5,386
Net income	\$6,985	\$ 5,792	\$6,408	\$ 8,688
Earnings per common share – basic	\$0.34	\$ 0.28	\$0.29	\$ 0.39
Earnings per common share – diluted	\$0.33	\$ 0.28	\$0.29	\$ 0.39
Weighted-average number of common shares outstanding				
Basic	20,767	20,808	21,866	22,056
Diluted	20,864	20,854	21,880	22,243

(in thousands, except per share data)	For the Quarter Ended			
	December 31, 2016	September 30, 2016	June 30, 2016	March 31, 2016
Revenues	\$3,604	\$15,710	\$8,951	\$22,357
Cost of revenues, exclusive of operating expenses shown below	3,478	13,259	5,769	17,311
Other operating expenses	5,388	5,364	7,794	8,357
Operating loss	(5,262)	(2,913)	(4,612)	(3,311)
Earnings from equity method investments	15,518	10,735	13,754	5,577
Royalties, related party	2,203	2,064	669	1,189
Other expenses, net	1,698	(2)309	(1,852)	974
Income before income tax expense	14,157	10,195	7,959	4,429
Income tax (benefit) expense	(61,673)	(3)583	99	53
Net income	\$75,830	\$9,612	\$7,860	\$4,376
Loss per common share – basic	\$3.45	\$0.44	\$0.36	\$0.20
Loss per common share – diluted	\$3.39	\$0.43	\$0.35	\$0.20
Weighted-average number of common shares outstanding				
Basic	21,693	21,740	21,875	21,849
Diluted	22,061	22,098	22,187	22,177

(1) During the fourth quarter of 2017, the Company recorded an income tax expense of \$11.5 million primarily related to statutory federal and state taxes of \$5.7 million at the statutory rates, and the impact of the Tax Act, which increased the Company's income tax expense by \$5.8 million.

Advanced Emissions Solutions, Inc. and Subsidiaries
Notes to Consolidated Financial Statements

(2) During the fourth quarter of 2016, the Company revised its estimate for future Royalty Award payments based on an updated forecast provided to the Company from Carbon Solutions. Based primarily on the updated forecast, the Company recorded a \$4.0 million reduction to its Royalty Award accrual.

(3) During the fourth quarter of 2016, the Company released \$61.4 million of the valuation allowance related to the deferred tax assets that resulted in an income tax benefit of \$61.7 million. See further discussion in Note 12.

Note 20 - Subsequent Events

Unless disclosed elsewhere within the notes to the Consolidated Financial Statements, the following are the significant matters that occurred subsequent to December 31, 2017.

Dividends

On February 8, 2018, the Company's Board of Directors declared a quarterly dividend of \$0.25 per share of common stock, which was paid on March 8, 2018 to stockholders of record at the close of business on February 21, 2018.

Item 9. Changes in and Disagreements with Accountants on Accounting and Financial Disclosure
None.

Item 9A. Controls and Procedures

Evaluation of Disclosure Controls and Procedures

As required by Rule 13a-15(b) under the Securities Exchange Act of 1934, as amended (the "Exchange Act"), we have evaluated, under the supervision of and with the participation of our management, including our principal executive officer and principal financial officer, the effectiveness of the design and operation of our disclosure controls and procedures (as defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act) as of the end of the period covered by this annual report. Our disclosure controls and procedures are designed to ensure that information required to be disclosed in the reports that we file or submit under the Exchange Act is recorded, processed, summarized and reported, within the time periods specified in the SEC's rules and forms. Based upon this evaluation, our principal executive officer and principal financial officer concluded that our disclosure controls and procedures were effective as of December 31, 2017.

Changes in Internal Control Over Financial Reporting

There has been no change in our internal control over financial reporting (as defined in Rules 13a-15(f) and 15d-15(f) under the Exchange Act) during the fourth quarter of 2017 that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

Management's Report on Internal Control over Financial Reporting

Management is responsible for establishing and maintaining adequate internal control over financial reporting as defined in Rules 13a-15(f) and 15d-15(f) under the Exchange Act. Internal control over financial reporting is designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of consolidated financial statements for external purposes in accordance with generally accepted accounting principles. The Company's internal control over financial reporting includes those policies and procedures that:

1. Pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of our assets;
2. Provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the Company are being made only in accordance with authorizations of our management and directors; and
3. Provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use or disposition of the Company's assets that could have a material effect on our financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

Under the supervision of, and with the participation of our management, including the principal executive officer and principal financial officer, we conducted an evaluation of the effectiveness of our internal control over financial reporting based on the framework and criteria established in Internal Control-Integrated Framework in 2013, issued by the Committee of Sponsoring Organizations of the Treadway Commission. Based on this evaluation, our management concluded that our internal control over financial reporting was effective as of December 31, 2017.

Moss Adams LLP, an independent registered public accounting firm, has issued an attestation report on our internal control over financial reporting as of December 31, 2017 and its report is included herein.

Report of Independent Registered Public Accounting Firm

To the Stockholders and the Board of Directors of
Advanced Emissions Solutions, Inc. and Subsidiaries

Opinion on Internal Control over Financial Reporting

We have audited Advanced Emissions Solutions, Inc. and subsidiaries' (the "Company") internal control over financial reporting as of December 31, 2017, based on criteria established in Internal Control - Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission ("COSO"). In our opinion, the Company maintained, in all material respects, effective control over financial reporting as of December 31, 2017, based on criteria established in Internal Control - Integrated Framework (2013) issued by COSO.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) ("PCAOB"), the consolidated balance sheet of Advanced Emissions Solutions, Inc. as of December 31, 2017, the related consolidated statements of operations, stockholders' equity and cash flows for the year then ended, and the related notes (collectively referred to as the "consolidated financial statements") and our report dated March 12, 2018, expressed an unqualified opinion on those consolidated financial statements.

Basis for Opinion

The Company's management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting, included in the accompanying Management Report on Internal Control over Financial Reporting. Our responsibility is to express an opinion on the Company's internal control over financial reporting based on our audit. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects. Our audit included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audit also included performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

Definition and Limitations of Internal Control Over Financial Reporting

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

/s/ Moss Adams LLP

Denver, Colorado
March 12, 2018

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Item 9B. Other Information

None.

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PART III

Item 10. Directors, Executive Officers, and Corporate Governance

The information required by this Item is incorporated by reference to our definitive proxy statement for the Annual Meeting of Stockholders to be filed within 120 days from December 31, 2017.

Item 11. Executive Compensation

The information required by this Item is incorporated by reference to our definitive proxy statement for the Annual Meeting of Stockholders to be filed within 120 days from December 31, 2017.

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Item 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters

The information required by this Item concerning security ownership of certain beneficial owners and management is incorporated by reference to our definitive proxy statement for the Annual Meeting of Stockholders to be filed within 120 days from December 31, 2017, with the exception of the following information.

Securities Authorized for Issuance under Equity Compensation Plans

We have plans under which equity awards are authorized for grant or issuance as compensation to eligible employees, consultants, and members of the Board. Our stockholders have approved these plans. See Note 6 Stock-Based Compensation included in Item 8 of this Report for further information about the material terms of our equity compensation plans. The following table is a summary of the shares of our common stock authorized for issuance under the equity compensation plans as of December 31, 2017:

Plan Category	Number of securities to be issued upon exercise of outstanding options, warrants and rights	Weighted-average exercise price of outstanding options, warrants and rights ⁽²⁾	Number of securities remaining available for future issuance under equity compensation plans (excluding securities reflected in the first column) ⁽³⁾
Equity compensation plans approved by security holders ⁽¹⁾	641,852	\$ 11.64	2,580,974
Equity compensation plans not approved by security holders	—	\$ —	—
Total	641,852		2,580,974

(1) Includes the Amended and Restated 2007 Equity Incentive Plan, as amended, the Amended and Restated 2010 Non-Management Compensation and Incentive Plan, as amended, and the 2017 Omnibus Incentive Plan.

(2) The weighted-average price pertains only to 622,446 shares of common stock issuable upon the exercise of outstanding options.

(3) The number of securities is reduced by 276,607 shares of restricted common stock for which restrictions have not lapsed.

Item 13. Certain Relationships and Related Transactions and Director Independence

The information required by this Item is incorporated by reference to our definitive proxy statement for the Annual Meeting of Stockholders to be filed within 120 days from December 31, 2017.

Item 14. Principal Accountant Fees and Services

The information required by this Item is incorporated by reference to our definitive proxy statement for the Annual Meeting of Stockholders to be filed within 120 days from December 31, 2017.

Item 15. Exhibits and Financial Statement Schedules

(a) The following consolidated financial statements of Advanced Emissions Solutions, Inc., are filed as part of this Report under Item 8:

(1) Financial Statements – see Index to Consolidated Financial Statements in Item 8;

Financial Statement Schedules – All schedules are omitted because the required information is not applicable or is (2) not present in amounts sufficient to require submission of the schedule or because the information required is included in the Consolidated Financial Statements and Notes thereto; and

(3) Exhibits – Those exhibits required by Item 601 of Regulation S-K and by paragraph (b) below.

