

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, 2019

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
(State of incorporation)

27-5472457
(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:

Class	Trading Symbol	Name of each exchange on which registered
Common stock, par value \$0.001 per share	ADES	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	<input type="checkbox"/>	Accelerated filer	<input checked="" type="checkbox"/>
Non-accelerated filer	<input type="checkbox"/>	Smaller Reporting Company	<input checked="" type="checkbox"/>
		Emerging growth company	<input type="checkbox"/>

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act.

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 \$182.9 million based on the last reported bid price of the Common Stock on the NASDAQ Global Market on June 30, 2019. The number of shares outstanding of the registrant's Common Stock, par value \$0.001 per share, as of March 6, 2020 was 18,341,113.

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, 2019

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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, effective July 1, 2013, Advanced Emissions Solutions, Inc. ("ADES"), a Delaware company incorporated in 2011, succeeded ADA as the publicly-held corporation and ADA became a wholly-owned subsidiary of ADES. This Annual Report on Form 10-K is referred to as the "Form 10-K" or the "Report." As used in this Report, the terms the "Company," "we," "us" and "our" means ADES and its consolidated subsidiaries.

We provide environmental solutions to customers in coal-fired power generation, municipal water and other industries primarily through air and water purification control technologies of our subsidiaries and joint ventures. Our proprietary technologies and associated product offerings provide multi-pollutant control and purification solutions to enable coal-fired power generators, municipal water and industrials to meet compliance requirements for applicable regulations.

As of December 31, 2019 and 2018, we held equity interests of 42.5% and 50.0% 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, 2019 and 2018. We account for Tinum Group and Tinum Services under the equity method of accounting.

We operate two segments: Refined Coal ("RC") and Power Generation and Industrials ("PGI"). The segments are discussed in more detail later under this Item 1. Our products are primarily used for the removal of mercury and other air pollutants at coal-fired power plants and other industrial companies. Our products are also used for the purification of water and our operating results from water products are included in All Other and Corporate for segment reporting purposes.

Carbon Solutions Acquisition

On December 7, 2018 (the "Acquisition Date"), the Company purchased 100% of the membership interests of ADA Carbon Solutions, LLC ("Carbon Solutions") for a total purchase price of \$75.0 million (the "Carbon Solutions Acquisition") plus transaction fees of \$4.5 million. The fair value of the purchase consideration was \$66.5 million and consisted of cash consideration of \$65.8 million and an additional purchase adjustment amount payable to Carbon Solutions' secured lender of \$0.7 million. The Company acquired Carbon Solutions to enter into the broader activated carbon market and to expand the Company's product offerings in the mercury control industry and other complementary activated carbon markets. Carbon Solutions owns and operates an activated carbon manufacturing and processing facility and owns an associated lignite mine ("Five Forks Mine"), which supplies the primary raw material for the activated carbon plant.

The Company primarily funded the cash consideration in the Carbon Solutions Acquisition from a \$70.0 million senior term loan facility, less original issue discount of \$2.1 million (the "Senior Term Loan"), which is further discussed below in Item 7 - Management's Discussion and Analysis of Financial Condition and Results of Operations ("Item 7").

Markets

Activated carbon ("AC") is a specialized sorbent material that is used widely in a host of industrial and consumer applications to remove impurities, contaminants or pollutants from gas, water and other product or waste streams. ACs are produced by activating carbonaceous raw materials, including wood, coal, nut shells, resins and petroleum pitch. Properties such as surface area, pore volume and particle size can be specifically engineered to selectively target various contaminants to meet end-use application requirements. AC can come in several different forms including powdered activated carbon ("PAC"), granular activated carbon ("GAC"), pellets, honeycombs, blocks or cloths, which can be important for the end-use application.

Key markets include removal of heavy metal pollutants from coal-fired electrical generation processes, treatment of drinking and waste waters, industrial acid gas and odor removal, automotive gasoline emission control, soil and ground water remediation and food and beverage process and product purifications.

The AC market has been and is expected to continue to be driven by increasing environmental regulations, principally water and air purification, especially in the mature and more industrialized areas of the world. Additionally, we believe environmental issues will continue to be the predominant force in the AC markets of rapidly developing countries.

Power Generation and Industrials

Currently, in the PGI segment, approximately 90% of our revenue is generated from coal-fired power. According to the most recent data from the U.S. Energy Information Administration ("EIA"), coal-fired power generation was down year-over-year by approximately 15% even though overall power generation was flat. Consistent with 2018, 2019 U.S. coal-fired power generation has been significantly affected by prices of competing power generation sources such as natural gas and the acceleration of new renewable energy available to the electricity grid. Low natural gas prices make gas generation a competitive alternative to coal-fired power generation and therefore, coal consumption has been reduced, which in turn has reduced the demand for our products in both the RC and PGI segments. Both lower prices of competing power generation sources and lower electricity demand in the U.S. may continue to negatively impact our revenues, sales volumes, earnings and cash flows in the near term as well as in future years. However, 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.

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 electricity generating units to control mercury emissions, acid gases, and particulate matter, as well as various state regulations and permitting requirements for coal-fired electricity generating units. In addition to the federal MATS rule, many states have implemented their own mercury rules that are similar to, or in many cases more stringent than, MATS, and many coal-fired electricity 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 creates a market for our RC and PGI products. An additional regulation impacting our products and services is the Industrial Boiler Maximum Achievable Control Technology ("MACT") rule that established air toxin standards for industrial boilers, including mercury, particulate matter, and acid gas emission limits.

While the long-term future for coal as a fuel source for electricity generation 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 a move 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 electricity generating units, coal-centric large equipment providers and other coal-related businesses will have difficulty 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 U.S. coal-related businesses meet regulatory compliance, improve efficiency, lower costs and maintain reliability.

Water

AC has been used in the treatment of drinking water, wastewater, contaminated soil and groundwater to absorb compounds causing unpleasant taste and odor and other contaminants. Both industrial and municipal wastewater treatment plants have deployed the use of AC in their treatment processes.