(b) The following exhibits are filed as part of this Report or, where indicated, were heretofore filed and are hereby incorporated by reference:

Exhibit No.	Description	Form	File No.	Incorporated by Reference Exhibit	Filing Date
3.1	<u>Second Amended and Restated Certificate of Incorporation of Advanced Emissions Solutions, Inc.</u>	10-Q	000-54992	3.1	August 9, 2013
3.2	<u>Conformed Copy of the Bylaws of Advanced Emissions Solutions, Inc., as amended*</u>				
3.3	<u>Certificate of Designation, Preferences, and Rights of Series B Junior Participating Preferred Stock of Advanced Emissions Solutions, Inc.</u>	8-K	001-37822	3.1	May 8, 2017
4.1	<u>Form of Specimen Common Stock Certificate</u>	10-Q	000-54992	4.1	August 9, 2013
4.2	<u>Tax Asset Protection Plan dated as of May 5, 2017, by and between the Company and Computershare Trust Company, N.A., as rights agent, which includes as Exhibit B the Form of Rights Certificate</u>	8-K	001-37822	3.2	May 8, 2017
10.1	<u>Advanced Emissions Solutions, Inc. 2017 Omnibus Incentive Plan**</u>	8-K	001-37822	10.1	June 22, 2017
10.2	<u>Form of Employment Agreement dated August 27, 2014, among L. Heath Sampson, ADA-ES, Inc. and Advanced Emissions Solutions, Inc., as amended**</u>	10-K	000-54992	10.19	February 29, 2016
10.3	<u>Rider to Employment Agreement dated August 27, 2014 between Heath Sampson and ADA-ES, Inc. and Advanced Emissions Solutions, Inc.**</u>	8-K	000-54992	10.66	September 2, 2014
10.4	<u>Employment Agreement dated March 1, 2003 between Sharon M. Sjostrom and ADA Environmental Solutions, LLC (assigned to ADA-ES, Inc.)**</u>	10-K	000-50216	10.34	March 27, 2007
10.5	<u>Form of Amendment to Employment Agreement dated August 26, 2014 between Sharon M. Sjostrom and ADA-ES, Inc. and Advanced Emissions Solutions, Inc.**</u>	8-K	000-54992	10.67	September 2, 2014
10.6	<u>Second Amended and Restated Operating Agreement of Clean Coal Solutions, LLC dated May 27, 2011, by and among Clean Coal Solutions, LLC, ADA-ES, Inc., GSFS Investments I Corp. and NexGen Refined Coal, LLC***</u>	10-Q/A	000-50216	10.33	September 28, 2011
10.7	<u>The First Amendment to the Second Amended and Restated Operating Agreement of Clean Coal Solutions, LLC, by and among Clean Coal Solutions, LLC, ADA-ES, Inc., GSFS Investments I Corp. and NexGen Refined Coal, LLC dated September 9, 2011</u>	10-Q	000-50216	10.89	November 14, 2011
10.8		10-Q	000-50216	10.59	

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	<u>Second Amendment to the Second Amended and Restated Operating Agreement of Clean Coal Solutions, LLC by and among ADA-ES, Inc., NexGen Refined Coal, LLC and GSFS Investments I Corp. dated July 31, 2012</u>				November 9, 2012
10.9	<u>Contribution Agreement dated May 27, 2011 between ADA-ES, Inc. and NexGen Refined Coal, LLC Amended and Restated Limited Liability Company</u>	10-Q	000-50216	10.87	August 12, 2011
10.10	<u>Operating Agreement by and between ADA-ES, Inc., NexGen Refined Coal, LLC and Clean Coal Solutions Services, LLC dated November 20, 2013</u>	10-K	000-54992	10.38	February 29, 2016
10.11	<u>Amended and Restated License Agreement between ADA-ES, Inc. and Clean Coal Solutions, LLC dated October 30, 2009</u>	10-Q	000-50216	10.77	August 16, 2010

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Exhibit No.	Description	Form	File No.	Incorporated by Reference Exhibit	Filing Date
10.12	<u>First Amendment to the Amended and Restated License Agreement between ADA-ES, Inc. and Clean Coal Solutions, LLC dated as of August 4, 2010</u>	10-K	000-50216	10.81	March 28, 2011
10.13	<u>Second Amendment to Amended and Restated License Agreement by and between ADA-ES, Inc. and Clean Coal Solutions, LLC dated as of July 23, 2013***</u>	10-Q	000-54992	10.63	November 12, 2013
10.14	<u>Technology Sublicense Agreement between ADA-ES, Inc., Clean Coal Solutions, LLC, and GS RC Investments LLC dated June 29, 2010</u>	10-Q	000-50216	10.74	August 16, 2010
10.15	<u>Amendment to Technology Sublicense Agreement between ADA-ES, Inc., GS RC Investments, LLC, and Clean Coal Solutions, LLC dated November 21, 2011***</u>	10-K	000-54992	10.44	February 29, 2016
10.16	<u>Amendment #2 to Technology Sublicense Agreement between ADE-ES, Inc, GS RC Investments, LLC, and Clean Coal Solutions, LLC dated December 15, 2011</u>	10-K	000-50216	10.49	March 15, 2012
10.17	<u>Exclusive Right to Lease Agreement dated May 27, 2011 between Clean Coal Solutions, LLC and GSFS Investments I Corp***</u>	10-Q/A	000-50216	10.84	September 28, 2011
10.18	<u>ADA-ES, Inc. Limited Guaranty for the benefit of GSFS Investments I Corp. dated May 27, 2011</u>	10-Q	000-50216	10.86	August 12, 2011
10.19	<u>ADA-ES, Inc. Limited Guaranty for the benefit of GS RC Investments LLC dated November 21, 2011</u>	10-K	000-50216	10.44	March 15, 2012
10.20	<u>ADA-ES, Inc. Limited Guaranty for the benefit of GS RC Investments LLC dated December 15, 2011</u>	10-K	000-50216	10.50	March 15, 2012
10.21	<u>M-45 Technology License Agreement between ADA-ES, Inc. and Clean Coal Solutions, LLC dated July 27, 2012***</u>	10-Q	000-50216	10.58	November 9, 2012
10.22	<u>Undertaking and Assumption Agreement by and among Advanced Emissions Solutions, Inc., ADA-ES, Inc., and ADA Environmental Solutions, LLC dated as of July 1, 2013</u>	10-Q	000-54992	10.62	November 12, 2013
10.23	<u>Settlement Agreement by and among ADA-ES, Inc., ADA Environmental Solutions, LLC, Norit Americas, Inc. and Norit International N.V. f/k/a Norit N.V. dated August 29, 2011</u>	10-Q	000-50216	10.88	November 14, 2011
10.24	<u>Indemnity Settlement Agreement between ADA-ES, Inc., ADA Environmental Solutions, LLC and Energy Capital Partners, LLC, Energy Capital Partners I, LP, Energy Capital Partners I-A, LP, Energy Capital Partners I-B IP, LP and Energy Capital Partners I (Crowfoot IP), LP and ADA Carbon Solutions, LLC (f/k/a Crowfoot Development, LLC), ADA Carbon Solutions (Red River), LLC (f/k/a Red River Environmental Products, LLC), Morton Environmental Products, LLC, Underwood Environmental Products, LLC, Crowfoot Supply Company, LLC, and Five Forks Mining, LLC dated November 28, 2011</u>	10-K	000-50216	10.45	March 15, 2012
10.25	<u>2013 Loan and Security Agreement by and among ADA-ES, Inc., Advanced Emissions Solutions, Inc., and CoBiz Bank d/b/a Colorado Business Bank in the State of Colorado dated</u>	10-K	000-54992	10.69	February 29, 2016

as of September 19, 2013

10.26	<u>First Amendment and Waiver to 2013 Loan and Security Agreement by and among ADA-ES, Inc., Advanced Emissions Solutions, Inc., and CoBiz Bank d/b/a Colorado Business Bank in the State of Colorado as of December 2, 2013</u>	10-K	000-54992 10.70	February 29, 2016
10.27	<u>Second Amendment to 2013 Loan and Security Agreement by and among ADA-ES, Inc., Advanced Emissions Solutions, Inc., and CoBiz Bank d/b/a Colorado Business Bank in the State of Colorado dated as of April 3, 2014</u>	10-K	000-54992 10.71	February 29, 2016
10.28	<u>Second Waiver to 2013 Loan and Security Agreement by and among ADA-ES, Inc., Advanced Emissions Solutions, Inc., and CoBiz Bank d/b/a Colorado Business Bank in the State of Colorado dated as of April 22, 2014</u>	10-K	000-54992 10.72	February 29, 2016

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Exhibit No.	Description	Form	File No.	Incorporated by Reference Exhibit	Filing Date
10.29	<u>Third Waiver to 2013 Loan and Security Agreement by and among ADA-ES, Inc., Advanced Emissions Solutions, Inc., and CoBiz Bank d/b/a Colorado Business Bank in the State of Colorado dated as of June 30, 2014</u>	10-K	000-54992	10.73	February 29, 2016
10.30	<u>Third Amendment and Fourth Waiver to 2013 Loan and Security Agreement by and among ADA-ES, Inc., Advanced Emissions Solutions, Inc., and CoBiz Bank d/b/a Colorado Business Bank in the State of Colorado dated as of September 20, 2014</u>	10-K	000-54992	10.74	February 29, 2016
10.31	<u>Fourth Amendment and Fifth Waiver to 2013 Loan and Security Agreement by and among ADA-ES, Inc., Advanced Emissions Solutions, Inc., and CoBiz Bank d/b/a Colorado Business Bank in the State of Colorado dated as of December 15, 2014</u>	10-K	000-54992	10.75	February 29, 2016
10.32	<u>Fifth Amendment and Sixth Waiver to 2013 Loan and Security Agreement by and among ADA-ES, Inc., Advanced Emissions Solutions, Inc., and CoBiz Bank d/b/a Colorado Business Bank in the State of Colorado dated as of May 29, 2015</u>	10-K	000-54992	10.76	February 29, 2016
10.33	<u>Sixth Amendment and Seventh Waiver to 2013 Loan and Security Agreement by and among ADA-ES, Inc., Advanced Emissions Solutions, Inc., and CoBiz Bank d/b/a Colorado Business Bank in the State of Colorado dated as of September 30, 2015</u>	10-K	000-54992	10.77	February 29, 2016
10.34	<u>Seventh Amendment and Eighth Waiver to 2013 Loan and Security Agreement by and among ADA-ES, Inc., Advanced Emissions Solutions, Inc., and CoBiz Bank d/b/a Colorado Business Bank in the State of Colorado dated as of May 31, 2016</u>	10-Q	001-37822	10.3	August 9, 2016
10.35	<u>Eighth Amendment and Ninth Waiver to 2013 Loan and Security Agreement by and among ADA-ES, Inc., Advanced Emissions Solutions, Inc., and CoBiz Bank d/b/a Colorado Business Bank in the State of Colorado dated as of August 29, 2016</u>	8-K	001-37822	10.1	September 1, 2016
10.36	<u>Ninth Amendment and Tenth Waiver to 2013 Loan and Security Agreement by and among ADA-ES, Inc., Advanced Emissions Solutions, Inc., and CoBiz Bank d/b/a Colorado Business Bank in the State of Colorado dated as of November 25, 2016</u>	10-K	001-37822	10.50	March 13, 2017
10.37	<u>Tenth Amendment to 2013 Loan and Security Agreement by and among ADA-ES, Inc., Advanced Emissions Solutions, Inc., and CoBiz Bank d/b/a Colorado Business Bank in the State of Colorado dated as of November 30, 2016</u>	10-K	001-37822	10.51	March 13, 2017
10.38	<u>Eleventh Amendment to 2013 Loan and Security Agreement by and among ADA-ES, Inc., Advanced Emissions Solutions, Inc., and CoBiz Bank d/b/a Colorado Business Bank in the State of Colorado dated as of September 30, 2017</u>	10-Q	001-37822	10.1	November 6, 2017

- 10.39 Termination of Certain Obligations under Settlement Agreement Regarding ADA-ES' Indemnity Obligations dated December 29, 2017 8-K 001-37822 10.1
- 21.1 Subsidiaries of Advanced Emissions Solutions, Inc.*
- 23.1 Consent of Moss Adams LLP*
- 23.2 Consent of Hein & Associates LLP*
- 23.3 Consent of Moss Adams LLP*
- 23.4 Consent of Hein & Associates LLP*
- 31.1 Certification of Chief Executive Officer of Advanced Emissions Solutions, Inc. Pursuant to 17 CFR 240.13a-14(a) or 17 CFR 240.15d-14(a)*
- 31.2 Certification of Chief Financial Officer of Advanced Emissions Solutions, Inc. Pursuant to 17 CFR 240.13a-14(a) or 17 CFR 240.15d-14(a)*

January 4,
2018

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Exhibit No.	Description	Form	File No.	Incorporated by Reference Exhibit	Filing Date
32.1	<p><u>Certification of Chief Executive Officer and Principal Financial Officer of Advanced Emissions Solutions, Inc. Pursuant to 18 U.S.C Section 1350, as Adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002*</u></p> <p>The following financial statements, formatted in XBRL: (i) Consolidated Balance Sheets as of December 31, 2017 and 2016, (ii) Consolidated Statements of Operations for the Years ended December 31, 2017, 2016 and 2015, (iii) Consolidated Statements of Changes in Stockholders' Equity (Deficit) for the Years ended December 31, 2017, 2016 and 2015, (iv) Consolidated Statements of Cash Flows for the Years ended December 31, 2017, 2016 and 2015; and (v) Notes to the Consolidated Financial Statements. The information in Exhibit 101 is "furnished" and not "filed" as provided in Rule 401 of Regulation S-T.</p>				
101					

Notes:

* – Filed herewith.

** – Management contract or compensatory plan or arrangement.

*** – Portions of this exhibit have been omitted pursuant to a request for confidential treatment. The non-public information has been separately filed with the Securities and Exchange Commission.

Filings for the Company were made under the name ADA-ES, Inc. (File No. 000-50216) prior to July 1, 2013, the effective date of our reorganization, and under the name Advanced Emissions Solutions, Inc. (File No. 000-54992) starting on July 1, 2013. Filings for the Company were made under the name Advanced Emissions Solutions, Inc. (File No. 001-37822) starting on July 6, 2016.

(c) The following financial statements are included in this report pursuant to Regulation S-X Rule 3-09:

(1) Tinum Group, LLC and Subsidiaries;

a. Consolidated Financial Statements, December 31, 2017, 2016 and 2015 (With Independent Auditors' Reports Thereon);

TINUUM GROUP, LLC AND SUBSIDIARIES

CONSOLIDATED FINANCIAL STATEMENTS

As of December 31, 2017 and 2016

And for the Years Ended December 31, 2017, 2016, and 2015

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Report of Independent Registered Public Accounting Firm

To the Board of Managers of
Tinum Group, LLC

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheet of Tinuum Group, LLC and subsidiaries (the “Company”) as of December 31, 2017, the related consolidated statements of operations, members’ equity, and cash flows for the year then ended, and the related notes (collectively referred to as the “consolidated financial statements”). In our opinion, the consolidated financial statements present fairly, in all material respects, the consolidated financial position of the Company as of December 31, 2017, and the consolidated results of their operations and their cash flows for the year then ended, in conformity with accounting principles generally accepted in the United States of America.

Basis for Opinion

These consolidated financial statements are the responsibility of the Company’s management. Our responsibility is to express an opinion on the Company’s consolidated financial statements based on our audit. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (“PCAOB”) and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audit in accordance with the standards of the PCAOB and in accordance with auditing standards generally accepted in the United States of America. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud. The Company is not required to have, nor were we engaged to perform, an audit of their internal control over financial reporting. As part of our audit we are required to obtain an understanding of internal control over financial reporting but not for the purpose of expressing an opinion on the effectiveness of the Company’s internal control over financial reporting. Accordingly, we express no such opinion.

Our audit included performing procedures to assess the risks of material misstatement of the consolidated financial statements, whether due to error or fraud, and performing procedures to respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the consolidated financial statements. Our audit also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements. We believe that our audit provides a reasonable basis for our opinion.

/s/ Moss Adams LLP

Denver, Colorado
March 2, 2018

We have served as the Company’s auditor since 2017.

INDEPENDENT AUDITOR'S REPORT

Board of Managers
Tinuum Group, LLC

We have audited the accompanying consolidated balance sheet of Tinuum Group, LLC and subsidiaries (the "Company") as of December 31, 2016, and the related consolidated statements of operations, members' equity, and cash flows for each of the two years in the period ending December 31, 2016. These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on these financial statements based on our audits.

We conducted our audits in accordance with the standards of the Public Company Accounting Oversight Board (United States) and in accordance with auditing standards generally accepted in the United States of America. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. The Company is not required to have, nor were we engaged to perform, an audit of its internal control over financial reporting. Our audits included consideration of internal control over financial reporting as a basis for designing audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Company's internal control over financial reporting. Accordingly, we express no such opinion. An audit also includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements, assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

In our opinion, the financial statements referred to above present fairly, in all material respects, the financial position of Tinuum Group, LLC and subsidiaries as of December 31, 2016, and the results of their operations and their cash flows for each of the two years in the period ending December 31, 2016, in conformity with accounting principles generally accepted in the United States of America.

/s/ Hein & Associates LLP

Denver, Colorado
March 6, 2017

TINUUM GROUP, LLC AND SUBSIDIARIES
CONSOLIDATED BALANCE SHEETS
As of December 31, 2017 and 2016
(in thousands)

ASSETS

	2017	2016
CURRENT ASSETS		
Cash	\$13,309	\$10,897
Accounts receivable	5,720	3,790
Related party receivables	969	—
Inventory	11,070	9,857
Prepaid royalties	—	40
Total current assets	31,068	24,584
NON-CURRENT ASSETS		
Fixed assets, net	65,228	68,469
Deferred tax assets	224	1,189
Other assets, net	10,140	13,963
Total non-current assets	75,592	83,621
TOTAL ASSETS	\$106,660	\$108,205

The following table presents certain assets of the consolidated variable interest entities (VIEs), which are included in the Consolidated Balance Sheets above. The assets in the table below include those assets that can only be used to settle obligations of consolidated VIEs, presented on the following page, and are in excess of those obligations. Additionally, the assets in the table below include third-party assets of consolidated VIEs only and exclude intercompany balances that eliminate in consolidation.

Assets of consolidated VIEs to be used to settle obligations of consolidated VIEs

	2017	2016
ASSETS		
Cash	\$6,919	\$6,213
Accounts receivable	1,093	526
Inventory	11,017	6,059
Prepaid expenses	1,049	2,771
Non-current assets	7,043	2,684
TOTAL ASSETS	\$27,121	\$18,253

Statement continues on the next page

The accompanying notes are an integral part of the consolidated financial statements.

TINUUM GROUP, LLC AND SUBSIDIARIES
 CONSOLIDATED BALANCE SHEETS
 As of December 31, 2017 and 2016
 (in thousands)

LIABILITIES AND MEMBERS' EQUITY

	2017	2016
CURRENT LIABILITIES		
Accounts payable	\$2,431	\$1,967
Accrued liabilities	3,345	5,197
Related party payables	7,498	5,734
Deferred revenue	35,006	30,219
Total current liabilities	48,280	43,117
NON-CURRENT LIABILITIES		
Secured promissory note	7,284	6,794
Deferred revenue - long-term	—	3,188
Asset retirement obligation	1,066	1,474
Total non-current liabilities	8,350	11,456
TOTAL LIABILITIES	56,630	54,573
TEMPORARY CLASS B PREFERRED EQUITY	821	18,250
OTHER MEMBERS' EQUITY		
Members' equity attributable to Class A Members	40,452	26,475
Noncontrolling interests	8,757	8,907
Total members' equity	49,209	35,382
TOTAL LIABILITIES AND MEMBERS' EQUITY	\$106,660	\$108,205

The following table presents certain liabilities of consolidated VIEs, which are included in the Consolidated Balance Sheets above. The liabilities in the table below include third-party liabilities of consolidated VIEs only and exclude intercompany balances that eliminate in consolidation. The liabilities also exclude intercompany amounts where creditors have recourse against the general credit of Tinum Group, LLC. However, the secured promissory note has a limited guarantee provided by Tinum Group, LLC.

Liabilities of consolidated VIEs for which creditors do not have recourse against the general credit of Tinum Group, LLC

	2017	2016
LIABILITIES		
Accounts payable and accrued liabilities	\$6,654	\$4,864
Secured promissory note	7,284	6,794
Non-current liabilities	575	401
TOTAL LIABILITIES	\$14,513	\$12,059

The accompanying notes are an integral part of the consolidated financial statements.