Groundwater contamination has become a matter of increasing concern to federal and state governments as well as to the public, especially in the last 10 years. The U.S. AC market may see significant growth from water purification markets, especially if future regulations are passed controlling certain chemicals in drinking water. At present, individual states are primarily responsible for the protection of groundwater. Worldwide, water treatment accounts for 41% of the total consumption of AC and continues to be the largest global market segment for AC.

We see opportunities in the water market for our products that will provide cost-effective solutions to help industrial and municipal wastewater treatment plants meet water purification standards.

Segments

Refined Coal

Tinum Group, an unconsolidated entity, provides reduction of mercury and nitrogen oxide ("NO_x") emissions at select coal-fired power generators through the production and sale of 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 historically has generated substantial tax credits to us, as well as our equity earnings earned from Tinum Group's sales or leases of 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.

Products

Our patented CyClean™ technology, a pre-combustion coal treatment process provides electric power generators the ability to enhance combustion and reduce emissions of nitrogen oxides ("NO_x") and mercury from coals burned in cyclone boilers.

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

Sales and Customers

Our RC segment derives its revenues from license royalties earned from Tinum Group on the M-45 Technology ("M-45 Royalties") and other revenues related to reduced emissions of both NO_x and mercury from coal are treated with our proprietary chemicals and burned at coal-fired electricity generating units. For the year ended December 31, 2019, M-45 Royalties comprised 24% of our total consolidated revenues. We also derive substantial earnings from our equity method investments in the RC segment, which include Tinum Group, Tinum Services and GWN Manager, LLC. RC segment earnings are primarily provided by equity earnings from Tinum Group and Tinum Services. The loss of equity earnings and M-45 Royalties will have a material adverse effect on our financial condition and consolidated operating results. Additional information related to major customers is disclosed in Note 16 of the Consolidated Financial Statements included in Item 8 of this Report.

Coal-fired electricity 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 was 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 expired in December 2019. As of December 31, 2019, Tinum Group had built and placed into service a total of 26 RC facilities designed to produce RC for sale to coal-fired electricity generating units that were still eligible to produce RC qualifying for Section 45 tax credits. The ability to generate Section 45 tax credits related to the remaining 26 RC facilities expires 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 remits to Tinum Group either payments to purchase or lease payments to lease the RC facility. We benefit from equity income and cash distributions 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 in Tinum Group, we benefit from the related Section 45 tax benefits. As of December 31, 2019 and 2018, respectively, the Section 45 tax credits were \$7.173 and \$7.031 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, 2019, we have earned, 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 14 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, 2019, Tinum Group had 20 invested RC facilities producing RC at utility sites. The remaining 6 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. As of December 31, 2019, Tinum Group had eight facilities that are leased to affiliates of The Goldman Sachs Group (the "GS Affiliates"), and one of these GS Affiliates is also an owner of Tinum Group. A majority of Tinum Group's leases are periodically renewed and the loss of these customers or material modification to the lease terms of these facilities by these customers would have a significant adverse impact on Tinum Group's financial position, results of operations and cash flows, which in turn would have material adverse impact on our financial position, results of operations and cash flows.

During the third quarter of 2019, Tinum Group restructured contracted RC facility leases with the GS Affiliates, which resulted in a decrease of lease payments for 2019 through 2021. Further, two coal-fired utilities in which Tinum Group had invested RC facilities announced closures in the fourth quarter of 2019, and the associated leases of those RC facilities terminated during this period. As a result of reduced lease payments with the GS Affiliates, the termination of the RC facility leases at the closed coal-fired utilities and higher depreciation on all Tinum Group RC facilities as a result of a reduction in their estimated useful lives as determined by Tinum Group during the three months ended September 30, 2019, we expect our pro-rata share of Tinum Group's earnings and distributions to be lower in future periods.

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 that are necessary for the production of RC. The term of each chemical agency agreement runs concurrently with the respective RC facility's operating and maintenance agreement.

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

The following table provides summary information related to the Company's investment in Tinum Group and the related RC facilities as of December 31, 2019 and tons of RC produced and sold for the year ended December 31, 2019:

	# of RC Facilities	Not Operating	Operating	
			Invested	Retained
RC Facilities	26	6	20 (1)	—
RC tons produced and sold (000's)			66,481	1,505

The following tables provide summary information related to the Company's investment in Tinum Group and the related RC facilities as of December 31, 2018 and tons of RC produced and sold for the year ended December 31, 2018:

	# of RC Facilities	Not Operating	Operating	
			Invested	Retained
Facilities	28	9	19 (1)	—
RC tons produced and sold (000's)			59,737	2,302

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

Competition

We believe Chem-Mod, LLC and licensees of Chem-Mod's technology are Tinum Group's principal competitors. Competition in the RC market is based primarily on price, the number of tons of coal burned at the coal-fired electric generating units 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.

Raw Materials

The principal raw materials used in our RC products are comprised of non-bromine based halogens.

Operations

Tinum RC facilities are located at coal-fired power plants in the U.S. As of December 31, 2019, Tinuum Group and Tinuum Services had operations in 15 states.

Power Generation and Industrials

Products

Our products provide mercury control and other air contaminants control to coal-fired power generators and other industrial companies. Most of the North American coal-fired power generators have installed equipment to control air pollutants, like mercury, prior to or since the inception of the MATS rule. However, many power generators need consumable products on a recurring basis to chemically and physically capture mercury and other contaminants. There are three primary consumable products that work in conjunction with the installed equipment, to control mercury: PAC, coal halogen additives and scrubber additives. In many cases these three consumable products can be used together or in many circumstances substituted for each other. However, PAC has widely been adopted as the best available technology to capture mercury due to product efficiency and effectiveness and currently accounts for over 50% of the mercury control consumables North American market. Additionally, we offer coal additives through both our RC and PGI segments. Regardless of the offering, we work with customers to develop and implement a compliance control strategy that utilizes the consumables solutions that fit with their unique operating and pollutions control configuration.