TINUUM GROUP, LLC AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF OPERATIONS
For the Years Ended December 31, 2017, 2016, and 2015
(in thousands)

	2017	2016	2015
REVENUES			
Coal	\$263,673	\$186,176	\$533,365
Lease	129,378	120,400	153,931
Other	346	2,407	8,201
TOTAL REVENUES	393,397	308,983	695,497
COST OF SALES (exclusive of depreciation shown separately below)			
Coal purchases	263,662	186,152	533,466
Chemicals	10,079	7,941	23,271
Site and production fees	13,727	15,934	19,286
Royalties and broker fees	10,377	6,651	11,058
TOTAL COST OF SALES	297,845	216,678	587,081
GROSS PROFIT	95,552	92,305	108,416
OPERATING EXPENSES	9,057	7,637	10,586
SELLING, GENERAL AND ADMINISTRATIVE EXPENSES	8,935	11,492	9,571
DEPRECIATION AND AMORTIZATION EXPENSE	4,966	4,533	3,248
INCOME FROM OPERATIONS	72,594	68,643	85,011
OTHER EXPENSE			
Other expense, net	2,644	5,903	823
Interest expense	482	447	160
TOTAL OTHER EXPENSE	3,126	6,350	983
INCOME BEFORE STATE INCOME TAXES	69,468	62,293	84,028
State income tax expense	1,394	2,425	1,220
NET INCOME	68,074	59,868	82,808
Class B holders preferred return	(1,712)	(3,901)	(6,157)
Loss attributable to noncontrolling interests	43,474	27,234	10,675
NET INCOME AVAILABLE TO CLASS A MEMBERS	\$109,836	\$83,201	\$87,326

The accompanying notes are an integral part of the consolidated financial statements.

TINUUM GROUP, LLC AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF MEMBERS' EQUITY
Years Ended December 31, 2017, 2016, and 2015
(in thousands)

	Other Members Equity (Deficit)			Total Other Members' Equity (Deficit)
	Temporary Class B Members	Class A Members	Noncontrolling Interest	
BALANCES, JANUARY 1, 2015	\$ 45,521	\$(63,027)	\$ 5,525	\$(57,502)
Class B holders preferred return	6,157	—	—	—
Member contributions	—	—	10,713	10,713
Member distributions	(3,053)	(17,301)	—	(17,301)
Reclassification of member equity	(18,177)	18,177	—	18,177
Net income available to Class A Members	—	87,326	—	87,326
Net loss attributable to noncontrolling interest	—	—	(10,675)	(10,675)
BALANCES, DECEMBER 31, 2015	\$ 30,448	\$25,175	5,563	\$30,738
Class B holders preferred return	3,901	—	—	—
Member contributions	—	—	30,578	30,578
Member distributions	(14,700)	(83,300)	—	(83,300)
Reclassification of member equity	(1,399)	1,399	—	1,399
Net income available to Class A Members	—	83,201	—	83,201
Net loss attributable to noncontrolling interest	—	—	(27,234)	(27,234)
BALANCES, DECEMBER 31, 2016	\$ 18,250	\$26,475	8,907	\$35,382
Class B holders preferred return	1,712	—	—	—
Member contributions	—	—	43,324	43,324
Member distributions	(17,250)	(97,750)	—	(97,750)
Reclassification of member equity	(1,891)	1,891	—	1,891
Net income available to Class A Members	—	109,836	—	109,836
Net loss attributable to noncontrolling interest	—	—	(43,474)	(43,474)
BALANCES, DECEMBER 31, 2017	\$ 821	\$40,452	\$ 8,757	\$49,209

The accompanying notes are an integral part of the consolidated financial statements.

TINUUM GROUP, LLC AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF CASH FLOWs
For the Years Ended December 31, 2017, 2016, and 2015
(in thousands)

	2017	2016	2015
CASH, BEGINNING OF YEAR	\$10,897	\$6,183	\$3,870
CASH FLOWS FROM OPERATING ACTIVITIES			
Net income	68,074	59,868	82,808
Adjustments to reconcile net income to net cash provided by operating activities:			
Depreciation and amortization	4,966	4,533	3,248
Loss on sale of assets	2,663	5,905	859
Amortization of prepaid royalties	—	3,012	3,540
Accretion of asset retirement obligation	139	122	94
Deferred state taxes	965	(972)	) 180
Effects of changes in operating assets and liabilities:			
Accounts receivable	(1,930)	) 13,071	(12,845)
Related party receivables	(969)	) 4,560	425
Prepaid expenses and other assets	3,858	(211)	) (13,689)
Inventory	(1,213)	) 310	(672)
Accounts payable and accrued liabilities	(1,388)	) (14,788)	) 16,334
Related party payables	1,721	943	772
Settlement of asset retirement obligation	(348)	) (108)	) (126)
Deferred revenue	1,599	3,478	(43,178)
Net cash provided by operating activities	78,137	79,723	37,750
CASH FLOWS FROM INVESTING ACTIVITIES			
Capital expenditures for fixed assets	(4,539)	) (2,846)	) (30,061)
Net cash used in investing activities	(4,539)	) (2,846)	) (30,061)
CASH FLOWS FROM FINANCING ACTIVITIES			
Borrowings (repayments) under secured promissory note, net	490	(741)	) 534
Borrowings under line of credit	5,000	—	4,000
Repayments under line of credit	(5,000)	) (4,000)) —
Noncontrolling member contributions	43,324	30,578	10,444
Members' distributions	(115,000)	(98,000)	) (20,354)
Net cash used in financing activities	(71,186)	) (72,163)	) (5,376)
NET INCREASE IN CASH	2,412	4,714	2,313
CASH, END OF YEAR	\$13,309	\$10,897	\$6,183
SUPPLEMENTAL DISCLOSURE			
Cash paid for interest	\$479	\$454	\$121
Cash paid for taxes	1,200	2,936	1,024
NON-CASH TRANSACTIONS			
Capital expenditures included in current liabilities	\$43	\$1,113	\$1,995
Asset retirement obligation recorded (removed)	(199)	) 381	299

The accompanying notes are an integral part of the consolidated financial statements.

TINUUM GROUP, LLC AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS
DECEMBER 31, 2017, 2016 AND 2015
(in thousands)

NOTE 1 - SIGNIFICANT ACCOUNTING POLICIES

Tinum Group, LLC (together with its subsidiaries, “Tinum” or “the Company”) develops, manages, sells and leases facilities used in the production and sale of reduced emissions fuel (“REF Facilities”). The production and sale of reduced emissions fuel (a/k/a refined coal) via these REF Facilities qualifies for production tax credits that are available under Section 45 of the Internal Revenue Code (“PTCs”). The value of the PTC is adjusted annually based on inflation adjustment factors published in the Federal Register. The 2017, 2016 and 2015 PTC rates were \$6.909, \$6.810, \$6.710, per ton of reduced emissions fuel produced, respectively.

Tinum is owned 42.5% by ADA-ES, Inc. (“ADA”), 42.5% by NexGen Refined Coal, LLC (“NexGen”) (collectively, Class A Members), and 15% by GSFS Investments I Corp. (“GSFS” or the “Class B Member”). ADA, NexGen, and GSFS are collectively referred to herein as the “Members.”

Tinum placed in service two REF Facilities prior to January 1, 2010 and 26 additional REF Facilities prior to January 1, 2012. Each REF Facility has demonstrated the required emissions reductions from the production of reduced emissions fuel to qualify for PTCs. The reduced emissions fuel produced at these REF Facilities is burned at coal-fired generation stations (the owner of which is a “Generator”) and is expected to continue to qualify for PTCs for a period of ten years following the applicable placed in-service date (expiring at certain dates in 2019 and 2021, respectively).

At December 31, 2017 and 2016, respectively, 17 and 13 REF Facilities had been sold or were under lease with third party investors (“TP Investors”) who utilize the REF Facilities to produce reduced emissions fuel. The REF Facilities are located at coal-fired generation stations throughout the United States.

Tinum has also at times produced reduced emissions fuel from REF Facilities for the benefit of its Members. As of December 31, 2017 and 2016 none of the REF Facilities were retained to produce reduced emissions fuel for the Members. Tinum does retain certain membership interests in TP Investor REF Facilities which generate PTCs that are allocated to Tinum in proportion to its membership interests. The PTCs are available for the benefit of Tinum’s Members.

Tinum Services, LLC (“TS”), operates and maintains the REF Facilities under respective operating and maintenance agreements. TS is owned 50% each by ADA and NexGen and is not consolidated with the accounts of Tinum. TP Investors of REF Facilities, and Tinum for retained REF Facilities, pay TS, subject to certain limitations, a fee for procuring certain patented and proprietary chemical additives, an operating fee for the production of reduced emissions fuel, and for the other operating and maintenance costs associated with running the REF Facilities.

Basis of Presentation

The accompanying consolidated financial statements are presented in accordance with accounting principles generally accepted in the United States (“GAAP”). The accompanying consolidated financial statements include the accounts of the Company and several variable interest entities (“VIEs”) for which Tinum is the primary beneficiary. An entity is referred to as a VIE if it meets the criteria outlined in Accounting Standards Codification (“ASC”) ASC 810 - Consolidation, (“ASC 810”) which are: (i) the entity has equity that is insufficient to permit the entity to finance its activities without additional subordinated financial support from other parties; or (ii) the entity has equity investors that cannot make significant decisions about the entity’s operations or that do not absorb their proportionate share of the entity’s expected losses or expected returns.

The Company consolidates a VIE when it has both the power to direct the activities that most significantly impact the VIE's economic performance and a right to receive benefits or the obligation to absorb losses of the entity that could be potentially significant to the VIE (i.e., it is the primary beneficiary).

All intercompany balances and transactions have been eliminated in consolidation.

Use of Estimates

The preparation of financial statements in conformity with GAAP requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenue and expenses during the reporting period. Management bases its estimates on

TINUUM GROUP, LLC AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS
DECEMBER 31, 2017, 2016 AND 2015
(in thousands)

historical experience and on various other assumptions that are believed to be reasonable under the circumstances. Significant estimates include the assumption that the Company's REF Facilities can be utilized after the expiration of the Section 45 PTC period. Ultimate realization of assets and settlement of liabilities in the future could differ from those estimates.

Cash

The carrying value approximates fair value due to the short-term nature of these instruments. The Company maintains its cash in accounts with a financial institution. These accounts at times may exceed federally insured limits. The Company has not experienced any losses in these accounts. The Company believes it is not exposed to any significant credit risk related to cash.

Accounts Receivable

Accounts receivable consist primarily of payments due from TP Investors that own or lease the REF Facilities. The carrying amount of accounts receivable may be reduced by a valuation allowance that reflects management's best estimate of amounts that will not be collected. Under the Company's agreements, interest can accrue on delinquent balances. No interest on delinquent balances was recorded for the years ended December 31, 2017, 2016 and 2015. Any allowance for doubtful accounts is based on management's assessment of the collectability of specific customer accounts and the aging of the accounts receivable. If there is a deterioration of a major customer's credit worthiness or actual defaults are higher than the historical experience, management's estimates of the recoverability of amounts due to the Company could be adversely affected. As of December 31, 2017 and 2016, no allowance for doubtful accounts was considered necessary.

Inventory

Inventory is comprised primarily of feedstock coal and chemicals used in the production and sale of reduced emissions fuel at REF Facilities. Inventory is valued at average cost.

Fixed Assets

Fixed assets are stated at historical cost and consist of major additions and improvements less accumulated depreciation. Expenditures for major improvements are capitalized, while maintenance and repair costs that do not significantly improve the related asset or extend its useful life are charged to expense as incurred. For financial reporting purposes, depreciation is calculated using the straight-line method over the estimated useful lives of the assets ranging from 3 to 20 years. Depreciation expense was \$4,961, \$4,528, and \$3,243, for the years ended December 31, 2017, 2016 and 2015, respectively.

The Company records a liability for asset retirement obligations ("ARO") equal to the fair value of the estimated cost to retire a REF Facility. The ARO liability is initially recorded in the period in which the obligation meets the definition of a liability, which is generally when a REF Facility is installed at a generation station. The ARO liability is estimated by the Company based on legal removal requirements, historical removal experience and uses anticipated future inflation rates. When the liability is initially recorded, the Company increases the carrying amount of the related long-lived asset by an amount equal to the original liability. The liability is increased over time to reflect the change in its present value, and the capitalized cost is depreciated over the useful life of the related long-lived asset. The ARO liability is removed when the Company is relieved of its removal obligation due to either completion of the removal

activities at a generation station or a transfer of the responsibility for the REF Facility removal to a third party. The Company reevaluates the adequacy of its recorded ARO liability at least annually. Actual costs of asset retirements such as removing the REF Facility from a generation station and related site restoration are charged against the related liability. Any difference between costs incurred upon settlement of an ARO and the recorded liability is recognized in Other Expense as a gain or loss in the Company's Statements of Operations.

Intangible Assets

Tinuum has two exclusive licenses from ADA for the patented and proprietary "CyClean™" and "M-45™" technologies related to the production and sale of reduced emissions fuel. The patents underlying the CyClean™ technology license expire beginning in 2021; however, the license agreement includes potential future patents related to the technology. The costs associated with the exclusive CyClean™ license are included in Other assets and are being amortized over the useful economic life of the technology, or approximately 14 years, using the straight-line method. Amortization expense was \$5 for each of the years ended December 31, 2017, 2016, and 2015.

TINUUM GROUP, LLC AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS
DECEMBER 31, 2017, 2016 AND 2015
(in thousands)

Impairment of Long-Lived Assets

The Company reviews long-lived assets for impairment whenever events or changes in circumstances indicate the carrying amount of an asset may not be recoverable. Recoverability of assets to be held and used is measured by a comparison of the carrying amount of an asset to future undiscounted net cash flows expected to be generated by the asset. If such assets are considered to be impaired, the impairment to be recognized is measured by the amount by which the carrying amount of the assets exceeds the fair value of the assets. Assets to be disposed of are reported at the lower of carrying amount or fair value less costs to sell. At December 31, 2017 and 2016, there were no such impairments.

Revenue Recognition

Coal Revenues

In connection with the operation of REF Facilities by the Company, the Company purchases and takes title to feedstock coal under purchase agreements with each respective Generator or other supplier of feedstock coal. The Company purchases the chemicals from third party vendors and applies them to the feedstock coal to produce reduced emissions fuel in its REF Facilities. The reduced emissions fuel is sold by the Company, under reduced emissions fuel sale agreements, to a Generator or to another third party at the Company's discretion, as permitted under the applicable Generator agreements. The Company performs reduced emissions fuel recertification or redetermination testing periodically as required by Section 45 with respect to production and sale at each of its REF Facilities. During the years ended December 31, 2017, 2016 and 2015, the Company sold all of its reduced emissions fuel and unrefined coal (coal untreated but part of the reduced emissions fuel process) to third parties that used the fuel to generate electricity, and recorded such amounts as coal revenues.

Lease Revenues

Lease revenues are recognized based on the earning of purchase or lease payments under the terms of the respective REF Facilities' TP Investor agreements. Depending on the agreement, the Company may receive fixed payments or a combination of fixed and contingent payments. Contingent payments are determined based on the actual amount of reduced emissions fuel production during the defined period. Certain prepayments are received upon execution of TP Investor agreements and are recorded as deferred revenue. Deferred revenue is amortized into revenue in accordance with the amortization period of the respective TP Investor agreement.

Other Revenues

Other revenues are comprised primarily of technology sublicense fees and chemical sales to third parties. TP Investors sublicense the Company's licensed technology for an annual fee. The sublicensed patented technology is necessary for each TP Investor to produce reduced emissions fuel utilizing the REF Facilities.

Income Taxes

The Company, with the consent of its Members, has elected to be taxed under applicable sections of federal and state income tax law as a limited liability company treated as a partnership for income tax purposes. As a result of this election, no federal income taxes are incurred by the Company. Instead, the Members are liable for income taxes on their pro rata share of the Company's income, deductions, losses, and credits.

In certain states, the Company is taxed based upon shareholder equity or other enterprise considerations. In these instances, the Company records and pays the applicable tax directly to the state agency. Deferred income taxes are provided for temporary differences arising from differences between the financial statement amount and tax basis of assets and liabilities existing at each balance sheet date, using enacted tax rates anticipated to be in effect when the related taxes are expected to be paid. A valuation allowance is established if it is more likely than not that a deferred tax asset will not be realized. The Company includes interest and penalties related to state tax as a component of income tax expense. As of December 31, 2017, the Company's tax years of 2014 through 2016 are subject to examination by the applicable taxing authorities.

The Company applies the Financial Accounting Standards Board's ("FASB") requirements related to accounting for uncertain tax positions. During the years ended December 31, 2017, 2016 and 2015, the Company has concluded that there are no significant

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uncertain tax positions that would require recognition or disclosure in the financial statements. As of December 31, 2017 and 2016, the Company made no provision for interest or penalties related to uncertain positions.

In December 2017, legislation known as the Tax Cuts and Jobs Act was signed into law. While this reduced the overall tax rates, since the Company is taxed as a partnership the legislation did not impact the Company's consolidated financial statements.

Reclassifications

Certain reclassifications have been made to the prior years' financial statements to conform to the current year presentation. These reclassifications had no effect on previously reported results of operations or member's equity.

Recent Accounting Pronouncements

In May 2014, the FASB issued Accounting Standards Update ("ASU") 2014-09, Revenue from Contracts with Customers. As amended by ASU 2015-14, the ASU is effective for public companies for annual reporting periods beginning after December 15, 2017. This standard has been codified as ASC 606 Revenue from Contracts with Customers (ASC 606). The FASB has issued several amendments to the standard, including clarification on accounting for licenses of intellectual property and identifying performance obligations. Under the new standard, revenue is recognized when a customer obtains control of promised goods or services and is recognized in an amount that reflects the consideration which the entity expects to receive in exchange for those goods and services. In addition, the standard requires disclosure of the nature, amount, timing, and uncertainty of revenue and cash flows arising from contracts with customers.

The guidance permits two methods of adoption to meet the new standard: retrospectively to each prior reporting period presented (full retrospective method), or retrospectively with the cumulative effect of initially applying the guidance recognized at the date of initial application (cumulative catch-up transition method). Tinum currently anticipates adopting the standard using the full retrospective method. While we continue to assess the potential impacts of the standard, we anticipate that the most significant impact will be on our Other revenues, specifically those related to technology sublicense fees. Under the new revenue standard licensing fees are generally recognized at a point in time as compared to our current practice of recognizing them over time. We expect the revenues from coal to remain substantially unchanged. Lease revenues are specifically excluded from the revenue standard. However, several of the Company's transactions with TP Investors are recognized as Lease revenues under ASC 360-40, Property, Plant and Equipment - Real Estate Sales, which will be superseded by ASC 606. As a result, a material change in how these contracts and their corresponding revenues are currently recognized could occur. Income from the sale of REF Facilities may also be required to be evaluated under ASC 610 Other Income. We anticipate that these accounting standards will require management to estimate any variable consideration related to the selling price of the REF Facility assets and to assign that variable consideration to identified performance obligations. Such changes could accelerate revenues and could require estimations of variable payments (consideration) which are currently only recognized as revenue as earned based entirely on levels of production. Management will also be required to adjust its estimates of variable consideration for each reporting period. The Company is planning to implement the revenue standard as of January 1, 2019.

In February 2016, the FASB issued ASU 2016-02 Leases (Topic 842) which is intended to increase transparency and comparability of accounting for lease transactions. The ASU will require all leases to be recognized on the balance sheet as lease assets and lease liabilities. Lessor accounting remains similar to the current model but is updated to

align with certain changes to the lessee model (i.e., certain definitions, such as initial direct costs, have been updated) and the new revenue recognition standard. Lease classifications by lessors are similar; operating, direct financing, or sales-type. Lessees will need to recognize a right-of-use asset and a lease liability for virtually all of their leases. The liability will be equal to the present value of lease payments. The asset value will be based on the liability, subject to adjustment, such as for initial direct costs. For income statement purposes, the FASB retained a dual model, requiring leases to be classified as either operating or finance. Classification will be based on criteria that are largely similar to those applied in current lease accounting, but without explicit thresholds. The ASU will require both quantitative and qualitative disclosures regarding key information about leasing arrangements.

The standard is effective for the Company for fiscal years beginning after December 15, 2019. Early adoption is permitted. The new standard must be adopted using a modified retrospective transition and provides for certain practical expedients. Transition will require application of the new guidance at the beginning of the earliest comparative period presented. Management is currently evaluating the effect of this ASU on its financial statements and disclosures. We currently expect to adopt this standard beginning January 1, 2020. We anticipate this standard will have a significant impact on our consolidated financial statements. The most significant impact will relate to any operating leases associated with our REF Facilities.