Power generators must stay in compliance with the various regulatory emissions requirements. As such, we believe power generators' top priority is to identify and work with a vendor that can consistently and reliably provide a consumables solution. However, as the market has matured since 2016 and coal-fired power continues to be under economic pressure from natural gas and renewable energy sources, cost of compliance has become increasingly important. Our current products and services provide cost competitive solutions across the entire spectrum of coal-fired power generators' needs.

Sales and Customers

Sales of consumables are made by the Company's employees and through distributors and sales representatives to coal-fired utilities and industrials. Some of our sales of AC are made under annual requirements-based contracts or longer-term agreements. Revenues from our top three customers comprised approximately 37% of our total consolidated revenues during the year ended December 31, 2019, and the loss of these customers would have a material adverse effect on the PGI operating results.

Competition

Our primary competitors for consumable products include Cabot Norit America, Inc., a division of Cabot Corporation (CBT), Calgon Carbon, a subsidiary of Tokyo Stock Exchange listed Kuraray Co., Ltd., Nalco Holding Company, a subsidiary of Ecolab Inc. (ECL) and Midwest Energy Emissions Corp (MEEC).

Raw Materials

The principal raw material we use in the manufacturing of AC is lignite coal, which is, in general, readily available and we believe we have an adequate supply through our ownership of the Five Forks Mine, which is operated by Demery Resources Company, LLC, a subsidiary of the North American Coal Company ("Demery").

We purchase additives that are included in certain products for resale to our customers through contracts with suppliers. The manufacturing of our consumables is dependent upon certain discrete additives that are subject to price fluctuations and supply constraints. In addition, the number of suppliers who provide the necessary additives needed to manufacture our products are limited. Supply agreements are generally renewed on an annual basis.

Operations

We own and operate an AC plant that is located in Louisiana. We also have sales, product development and administrative operations located in Colorado.

Revenue by Type

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

<i>(in thousands)</i>	Years Ended December 31,	
	2019	2018
Revenues:		
Consumables	\$ 53,187	\$ 8,733
License royalties, related party	16,899	15,140
Other	—	72
Total revenues	<u>\$ 70,086</u>	<u>\$ 23,945</u>

Legislation and Environmental Regulations

Our products and services, as well as Tinnium Group's production and sale of RC, are for the reduction of pollutants and other contaminants in the coal-burning electrical generation and water treatment processes. To the extent that legislation and regulation limit the amount of pollutants and other contaminants permitted, the need for our products increases. Below is a summary of the primary legislation and regulation that affects the market for our products.

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

On December 16, 2011, the U.S. Environmental Protection Agency ("EPA") issued the final "MATS Rule" that went into 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 through 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 hydrochloric acid ("HCl"), sulfuric acid ("H₂SO₄") and other Hazardous Air Pollutants ("HAPs"). Approximately 1,260 units were coal-fired EGUs when the rule was enacted. According to our estimates, the MATS Rule 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 now largely complete. We estimate that 42% of the coal-fired EGUs that were operating in December 2011 when the MATS rule was finalized have been permanently shut down, leaving approximately 527 EGUs in operation at the end of 2019.

In April 2017, a review by the U.S. Court of Appeals for the D.C. Circuit of a 2016 "supplemental finding" associated with the cost benefit analysis of the MATS Rule conducted by the EPA was stayed at the request of the current Administration. The court case continues to be stayed indefinitely. In February 2019, the EPA published a reconsideration of its 2016 "supplemental finding" associated with the cost benefit analysis of the MATS Rule. This reconsideration proposes that it is not "appropriate or necessary" to regulate HAPs emissions from coal- and oil-fired EGUs. However, the EPA expressly states that the reconsideration is not removing coal- and oil-fired EGUs from the list of sources that must comply with the MATS rule, but does, in the reconsideration, solicit public comments on whether the EPA has the authority to remove coal- and oil-fired EGUs from the list of sources that must comply with the MATS Rule or whether it can rescind the MATS Rule. The timing and content of the final reconsideration rule are unknown.

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 electricity generating units in the U.S are subject to consent decrees that require the control of acid gases and particulate matter, in addition to mercury emissions.

U.S. Federal Industrial Boiler MACT

In January 2013, the U.S. EPA issued the final set of adjustments to the MACT-based air toxics standards for industrial boilers, including mercury, particulate matter, and acid gas emission limits. Existing boilers typically had until January 31, 2017 to comply with the rule. On December 1, 2014, the EPA announced the reconsideration of the industrial boiler MACT ("IBMACT") and proposed amendments to the version published January 31, 2013, representing technical corrections and clarifications. The proposed amendments do not affect the applicability of the final rule.

The EPA estimated that approximately 600 coal-fired boilers will be affected by IBMACT, in industries such as pulp and paper. Our estimates, based on conversations with plant operators, suggest that most of the affected plants have or will either shut down or switch fuels to natural gas to comply with the regulation.

Effluent Limitation Guidelines

On September 30, 2015, the EPA set the first federal limits known as effluent limitation guidelines ("ELGs") 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 and bottom ash transport water, and limits on mercury, arsenic, selenium, and nitrate from flue gas desulfurization ("FGD") wastewater. In September 2017, EPA finalized a rule that delayed the original compliance deadlines for certain wastewater streams from November 2018 to November 2020, with the possibility that plants would not need to comply until December 2023 with state approval. In April 2019, the U.S. Court of Appeals for the Fifth Circuit struck down the EPA's ELGs that apply to leachate wastewater and "legacy wastewater," and directed the EPA to revise the limits on the levels of toxic metals in those wastewater streams. In November 2019, the EPA proposed to revise the ELGs for bottom ash and FGD wastewater. In none of the proposed effluent guidelines that the EPA is considering are halogens directly regulated. Though under several (though not all) of the proposed treatment options that the EPA is considering, selenium in FGD wastewater would be regulated, and some halogens may impact the effectiveness of biological wastewater treatment systems that are often used for the removal of selenium.