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In June 2016, ASU 2016-13, Financial Instruments-Credit Losses was issued. The ASU introduces new accounting models for expected credit losses on financial instruments and applies to: (1) loans, accounts receivable, trade receivables and other financial assets measured at amortized cost, (2) loan commitments and certain other off-balance sheet credit exposures, (3) debt securities and other financial assets measured at fair value and (4) beneficial interests in securitized financial assets. The standard is effective for the Company for fiscal years beginning after December 15, 2020. We do not expect this standard to have a material impact on the Company's consolidated financial statements.

In August 2016, the FASB issued Accounting Standard Update 2016-15, Classification of Certain Cash Receipts and Cash Payments. The new standard is intended to reduce statement of cash flows diversity in practice in how certain cash receipts and cash payments are presented and classified in the statement of cash flows. ASU 2016-15 is effective for fiscal years beginning after December 15, 2018 and should use the retrospective transition method. The Company does not anticipate any material impact from the adoption of this standard.

In January 2017, the FASB issued ASU 2017-01, Business Combination: Clarifying the Definition of a Business. The amendments in this ASU change the definition of a business to assist with evaluating when a set of transferred assets and activities is a business. The Company is required to adopt the guidance January 1, 2019; however early adoption on an individual transaction basis is permitted. The Company has early adopted this standard for its 2017 transactions. As a result, any 2017 transactions with TP Investors have been evaluated utilizing the updated definition of a group of assets or a business as defined in the accounting standard.

In February 2017, the FASB issued ASU 2017-05, Other Income - Gains and Losses from the Derecognition of Nonfinancial Assets (Subtopic 610-20): Clarifying the Scope of Asset Derecognition Guidance and Accounting for Partial Sales of Nonfinancial Assets. ASU 2017-05 clarifies the scope of Subtopic 610-20, Other Income-Gains and Losses from the Derecognition of Nonfinancial Assets, which provides guidance for recognizing gains and losses from the transfer of nonfinancial assets in contracts with noncustomers. The amendments in ASU 2017-05 are effective for annual reporting periods beginning after December 15, 2018. The Company believes this could have a material impact on how sales of REF Facilities are recorded which could include recording revenues currently considered lease revenues recognized over time as revenues to be recorded at a point in time.

NOTE 2 - FIXED ASSETS

Reduced Emissions Fuel Facilities

Reduced emissions fuel production facilities and their related components represent the 28 REF Facilities that were placed in service by the Company in 2009 and 2011, and have demonstrated the qualified emissions reductions to qualify for PTCs. REF Facilities are stated at historical cost. Depreciation is calculated using the straight-line method over a 20-year period, commencing with the original placed in service date in 2009 or 2011, as appropriate.

Under the site license agreements between Tinuum and the Generators, Tinuum may be required to return the site upon which the REF Facility is located at a generation station ("Site") to its original condition at the end of the applicable contract period. In instances where the applicable agreements place this responsibility on the Company, the Company has recorded a liability for an ARO equal to the fair value of the estimated cost to retire the REF Facility and return each Site to its original condition. The ARO liability was estimated by the Company using estimated and historic facility removal costs and anticipated future inflation rates. This estimated future value was discounted to its present value using the Company's credit-adjusted risk-free rate. The carrying value of the asset is depreciated on a

straight-line basis over the remaining estimated life of the REF Facility asset group. The ARO liability is increased over time to reflect the change in its present value, and the capitalized cost is depreciated over the useful life of the site license. In subsequent periods, the Company is required to make adjustments to AROs based on changes in the estimated fair values of the obligations. Corresponding increases in asset book values are depreciated over the remaining useful life of the related site license. Uncertainties as to the probability, timing, or amount of cash flows associated with AROs may affect management's estimates of fair value. For the years ended December 31, 2017, 2016 and 2015, the Company recorded \$139, \$122, and \$94, of accretion expense, respectively.

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The following table describes changes to the Company's ARO liability for the years ended December 31, 2017 and 2016:

	2017	2016
Beginning balance	\$1,474	\$1,079
Liabilities incurred (removed)	(199)	381
Accretion	139	122
Settlement of obligations	(348)	(108)
Ending balance	\$1,066	\$1,474

Furniture, Fixtures and Equipment

Furniture, fixtures, and equipment is comprised of office furniture and fixtures and office equipment, including those under capital lease. These assets are recorded at cost and depreciated using the straight-line method with estimated useful lives ranging from 3 to 14 years.

The following table summarizes the components of gross and net carrying amounts for fixed assets as of December 31, 2017 and 2016:

	2017	2016
REF Facilities and related equipment	\$88,527	\$87,031
Furniture, fixtures and equipment	898	1,019
Other	348	477
	89,773	88,527
Accumulated depreciation	(24,545)	(20,058)
Fixed assets, net	\$65,228	\$68,469

NOTE 3 - INVENTORY

Inventory is comprised primarily of feedstock coal and chemicals used in the production and sale of reduced emissions fuel at REF Facilities owned and operated by the Company. Inventory is valued at average cost. The Company assesses the inventory valuation on a monthly basis and reduces the value for any obsolete inventory. No valuation allowance was considered necessary as of December 31, 2017 and 2016.

	2017	2016
Feedstock coal	\$10,750	\$9,723
Chemicals	320	134
Total	\$11,070	\$9,857

NOTE 4 - REF FACILITY ACTIVITIES

The Company has entered into several types of transaction structures with TP Investors. Each of the agreements contains terms such that the payments received are recognized by the Company as Lease revenues as they are earned. Payments under the agreements may include both fixed and contingent components and may represent rents, member interest purchase payments, or asset purchase payments, depending on the particular transaction structure.

Eleven and ten of the REF Facility transactions with TP Investors are transactions with a related party as of December 31, 2017 and 2016, respectively. These transactions generally have terms that extend to the date ten years after the placed in-service date for the particular REF Facility, subject to earlier termination by the TP Investor at periodic

intervals or upon the occurrence of specified events. Six and three operating REF Facilities placed with TP Investors operate under partnership or asset sale transaction structures as of December 31, 2017 and 2016, respectively.

Under certain REF Facility transactions, an initial deposit or prepayment may be received. Any prepayments received are recorded

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as deferred revenue and are amortized into revenue under the straight-line method over the amortization period defined in the respective agreement. As of December 31, 2017 and 2016, the Company has recorded \$35,006 and \$33,407, respectively, of deferred revenue related to prepayments.

An REF Facility Asset Purchase Agreement was entered into with a specific TP Investor (“Purchaser”) in February 2013. Under this agreement, Tinum received prepayments from the Purchaser which were amortized and recognized as revenue over a 36-month term. As part of the agreements a Put-Call Agreement was entered into, which granted the Purchaser the option to put the REF Facility back to Tinum under certain circumstances. In October 2015, Tinum was notified of the Purchaser’s intent to put the REF Facility back to Tinum, effective in April 2016. As a result of the put, no additional gain or loss was recognized and all previously recognized revenues were not impacted.

In February 2014, the Company sold 99.8% of the member interests of one of its subsidiaries, RCM6, LLC (“RCM6”). RCM6 owns a single REF Facility. A portion (49.9%) of the member interests was purchased by parties related to or controlled by ADA, NexGen, and Republic Financial Corporation (“Republic”). The remaining 49.9% was sold to a TP Investor. Effective March 3, 2016, the TP Investor purchased the interests held by ADA and NexGen (including interests previously acquired by NexGen from Republic) resulting in the TP Investor owning 99.8% of member interests in RCM6. The Company retains its 0.2% member interest.

Under the RCM6 Member Interest Purchase Agreements (“RCM6 MIPA”), the Company received prepayments at closing which were to be amortized through the first quarter of 2017. As part of the 2016 purchase of member interests between the owners, the amortization period was extended through the fourth quarter of 2017. The RCM6 MIPA calls for additional installment payments to be made quarterly by the owners of the member interests of RCM6 through 2021. These payments are recorded as Lease revenues in the Company’s consolidated financial statements.

Simultaneously with the sale by the Company of the member interests, RCM6 entered into agreements for the purchase of feedstock coal, the sale of reduced emissions fuel, the provision of coal yard services and a site license (the “RCM6 Agreements”) with a Generator. The RCM6 Agreements are required for the ongoing production and sale of reduced emissions fuel by RCM6 at its current location. Simultaneously with the execution of the RCM6 Agreements, the Company also entered into a guarantee agreement whereby the Company guaranteed, on behalf of RCM6, up to \$15.0 million of its obligations under the RCM6 Agreements (“RCM6 Guarantee Agreement”), including payment obligations and obligations to indemnify the Generator. The RCM6 Guarantee Agreement expires six years after the expiration of the RCM6 Agreements. No liabilities have been recorded related to the RCM6 Guarantee Agreement by the Company as of December 31, 2017 and 2016.

During 2016 the Company created two additional limited liability companies, Green River RC218, LLC and Red River RC220, LLC, (together “River LLCs”) in which the Company owns a 1% member interest and an unrelated TP Investor owns the remaining 99%. The River LLCs lease REF Facilities from the Company, which REF Facilities are utilized in the production and sale of reduced emissions fuel. The agreements for the River LLCs call for payments to be made quarterly through 2021, subject to deferral in certain circumstances, by the owners of the member interests of the River LLCs. The River LLCs entered into agreements for the purchase of feedstock coal, the sale of reduced emissions fuel, the provision of coal yard services and site licenses (the “River Agreements”) with two different Generators, one for each of the River Facilities. These River Agreements are required for the ongoing production and sale of reduced emissions fuel by the River LLCs. In connection with these River Agreements, the Company also entered into guarantee agreements whereby the Company guaranteed, on behalf of the River LLCs, each of their obligations under the River Agreements, including payment obligations and obligations to indemnify the Generator (“River Guarantee Agreements”). No liabilities have been recorded related to the River Guarantee Agreements by the

Company as of December 31, 2017 and 2016.

In July 2017, the Company sold 50.1% of the member interests of one of its subsidiaries, GWN-REF, LLC (“GWN-REF”). GWN-REF owns a single REF Facility. A portion (.2%) of the member interests was purchased by GWN Manager, LLC which is owned by parties related to or controlled by ADA and NexGen. Tinium has been appointed as the Manager of GWN Manager, LLC. Another 49.9% of the member interest of GWN-REF were purchased by a TP Investor. The remaining 49.9% member interest in GWN-REF was retained by Tinium and is included in Tinium’s consolidated financial statements as Tinium remains the primary beneficiary of GWN-REF.

Under the GWN-REF Member Interest Purchase Agreements (“GWN-REF MIPA”), the Company received a prepayment which is to be amortized through July of 2018. The agreement calls for additional installment payments through 2021 to be made quarterly by the TP Investor which owns 49.9% of the member interests of GWN-REF. These payments are recorded as Lease revenues in the Company’s consolidated financial statements.

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Simultaneously with the sale by the Company of the member interests, GWN-REF entered into agreements for the purchase of feedstock coal, the sale of reduced emissions fuel, the provision of coal yard services and a site license (the “GWN-REF Agreements”) with a Generator. The GWN-REF Agreements are required for the ongoing production and sale of reduced emissions fuel by GWN-REF at its current location. Simultaneously with the execution of the GWN-REF Agreements the Company entered into a guarantee agreement whereby the Company guaranteed, on behalf of GWN-REF, payment for any amounts due under the GWN-REF Agreements (“GWN-REF Guarantee Agreement”), including obligations to indemnify the Generator. The GWN-REF Guarantee Agreement expires after final payments are made after the termination of the GWN-REF Agreements. No liabilities have been recorded related to the GWN-REF Guarantee Agreement by the Company as of December 31, 2017. TS does not operate and maintain the REF Facility on behalf of GWN-REF. Instead the REF Facility is operated and maintained by an affiliate of the TP Investor.

In November 2017, the Company sold two REF Facilities to a TP Investor in exchange for \$19,161 of cash, net of closing costs, and installment payments to be recognized over time. Under the Asset Purchase Agreements for these two REF Facilities, both fixed and contingent payments are required to be made quarterly. Contingent payments are based upon production volumes achieved by the specific REF Facilities. The Company recorded the down payment as deferred revenue that is being amortized over the term specified in the Asset Purchase Agreement. Due to the Company’s continuing involvement with the REF Facilities, the gain on sale is being recognized as Lease revenues over the installment payment period. Any contingent payments received under the Asset Purchase Agreements will be recorded as production is achieved and will be recorded as contingent lease revenues within the Company’s consolidated Statements of Operations.

The following is a schedule of periodically renewable fixed payments to be paid by TP Investors to the Company through December 31, 2021, assuming no postponement of scheduled payments, no modifications of payments, non-renewals or early terminations. Certain TP Investor agreements include provisions for modification of future payments. Accordingly, it is possible that future payments from TP Investors may be modified or reduced. Only known payment changes have been included below. Future REF Facility payments, including any eliminated in consolidation, do not include contingent amounts which are based on the levels of reduced emissions fuel production:

2018	\$ 147,148
2019	168,375
2020	158,746
2021	109,834
Thereafter	1,849
	\$ 585,952

NOTE 5 - VARIABLE INTEREST ENTITIES

RCM6, the River LLCs and GWN-REF (together the “TG VIEs”) were created as reduced emissions fuel production companies. The operations include the purchase of feedstock coal from a Generator, application of chemicals utilizing that entity’s REF Facility, and the subsequent sale of reduced emissions fuel to the Generator.

Based upon the criteria set forth in ASC 810, the Company has determined that it is the primary beneficiary in the TG VIEs for the years ended December 31, 2017, 2016, and 2015. The Company, through its 100% owned subsidiaries (“Managers”), holds a 0.2%, 1.0% or 49.9% member interest, respectively in the TG VIEs, is the manager of the TG VIEs, and directs the activities that are considered most significant to the entities. As such, the financial results of the

TG VIEs are consolidated with the results of the Company, and the results attributable to the other owners are presented as “Noncontrolling Interests” within the consolidated financial statements.

Creditors of the TG VIEs have no recourse against the general credit of the Company (outside of its member interest or specific guarantee obligations), and the assets of the Company are not collateral for any TG VIE obligations. The operations of all four entities are financed through capital calls of the respective members in proportion to their member interests. In the event that a member defaults on a capital call request made by the Manager, the Manager may (i) withhold distributions payable to the defaulting member or sue for the amount due and/or (ii) elect to transfer the defaulting member’s interest to a separate legal entity controlled by the Manager or (iii) suspend operations of the REF Facility. In certain instances, the TP Investor has the ability to put, and Tinuum has the ability to call the other membership interests at a purchase price equal to fair market value.

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Under the provisions of certain of the TG VIE's various agreements, including the leases of REF Facilities or the partnership operations of the TG VIEs, the agreements terminate sometime during time periods ranging from the fourth quarter of 2021 through December 31, 2022, unless terminated earlier by unanimous written consent of the members.

Under the various RCM6 Agreements, certain capital call limitations exist, limiting the amount of capital calls available if certain operational costs are exceeded.

NOTE 6 - NOTES PAYABLE

Line of Credit -

In June 2015, the 2013 Revolver with Colorado Business Bank ("CBB") was amended and replaced with an Amended and Restated Revolving Credit and Security Agreement ("Amended Revolver"). The Amended Revolver increased the size of the facility to \$20.0 million. The interest rate was modified to be the greater of 5.5% per annum or the prime rate (as defined in the agreement) plus 1.0%. The maturity date was modified to be June 2016, which was later extended to September 30, 2016.

On September 26, 2016, the Company and CBB entered into the Second Amendment to Amended and Restated Revolving Credit and Security Agreement and Waiver of Default ("Second Amendment") which extended the maturity date to September 30, 2017 and waived the default arising from the Company's failure to provide CBB sufficient notice of the change in its corporate name. The Second Amendment changed the line of credit maximum principal amount to \$17.0 million less any undrawn face amount of letters of credit. Any undrawn balance was subject to a quarterly unused facility fee in the amount of 0.9% annually. Interest on outstanding balances was paid monthly at the rate of 5.5% per annum.

On September 25, 2017 the Company and CBB entered into the Third Amendment to the Amended Revolver extending the maturity date to December 29, 2017. In December 2017, the Company and CBB entered into the Fourth Amendment to the Amended Revolver. Under the Fourth Amendment the maturity date was extended until December 31, 2020, and the maximum available borrowing limits were modified as follows:

Date	Available Borrowing Limit
For the period ending December 30, 2019	\$ 17,000
For the period commencing December 31, 2019 through March 30, 2020	\$ 13,600
For the period commencing March 31, 2020 through June 29, 2020	\$ 10,200
For the period commencing June 30, 2020 through September 29, 2020	\$ 6,800
For the period commencing September 30, 2020 through December 30, 2020	\$ 3,400
For the period after December 31, 2020	\$ 0

The Fourth Amendment requires any outstanding borrowings annually to be fully repaid for a period of fifteen consecutive days during two non-consecutive calendar quarters.

Amounts outstanding under the Fourth Amendment may be repaid at the option of the Company. Any undrawn balance is subject to a quarterly unused facility fee in the amount of 0.826% annually. Interest on outstanding balances is payable monthly and is accrued at the greater of 5.5% per annum or the prime rate (as defined in the agreement)

plus 1.0%.

The Fourth Amendment is collateralized by the assets of the Company and the equity interests and proceeds related to such equity interests of each material subsidiary owned by the Company. The Fourth Amendment is also collateralized by the Company's deposit accounts held at CBB. These accounts are not restricted by the Fourth Amendment.

Tinum is required to be in compliance with certain loan covenants under the Company's debt agreements, including tangible net worth as defined in the agreement. As of December 31, 2017 and 2016, the Company was in compliance with the respective loan covenants.

Secured promissory note -

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On February 10, 2014, RCM6, a VIE consolidated into the consolidated financial statements of the Company, entered into an \$11.0 million secured promissory note (the "Note") with a Generator from which it purchases feedstock coal, and to which it sells reduced emissions fuel and unrefined coal on a monthly basis. The purpose of the Note is to finance the purchases of feedstock coal from the Generator. The amount of principal and interest owed is dependent upon the amount of feedstock coal purchased and reduced emissions fuel and unrefined coal sold between the two parties and is net settled on a monthly basis. The Note is collateralized by RCM6's feedstock coal inventory.

The Note bears interest at a per annum rate equal to the short-term applicable federal rate announced by the IRS in December of each year. The interest rate for the years ended December 31, 2017, 2016 and 2015 was 0.96%, 0.56% and 0.34% per annum, respectively. Interest is payable quarterly in arrears.

All outstanding amounts owed under the Note are due and payable on the earlier of December 31, 2021 or the termination or expiration of the Feedstock Coal Purchase Agreement between RCM6 and the Generator.

As of December 31, 2017 and 2016, respectively, the outstanding balance on the Note was \$7,284 and \$6,794 with interest payable of \$17 and \$12.

NOTE 7 - MEMBERS' EQUITY

Under the Class B Unit Purchase Agreement ("Class B Agreement") with GSFS, which was entered into upon the amendment and restatement of the Tinum Operating Agreement in 2011, ADA and NexGen each entered into a limited guarantee agreement under which the parties are obligated to guarantee performance by Tinum of its obligations to indemnify GSFS against certain losses it may suffer as a result of inaccuracies or breach in representations and covenants related to the Class B Agreement or REF Facilities' lease agreements with GSFS affiliates. ADA and NexGen entered into a contribution agreement where, in the event of such a breach, they have agreed to contribute their pro rata share of any amounts under the limited guarantee.

The Class B units are considered conditionally redeemable. As specified in the Second Amended and Restated Operating Agreement and the Class B Agreement, on or after the earlier of (i) a breach of any material provision of the Class B Agreement or Tinum's organizational documents that is not cured and that results in damages to GSFS of at least \$10.0 million and (ii) the 10 year anniversary of the date the last REF Facility owned by Tinum was placed in service but in no event later than December 31, 2021, and if GSFS' unrecovered investment balance in its Class B units has not been reduced to zero, GSFS may require its Class B units to be redeemed for an amount equal to its unrecovered investment balance. No triggering redemption events have occurred as of December 31, 2017 and 2016, respectively. GSFS' Class B units include a guaranteed 15% annual return calculated monthly based upon the outstanding balance as of that date. The outstanding balance over time is based on the original investment, increased by the guaranteed return, and reduced by any distributions of cash or PTCs. In February 2018, the unrecovered investment balance associated with the Class B Units was repaid in full.