Additional U.S. Legislation and Regulations

On August 3, 2015, the EPA finalized rules to reduce greenhouse gases ("GHGs") in the form of the Clean Power Plan ("CPP"), which established guidelines for states to follow in developing plans to reduce GHG emissions from fossil fuel-fired power plants. Under the CPP, states were required to prepare "State Plans" to meet state targets based on emission reductions from affected sources. The CPP was challenged by multiple states in the U.S. Court of Appeals for the District of Columbia Circuit ("DC Circuit"). The CPP was stayed by the U.S. Supreme Court. The DC Circuit held the CPP litigation in abeyance until April 28, 2017, and dismissed the case once the EPA replaced the CPP.

In July 2019, the EPA repealed the CPP and replaced it with the Affordable Clean Energy ("ACE") rule, which established guidelines for states to follow in developing plans to reduce GHG emissions from fossil fuel-fired power plants. ACE also requires states to prepare State Plans and prescribes that they must be based on heat rate improvements at affected plants. Numerous states, power companies, and non-governmental organizations challenged the ACE rule in the D.C. Circuit.

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 emissions caps for each province. China and Germany both have limits for mercury emissions that are less stringent than U.S. limits and 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 electricity 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.

Mining Environmental and Reclamation Matters

Federal, state and local authorities regulate the U.S. coal mining industry with respect to matters such as employee health and safety and the environment, including the protection of air quality, water quality, wetlands, special status species of plants and animals, land uses, cultural and historic properties and other environmental resources identified during the permitting process. Reclamation is required during production and after mining has been completed. Materials used and generated by mining operations must also be managed according to applicable regulations and law.

The Surface Mining Control and Reclamation Act of 1977 ("SMCRA"), establishes mining, environmental protection, reclamation and closure standards for all aspects of surface mining. Mining operators must obtain SMCRA permits and permit renewals from the Office of Surface Mining (the "OSM"), or from the applicable state agency if the state agency has obtained regulatory primacy. A state agency may achieve primacy if the state regulatory agency develops a mining regulatory program that is no less stringent than the federal mining regulatory program under SMCRA. Our Five Forks Mine operates in Louisiana which has achieved primacy and issues permits in lieu of the OSM.

Mine operators are often required by federal and/or state laws, including SMCRA, to assure, usually through the use of surety bonds, payment of certain long-term obligations including mine closure or reclamation costs, federal and state workers' compensation costs, coal leases and other miscellaneous obligations. Although surety bonds are usually noncancelable during their term, many of these bonds are renewable on an annual basis and collateral requirements may change. As of December 31, 2019, we posted a surety bond of approximately \$5.9 million for reclamation of the Five Forks Mine.

Patents

As of December 31, 2019, we held 57 U.S. patents and seven international patents that were issued or allowed, 27 additional U.S. provisional patents or applications that were pending, and seven 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.

Seasonality of Activities

The sale of our consumable products and RC facility operation levels depend on the operations of the coal-fired electricity generating units to which the applicable consumables are provided and the location of the RC facilities, respectively. Power generation is weather dependent, with electricity and steam production varying in response to heating and cooling needs. Additionally, coal-fired electricity 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 consumables are used and no RC is produced or sold, and our revenues and Tinum's revenues may be correspondingly reduced.

The sale of our AC products for water purification depends on demand from municipal water treatment facilities where these products are utilized. Depending on weather conditions and other environmental factors the summer months historically have the highest demand for PAC, as one of the major uses for PAC is for the treatment of taste and odor problems caused by increased degradation of organic contaminants and natural materials in water during the summer.

Safety, Health and Environment

Our operations are subject to numerous federal, state, and local laws, regulations, rules and ordinances relating to safety, health, and environmental matters ("SH&E Regulations"). These SH&E Regulations include requirements to maintain and comply with various environmental permits related to the operation of many of our facilities, including mine health and safety laws required for continued operation of the Five Forks Mine.

Employees

As of December 31, 2019, we employed 133 personnel, all of which were full-time employees; 36 employees were employed at our offices in Colorado and 97 employees were employed at our facilities in Louisiana.

Available Information

Our periodic and current reports are filed with the Securities and Exchange Commission ("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.advancedemissionsolutions.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 website 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.advancedemissionsolutions.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 RC facilities that 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 PGI market;
- (f) future level of research and development activities;
- (g) the effectiveness of our technologies and the benefits they provide;
- (h) 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 to recognize the tax benefits from production and sale of RC on retained RC facilities and the effect of these factors on Tinuum Group's future earnings and distributions;
- (i) probability of any loss occurring with respect to certain guarantees made by Tinuum Group ("Party Guarantees");
- (j) the timing of awards of, and work and related testing under, our contracts and agreements and their value;
- (k) the timing and amounts of or changes in future revenues, royalties earned, backlog, funding for our business and projects, gross margins, expenses, earnings, tax rates, valuation allowance on our deferred tax assets, cash flows, license royalties, working capital, liquidity and other financial and accounting measures;
- (l) the outcome of current legal proceedings;
- (m) awards of patents designed to protect our proprietary technologies both in the U.S. and other countries; and
- (n) 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 significant source of fuel for electrical generation in the U.S.;
- (b) the IRS will allow the production and sale of RC to qualify for Section 45 tax credits through December 31, 2021;
- (c) we will continue as a key supplier of consumables 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 obtain adequate capital and personnel resources to meet our operating needs and to fund anticipated growth and our indemnity obligations;
- (f) we will be able to establish and retain key business relationships with current and other companies;
- (g) orders we anticipate receiving will be received;
- (h) we will be able to formulate new consumables that will be useful to, and accepted by, the PGI markets;
- (i) we will be able to effectively compete against others;
- (j) we will be able to meet any technical requirements of projects we undertake;
- (k) Tinuum Group will be able to sell or lease additional RC facilities, including RC facilities that may be returned to Tinuum Group, to third party investors; and
- (l) we will be able to utilize the Section 45 tax credits earned from the 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 or such facilities to qualify for Section 45 tax credits; decreases in the production of RC; our 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; availability of materials and equipment for our businesses; intellectual property infringement claims from third parties; pending litigation; 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

The following risks relate to us as of the date this Report is filed with the SEC. 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, if it occurs, would be likely to have a negative impact on your investment in ADES, 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.

Risks relating to our business

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 electricity 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 electricity generating units, climate change or other actions to limit emissions, including public opposition to new coal-fired electricity 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, emissions 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.

Action by the EPA related to MATS that decreases demand for our mercury removal products could have a material adverse effect on our PGI segment.

Performance in our PGI segment depends on demand for mercury removal related product, which is largely dependent on the amount of coal-based power generation used in the U.S. and the continued regulation of utilities under MATS. In August 2018, the EPA announced that it intends to reconsider the MATS rule and in September 2018 submitted its proposal to the White House Office of Management and Budget. In February 2019, the EPA published a reconsideration of its 2016 "supplemental finding" associated with the cost benefit analysis of the MATS Rule. This reconsideration proposes that it is not 'appropriate or necessary' to regulate HAPs emissions from coal- and oil-fired EGUs. However, the EPA expressly states that the reconsideration is not removing coal- and oil-fired EGUs from the list of sources that must comply with the MATS rule, but does, in the reconsideration, solicit comments on whether the EPA has the authority to remove coal- and oil-fired EGUs from the list of sources that must comply with the MATS Rule or whether it can rescind the MATS Rule. Any final action taken by

the EPA related to MATS that decreases demand for our products for mercury removal will have a negative effect on the financial results of our PGI segment. The timing and content of the final reconsideration rule are unknown.

The failure of tariffs placed on U.S. imports of Chinese activated carbon to adequately address the impact of low-priced imports from China could have a material adverse effect on the competitiveness and financial performance of our PGI segment.

Our PGI segment faces competition in the U.S. from low-priced imports of activated carbon products. If the amounts of these low-priced imports increase, especially if they are sold at less than fair value, our sales of competing products could decline, which could have an adverse effect on the earnings of our PGI segment. In addition, sales of these low-priced imports may negatively impact our pricing. To limit these activities, regulators in the U.S. have enacted an anti-dumping duty order on steam activated carbon products from China. In 2018, the order was extended for an additional five years. The amount of anti-dumping duties collected on imports of steam activated carbon from China is reviewed annually by the U.S. Department of Commerce. To the extent the anti-dumping margins do not adequately address the degree to which imports are unfairly traded, the anti-dumping order may be less effective in reducing the volume of these low-priced activated carbon imports in the U.S., which could negatively affect demand and/or pricing for our AC products.

The market for consumables and other products that provide pollutant 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 operate in a highly competitive marketplace. Our ability to compete successfully depends in part upon our ability to maintain a production cost advantage, competitive technological capabilities and to continue to identify, develop and commercialize new and innovative products for existing and future customers. We may face increased competition from existing or newly developed products offered by industry competitors or other companies whose products offer a similar functionality as our products and could be substituted for our products, which may negatively affect demand for our products. In addition, market competition could negatively impact our ability to maintain or raise prices or maintain or grow our market position.

We compete against certain significantly larger and/or more established companies in the market for consumables and other products that provide mercury emissions reduction and water treatment.

Reduction of coal consumption by North American electricity power generators could result in less demand for our products and services. If utilities significantly reduce the number of coal-fired electricity 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 North American electricity 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 and renewable energy generation has been displacing and may continue to displace coal-fueled generation, particularly from older, less efficient coal-powered generators. We expect that a significant amount of the new power generation necessary to meet increasing demand for electricity generation will be fueled by these sources. The price of natural gas has remained at historically low levels 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, that enhance the economics of renewable energy sources could make those sources more competitive than coal. Any reduction in the amount of coal consumed by domestic electricity 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 may result in the reduction or closure of a significant number of coal-fired electric generating units, and may adversely affect our business, financial condition and results of operations.

The loss of, or significant reduction in, purchases by our largest customers could adversely affect our business, financial condition or results of operations.

During the year ended December 31, 2019, we derived approximately 65% of our total consumable revenues from our ten largest customers. Many of these customers purchase our products to comply with emissions regulations, and if coal-fired generation decreases, it may have a negative impact on the amount of consumable products purchased. If any of our ten largest customers, were to significantly reduce the quantities of consumables they purchase from us, it may adversely affect our business, financial condition and results of operations.

Volatility in price and availability of raw materials can significantly impact our results of operations.

The manufacturing and processing of our consumable products requires significant amounts of raw materials. The price and availability of those raw materials can be impacted by factors beyond our control. Our consumable products, exclusive of lignite coal, use a variety of additives. Significant movements or volatility in the costs of additives could have an adverse effect on our working capital or results of operations. Additionally, we obtain certain raw materials from selected key suppliers. While we have inventory of such raw materials, if any of these suppliers are unable to meet their obligations with us on a timely basis or at an acceptable price, we may be forced to incur higher costs to obtain the necessary raw materials.

We may attempt to offset the increase in raw material costs with price increases allowed in our contractual relationships or through cost reduction efforts. If we are unable to fully offset the increased cost of raw materials through price increases, it could significantly impact our business, financial condition and results of operations.

We face operational risks inherent in mining operations and our mining operations have the potential to cause safety issues, including those that could result in significant personal injury.

We own the Five Forks Mine, a lignite coal mine located in Louisiana that is operated for us by a third party. Mining operations by their nature involve a high level of uncertainty and are often affected by risks and hazards outside of our control. At the Five Forks Mine, the risks are primarily operational risks associated with the maintenance and operation of the heavy equipment required to dig and haul the lignite and risks relating to lower than expected lignite quality or recovery rates. The failure to adequately manage these risks could result in significant personal injury, loss of life, damage to mineral properties, production facilities or mining equipment, damage to the environment, delays in or reduced production, and potential legal liabilities.

Our operations and products are subject to extensive safety, health and environmental requirements that could increase our costs and/or impair our ability to manufacture and sell certain products.