The U.S. Securities and Exchange Commission (the "SEC") requires conditionally redeemable equity to be classified outside of permanent equity. Because the financial statements of the Company are expected to be furnished to the SEC as part of a filing by one of the Company's Members, the conditionally redeemable amount has been classified out of permanent equity and into temporary equity in these consolidated financial statements. Additionally, the income and member equity attributable to the Class B Member has been classified and is separately presented in the consolidated financial statements.

Additionally, GSFS has certain preferences over Class A Members as to liquidation proceeds and profit distribution. Class B units have no further capital call requirements and have limited voting rights.

The Company had the following classes and percentages of Member units issued and outstanding at December 31, 2017 and 2016:

Class A Units (voting) 85%

Class B Units (non-voting) 15%

NOTE 8 - INCOME TAXES

The Company has adopted Accounting Standards Update No. 2015-17 - Income Taxes, retrospectively, commencing with the year ended December 31, 2016. As such, we have reclassified the deferred tax asset and liability balances to be presented as a net long-

term asset in the Company's Balance Sheets as of December 31, 2017 and 2016, respectively. There were no effects on operations for the years ended December 31, 2017, 2016, and 2015 as a result of this reclassification.

For the years ended December 31, 2017, 2016, and 2015, state income tax expense (benefit) consisted of the following:

	2017	2016	2015
Current	\$429	\$3,396	\$881
Deferred	965	(971)	339
Total state income tax expense	\$1,394	\$2,425	\$1,220

The following represents the approximate tax effect of each significant type of temporary difference and classification of net deferred income taxes as of December 31, 2017 and 2016:

	2017	2016
Deferred tax assets	\$275	\$1,189
Deferred tax liabilities (51)	—	—
Net deferred tax asset	\$224	\$1,189

Deferred income taxes reflect the net tax effects of temporary differences between the carrying amounts of non-current assets and liabilities for financial reporting purposes and the amounts used for income tax purposes. Long term deferred tax assets are comprised of deferred revenue and the deferred tax liabilities are associated with depreciation for the years ending December 31, 2017 and 2016. No valuation allowance was established as it is more likely than not that the deferred tax asset will be realized. Additionally, no liability related to uncertain tax positions was recorded at December 31, 2017 and 2016.

NOTE 9 - RELATED PARTY TRANSACTIONS

During 2017, 2016, and 2015, the Company incurred expenses and capital expenditures and had amounts payable (excluding capital distributions) to and revenues recognized from the following related party entities:

	ADA	TS	GSFS affiliates	NexGen and affiliates
	(a)	(b)	(c)	(d)
Payable at December 31, 2017	\$3,249	\$4,204	\$—	\$ 45
Payable at December 31, 2016	1,930	3,766	3	35
Receivable at December 31, 2017	\$—	\$934	\$20	\$ 15
Receivable at December 31, 2016	—	—	—	—
Revenues recognized during the year ended				
December 31, 2017	\$—	\$3,489	\$117,376	\$ —
December 31, 2016	—	—	112,310	—
December 31, 2015	3,271	—	132,510	3,271
Expenses incurred during the year ended				
December 31, 2017	\$9,677	\$9,856	\$2	\$ 767
December 31, 2016	6,124	8,288	14	1,039
December 31, 2015	10,643	12,643	31	564

- (a) ADA expenses include expenditures for royalties. Revenues relate to REF Facility lease revenues recognized.
- (b) TS expenses include operating expenses associated with the operations of retained REF Facilities.
- (c) GSFS affiliates expenses include chemical expenses at certain REF Facilities. Revenues relate to REF Facility lease revenues recognized.
- (d) NexGen and affiliates expenses costs include management fees and labor costs.

The Company acquires substantial amounts of fixed assets from TS. For the years ended December 31, 2017 and 2016, the Company acquired \$4,692 and \$2,846, respectively, of capital assets from its related party, TS.

NOTE 10 - COMMITMENTS

Purchase Commitments -

On November 3, 2011, Tinum entered into a technology licensing agreement with ADA whereby Tinum agreed to pay ADA royalties based on a percentage of operating income from reduced emissions fuel production at REF Facilities that utilize the M-45™ technology. The licensing agreement required a prepayment of \$10.0 million upon the achievement of certain milestones. As of December 31, 2012, all the milestones had been substantially achieved. Tinum paid \$2.0 million to ADA in 2011, and the remaining \$8.0 million plus accrued interest of \$189 in March 2013. These prepaid royalties were applied to royalties due to ADA, in lieu of cash payment, in the proportion of 66.67% cash payment and 33.33% to the reduction of the prepaid royalty balance. During 2016 the remaining prepaid balance of \$1,442 was returned to the Company by ADA, reducing the prepaid balance to zero. Royalties due in 2017 were accrued for and paid in cash. During the years ended December 31, 2017, 2016 and 2015, respectively, the Company recognized royalty expense under Cost of Sales in the amounts of \$9,677, \$3,052, and \$3,539, respectively.

In December 2015 the Company was assigned by TS a Master Supply Agreement with a chemical vendor. Under the agreement the Company has a commitment commencing January 1, 2015 for minimum purchase quantities of the specified chemical that if not achieved require a shortfall payment amount (“Shortfall”) to be paid to the vendor on a monthly basis. Any Shortfall payment required would be applied to future chemical purchases once certain minimum volume levels are achieved. Each renewal term prior to January 1, 2017 also requires minimum purchase volumes and Shortfall payments that decline over time. In the years ending December 31, 2016 and 2015, respectively, the Company paid \$2,273 and \$13,675 under the Master Supply Agreement and recorded these amounts as long-term Other assets on the Consolidated Balance Sheets. During 2016 the Master Supply Agreement was amended and the required Shortfall payments were suspended. Additionally, the Company was able to utilize some of the chemicals and therefore reduce the prepaid balance by \$4,339 and \$2,040 for the years ended December 31, 2017 and 2016, respectively. In 2018 an agreement was reached to further amend the Master Supply Agreement to eliminate the Shortfall payment requirement to be made for any additional product purchases and to also defer the repayment provisions back to Tinum. In exchange the vendor will retain a minimum quantity of chemical inventory on hand and the Company will leave a minimum deposit amount of \$9.6 million on deposit with the vendor until such time as the minimum guarantee of chemicals is reduced by the Company.

401k Profit Sharing Plan and Other Benefits -

The Company offers a defined contribution and profit sharing plan (the “Plan”) to employees who are over 18 years of age and have been employed by the Company for more than 30 days. Employees can deposit up to 80% of their eligible pay up to the statutory limit in the Plan. The Company contributes 3.0% of employees’ eligible pay to the Plan as safe harbor contributions. Commencing January 1, 2018, the Company began providing an additional matching contribution to employees equivalent to 50% of the first 6% of employee contributions. Company contributions charged to benefits expense were \$90, \$99, and \$90 for the years ended December 31, 2017, 2016 and 2015, respectively.

Office Lease -

In March 2014, the Company entered into an eight year lease agreement for office space. Rent expense under the lease for the years ended December 31, 2017, 2016, and 2015 was \$192, \$189, and \$203, respectively.

Future minimum lease payments under lease agreements through December 31, 2022 are as follows:

129

2018	\$ 199
2019	207
2020	214
2021	221
Thereafter	229
Total	\$ 1,070

NOTE 11 - CONCENTRATIONS

The Company's operations are currently dependent upon a limited number of TP Investors leasing REF Facilities. Further, under the terms of the various TP Investor agreements, the agreements may be subject to termination or modification by the TP Investor at periodic intervals or upon the occurrence of specified events which include amendments to Section 45 of the Internal Revenue Code. The impact of Tax Reform is still being assessed by both the TP Investors and management of the Company. The termination or modification of all or a material portion of any TP Investor agreements would have a significant adverse impact on the Company's future operations and financial condition.

Additionally, the production and sale of reduced emissions fuel is dependent upon the plant operations of specific generating stations. Production at these locations could be impacted by the demand for electricity, the amount of coal burned as compared to other electricity generation fuel sources utilized by the utility to produce electricity, disruptions due to foreseen or unforeseen plant outages, and changes in government regulations related to electricity generation or coal burning activities.

Certain of the chemicals utilized by the Company to produce reduced emissions fuel are available from a limited number of vendors in the United States. The Company's future operations may be materially and adversely affected if the Company encounters difficulty procuring these chemicals, the quality of available chemicals deteriorates, or there are significant price increases for the chemicals.

NOTE 12 - SUBSEQUENT EVENTS

Management evaluated subsequent events through March 2, 2018 the date the financial statements were available to be issued.

Item 16. Form 10-K Summary

None.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Exchange Act, the Registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

Advanced Emissions Solutions, Inc.

(Registrant)

By/s/ L. Heath Sampson By/s/ Greg P. Marken

L. Heath Sampson Greg P. Marken

Chief Executive Officer Chief Financial

(Principal Executive Officer (Principal

Officer) Financial and

Accounting Officer)

Date: March 12, 2018 Date: March 12, 2018

Pursuant to the requirements of the Exchange Act, this report has been signed below by the following persons on behalf of the Registrant and in the capacities and on the dates indicated.

By/s/ A. Bradley Gabbard By/s/ Derek C. Johnson

A. Bradley Gabbard, Derek C. Johnson,

Director Director

Date: March 12, 2018 Date: March 12, 2018

By/s/ Gilbert Li By/s/ R. Carter Pate
Gilbert Li, Director R. Carter Pate, Director

Date: March 12, 2018 Date: March 12, 2018

By/s/ L. Heath Sampson By/s/ J. Taylor Simonton
L. Heath Sampson, J. Taylor Simonton,
Director and Chief Director
Executive Officer

Date: March 12, 2018 Date: March 12, 2018

By/s/ L. Spencer Wells
L. Spencer Wells, Director

Date: March 12, 2018