Our ongoing operations are subject to extensive federal, state and local laws, regulations, rules and ordinances relating to safety, health and environmental matters, many of which provide for substantial monetary fines and criminal sanctions for violations. These include requirements to obtain and comply with various environmental-related permits for constructing any new facilities and operating all of our existing facilities. In addition, our AC manufacturing facility may become subject to greenhouse gas emission trading schemes under which we may be required to purchase emission credits if our emission levels exceed our allocations. Greenhouse gas regulatory programs that have been adopted, such as cap-and-trade programs, have not had a significant impact on our business to date. Costs of complying with regulations could increase, as concerns related to greenhouse gases and climate change continue to emerge. The enactment of new environmental laws and regulations and/or the more aggressive interpretation of existing requirements could require us to incur significant costs for compliance or capital improvements or limit our current or planned operations, any of which could have a material adverse effect on our earnings or cash flow. We attempt to offset the effects of these compliance costs through price increases, productivity improvements and cost reduction efforts, and our success in offsetting any such increased regulatory costs is largely influenced by competitive and economic conditions and could vary significantly depending on the segment served. Such increases may not be accepted by our customers, may not be sufficient to compensate for increased regulatory costs or may decrease demand for our products and our volume of sales.

We may not be successful in achieving our growth expectations related to new products in our existing or new markets.

We may not be successful in achieving our growth expectations from developing new products for our existing or new markets. Further, we cannot ensure costs incurred to develop new products will result in an increase in revenues. Additionally, our ability to bring new products to the market will depend on various factors, including, but not limited to, solving potential technical or manufacturing difficulties, competition and market acceptance, which may hinder the timeliness and cost to bring such products to production. These factors or delays could affect our future operating results.

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:

- our evaluation of the synergies and/or long-term benefits of an acquired business;
- integration difficulties, including challenges and costs associated with implementing systems, processes and controls to comply with the requirements of a publicly-traded company;
- diverting management’s attention;
- litigation arising from acquisition activity;
- potential increased debt leverage;
- potential issuance of dilutive equity securities;
- 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 goodwill or other intangible asset impairments;
- 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. The Senior Term Loan and our line of credit facility contain certain covenants that limit, or that may have the effect of limiting, among other things, the payment of dividends, acquisitions, capital expenditures, the sale of assets and the incurrence of additional indebtedness.

Natural disasters could affect our operations and financial results.

We operate facilities, including the Five Forks Mine, that are exposed to natural hazards, such as floods, windstorms and hurricanes. Extreme weather events present physical risks that may become more frequent as a result of factors related to climate change. Such events could disrupt our supply of raw materials or otherwise affect production, transportation and delivery of our products or affect demand for our products.

Additionally, we could experience a prolonged disruption, interruption or other loss of operations at our manufacturing facility and headquarters as well as reduced travel and interactions with customers for any number of reasons, including the occurrence of a contagious disease or illness, such as the novel coronavirus (“COVID-19”). Due to the evolving and highly uncertain nature of this event, it is currently not possible to estimate the direct or indirect impacts this outbreak may have on our business. However, if the COVID-19 were to develop into a global pandemic that disrupts the manufacturing of our product, commerce

and related activity, it could materially and adversely affect our results of operations and financial condition due to these and other potential consequences of a pandemic.

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 Refined Coal

The ability of Tinum Group to continue 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.

Tinum Group has successfully sold and leased RC facilities to third party investors and is continuing its efforts to sell or lease new RC facilities in the near term. The inability of Tinum Group to successfully lease or sell additional RC facilities to third party tax equity investors who qualify to receive the benefit of the Section 45 tax credits that are expected to be generated from those RC facilities, as well as the termination or cancellation of existing RC facility leases in the near term, would likely have an adverse effect on our future growth and profitability.

Furthermore, if, in the near term, electricity power generators decide to limit coal-fired generation for economic reasons such as cheaper alternative power sources or are forced to limit coal-fired generation under environmental regulations or other legal statutes, this could also lessen the production and use of RC. This in turn would likely negatively impact Tinum Group's ability to attract additional investors in RC facilities over the currently anticipated term of the Section 45 tax credit program, which in turn would negatively impact its business, financial condition and results of operations.

The ability to generate Section 45 tax credits from existing operating RC facilities ends in 2021, which could eliminate the desire for investors to lease further RC facilities beyond this date. This would effectively eliminate Tinum Group's and Tinum Services' operations and significantly impact our financial condition and results of operations beyond 2021.

Substantially all of our earnings and cash flows in 2019 and 2018 are comprised of equity method earnings from Tinum Group and license royalties generated from certain of Tinum Group's invested RC facilities. For the year ended December 31, 2019, our RC segment generated segment operating income of \$83.5 million. As of December 31, 2019, Tinum Group has 20 invested facilities and zero retained facilities. Absent a modification to the Section 45 tax credit program, the 20 invested facilities 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 upon the expiration of the Section 45 tax credit program. If Tinum Group continues to operate these RC facilities, if any, its earnings will be significantly reduced and accordingly, our pro rata share will also be substantially reduced.

Additionally, our RC segment is the larger of our two segments, and the remainder of our business must grow substantially, either organically or acquisitively, in order to replace earnings from Tinnuum Group that will substantially end during the 2021. There can be no assurance that we will be able to increase our PGI segment earnings during this period 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 2017 Tax Act introduced changes in income tax rates and other specific provisions that 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 "2017 Tax Act") became law. The 2017 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 and created certain new tax provisions, including the Base Erosion and Anti-Abuse tax ("BEAT"). In December 2019, the U.S. Treasury Department and the Internal Revenue Service issued final and proposed regulations on BEAT under Internal Revenue Code Section 59A (the "final BEAT regulations") and the "2019 proposed regulations," respectively). The final BEAT regulations are generally consistent with the proposed BEAT regulations released on December 13, 2018 but adopted several changes. Most notably, the final BEAT regulations generally exclude from the base erosion payment definition amounts transferred to a foreign-related party in certain specified nonrecognition transactions. The 2019 proposed regulations would also allow taxpayers to elect to forego a deduction so that it is not taken into account as a base erosion tax benefit so long as the deduction is waived for all US income tax purposes. In general, the final BEAT regulations apply to tax years ending on or after December 17, 2018, and the 2019 proposed regulations generally would apply to tax years beginning on or after the date that regulations finalizing those rules are published. However, taxpayers may rely on the 2019 proposed regulations in their entirety for tax years beginning after December 31, 2017 and before the regulations are finalized. The changes to previously higher tax rates and provisions such as BEAT could negatively impact tax capacity of current or potential tax equity investors and result in Section 45 production tax credits being less attractive.

Presently, the GS Affiliates account for a substantial portion of earnings for Tinnuum Group and any further lease renegotiation or termination by the GS Affiliates or any failure to continue to produce and sell RC at the GS Affiliates' RC facilities would have a material adverse effect on our business.

As of December 31, 2019, eight of Tinnuum Group's 26 RC facilities are leased to the GS Affiliates. 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 2021. In September 2019, Tinnuum Group restructured all of the existing leases with the GS Affiliates, which resulted in a decrease in net lease payments for the balance of 2019 and will result in lower net lease payments for 2020 and 2021. If the GS Affiliates further renegotiate or terminate 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.

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 financial effects of Tinum Group providing indemnification 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.

Risks related to intellectual property

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 marketing and selling 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.

Indemnification of third party licensees of our technologies against intellectual property infringement claims concerning our licensed technology and our products could be financially 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.

Risk related to tax matters

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 Credits"). As of December 31, 2019, we had \$98.5 million of Tax Credits, equaling 92% of our total gross deferred tax assets. Our ability to use these Tax Credits to offset future taxable income may be significantly limited if we experience an "ownership change" as discussed below. Under the Internal Revenue Code ("IRC") and regulations promulgated by the U.S. Treasury Department, we may carry forward or otherwise utilize the Tax Credits 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 Credits do not otherwise become limited, we believe that we will have available a significant amount of Tax Credits in future years, and therefore the Tax Credits could be a substantial asset to us. However, if we experience an "ownership change," as defined in Section 382 and 383 of the IRC, our ability to use the Tax Credits may be substantially limited, and the timing of the usage of the Tax Credits could be substantially delayed, which could therefore significantly impair the value of that asset.

In general, an "ownership change" under Section 382 and 383 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 Credits arising from an ownership change under Section 382 and 383 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 credit carryforwards could expire before we would be able to use them to offset future taxable income.

On May 5, 2017, our Board of Directors (the "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 Credits to reduce potential future federal income tax obligations may become substantially limited.

On April 5, 2019, the Board approved amending the Protection Plan as previously amended to extend the duration of the Protection Plan and makes associated changes in connection therewith. At the Company's 2019 annual meeting of stockholders, the Company's stockholders approved that amendment; thus the final expiration date will be the close of business on December 31, 2020.

The Protection Plan, as amended, 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 Protection Plan will not trigger the Protection Plan so long as they do not acquire beneficial ownership of additional shares of our common stock. The Board may, in its sole discretion, also exempt any person from triggering the Protection Plan.

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;
- Tinum 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;
- trends in social responsibility and investment guidelines;
- our ability to continue to be able to pay cash dividends;
- the number of shares of common stock repurchased under stock repurchase programs; and
- the degree of trading liquidity in our common stock and general market conditions.

From January 1, 2018 to December 31, 2019, the closing price of our common stock ranged from \$7.69 to \$14.84 per share. In June 2017, we commenced a quarterly cash dividend program and have paid out cash dividends in each succeeding quarter through December 31, 2019. In 2018 and 2019, we implemented stock repurchase programs, and repurchased a total of 2,883,767 shares of our common stock during these two years for cash of \$31.1 million.

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 2018 and 2019, we declared quarterly dividends in the aggregate amount of \$38.8 million. We intend to continue to pay quarterly dividends subject to capital availability, compliance with debt covenants and periodic determinations by the 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.

The payment of future dividends may also be affected by, among other factors, compliance with debt covenants; 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 the Senior Term Loan and any additional indebtedness that we may incur in the future.

Under covenants in the Senior Term Loan, annual collective dividends and repurchases of our common stock in the aggregate may not exceed \$30 million, and shall be permitted so long as (a) no default or event of default exists under the Senior Term Loan and (b) expected future net cash flows from the refined coal business as of the end of the most recent fiscal quarter exceed \$100 million. Based on our current forecasts, we anticipate that future net cash flows from the refined coal business will be below the \$100 million minimum requirement as of the third fiscal quarter of 2020, which would preclude us from paying dividends or repurchasing our common stock at that time, absent a modification to the Senior Term Loan.

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.

An increased focus on environmental, social and governance factors by institutional investors may negatively impact our access to capital and the liquidity of our stock price.

Some institutional investors, including our largest shareholder, have recently adopted Environmental, Social and Governance ("ESG") investing guidelines that may prevent them from increasing or taking new stakes with companies with exposure to fossil fuels. Additional institutional investors may adopt similar ESG investment guidelines. This could limit the demand for owning our common stock and/or our access to capital. If such capital is desired, we cannot assure you that we will be able to obtain any additional equity or debt financing on terms that are acceptable to us. Given these emerging trends, liquidity in our common stock and our stock price may be negatively impacted.

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 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

Offices and Facilities

We lease office space in Highlands Ranch, Colorado for our corporate headquarters. Also, in Colorado, we lease additional office, warehouse and laboratory space. Total combined leased space for these facilities is approximately 32,000 square feet. We also lease or own manufacturing, storage and distribution facilities in Louisiana. Our manufacturing plant sits on

approximately 59 acres and the remaining facilities are comprised of a total of approximately 310,000 square feet. All of the facilities located in Louisiana are included in our PGI segment and Corporate and other.

In August 2019, we entered into a new lease for our corporate headquarters and primary laboratory (approximately 21,000 square feet located in Greenwood Village, Colorado). We expect to occupy this new facility beginning in March 2020, at which point we will no longer occupy the previously leased space in Colorado of approximately 32,000 square feet.

Mining

As of December 31, 2019, we owned or controlled, primarily through long-term leases, approximately 2,279 acres of coal land for surface mining located in the Gulf Coast Lignite Region, in Natchitoches Parish, Louisiana ("Five Forks"). The majority of the Five Forks land is leased for mineral rights and right-of-use purposes that expire at varying dates over the next 30 years and contain options to renew. The remaining land is owned by us.

Under our current mining plans, substantially all leased reserves will be mined out within the period of existing leases or within the time period of assured lease renewals. Royalties are paid to lessors either as a fixed price per ton or as a percentage of the gross sales price of the mined coal. The majority of the significant leases are on a percentage royalty basis. In some cases, a payment is required either at the time of execution of the lease or in annual installments. In most cases, the prepaid royalty amount is applied to reduce future production royalties.

On October 31, 2018, the SEC issued new rules for disclosures under this Item for mining registrants. These rules amend Item 102 of Regulation S-K under the Securities Act and the Exchange Act and rescind Industry Guide 7 to direct mining registrants, and create a new subpart of Regulation S-K, which contains all of the requirements for property disclosures by mining registrants from and after January 1, 2021 (the "Mining Disclosures"). The Mining Disclosures became effective on February 25, 2019 and allow mining registrants a transition period through January 1, 2021 to comply. We elected to adopt the Mining Disclosures effective February 25, 2019 and were subject to the requirements effective with the filing of our Annual Report on Form 10-K for the fiscal year ended December 31, 2019. Based on the materiality and the vertically-integrated company guidelines contained in the Mining Disclosures, we have concluded that no additional disclosures related to our mining operations are required under this Item.

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 9 "Commitments and Contingencies" to the consolidated financial statements included in Item 8 of this Report.

Item 4. Mine Safety Disclosures

The statement concerning mine safety violations or other regulatory matters required by Section 1503(a) of the Dodd-Frank Wall Street Reform and Consumer Protection Act and Item 104 of Regulation S-K is included in Exhibit 95 to this Report.

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, 2019, our common stock was quoted on the NASDAQ Global Market under the symbol "ADES." 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

In June 2017, we commenced a quarterly cash dividend program of \$0.25 per common share.

We may 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 the Board and will depend on a variety of factors including, but not limited to, our financial results, cash requirements, financial condition, compliance with loan covenants and other contractual restrictions and other factors considered relevant by the Board and will be subject to limitations imposed under Delaware law.

Holdings

The number of holders of record of our common stock as of March 6, 2020 was approximately 800. The approximate number of beneficial stockholders is estimated at 7,800.

Purchases of Equity Securities by the Company and Affiliated Purchasers

In November 2018, the Board authorized a program for us to repurchase up to \$20.0 million of shares of our common stock through open market transactions at prevailing market prices. As of September 30, 2019, the Company had \$2.9 million remaining under this program. In November 2019, the Board authorized an incremental \$7.1 million to this stock repurchase program and provided that the program will remain in effect until all amounts are utilized or the program is otherwise modified by the Board. The following table summarizes the common stock repurchase activity for the three months ended December 31, 2019:

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, 2019	—	\$ —	—	\$ —
November 1 to 30, 2019	144,615	10.36	144,615	—
December 1 to 31, 2019	131,987	10.37	131,987	7,134
Total	276,602		276,602	\$ 7,134

Item 6. Selected Financial Data

The information under this Item is not required to be provided by smaller reporting companies.

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, 2019 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 through consumables that utilize powdered activated carbon (“PAC”) and chemical based technologies, 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 regulations. See further discussion of our business included in Item 1 - "Business" ("Item 1") of this Report. Discussion regarding segment information is included in the discussion of our consolidated results under this Item 7. Additionally, discussion related to our reportable segments is included in Item 1 and Note 15 of the Consolidated Financial Statements included in Item 8 of this Report.

On December 7, 2018 (the “Acquisition Date”), we acquired all of the outstanding equity interests (the "Carbon Solutions Acquisition”) of ADA Carbon Solutions, LLC (“CS” or “Carbon Solutions”). Carbon Solutions is an activated carbon company and the North American leader in mercury capture using PAC for the coal-fired power plant, industrial and water treatment markets. Carbon Solutions owns and operates an activated carbon ("AC") manufacturing and processing facility. It also owns an associated lignite mine ("Five Forks Mine") that supplies the raw material for the powdered activated carbon plant. Our operating results for 2018 include the operating results of Carbon Solutions for the period from the Acquisition Date to December 31, 2018.

On December 7, 2018, ADES and ADA-ES, Inc. ("ADA"), a wholly-owned subsidiary, and certain other subsidiaries of the Company as guarantors, The Bank of New York Mellon as administrative agent, and Apollo Credit Strategies Master Fund Ltd. and Apollo A-N Credit Fund (Delaware) L.P. (collectively "Apollo"), affiliates of a beneficial owner of greater than five percent of the Company's common stock and related parties, entered into the Term Loan and Security Agreement (the "Senior Term Loan") in the principal amount of \$70.0 million, less original issue discount of \$2.1 million. Proceeds from the Senior Term Loan were used to fund the Carbon Solutions Acquisition.

Drivers of Demand and Key Factors Affecting Profitability

Drivers of demand and key factors affecting our profitability differ by segment. In the Refined Coal ("RC") segment, demand is driven primarily by the Internal Revenue Code ("IRC") *Section 45 - Production Tax Credit* ("Section 45 tax credits"), which is expected to expire no later than December 31, 2021. Operating results in RC have been influenced by: (1) the ability to sell, lease or operate RC facilities; (2) lease renegotiation or termination; and (3) changes in tonnage of RC due to changing coal-fired dispatch and electricity power generation sources.

In the Power Generation and Industrials ("PGI") segment, demand is driven primarily by consumables-based solutions for coal-fired power generation and other industrials. Operating results in PGI has been influenced by: (1) changes in our sales volumes; (2) changes in price and product mix; and (3) changes in coal-fired dispatch and electricity power generation sources.

Components of Revenue, Expenses and Equity Method Investees

The following briefly describes the components of revenues and expenses as presented in the Consolidated Statements 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

Consumables

We sell PAC and proprietary chemical blends to coal-fired utilities and other industrial boilers that allow the respective utilities to comply with the regulatory emissions standards. Additionally, we also sell PAC to water treatment plants to remove contaminants from the water. Revenue is generally recorded upon delivery of our product.

License royalties, related party

We recognize license royalties under a licensing arrangement (the "M-45 License") of our M-45™ and M-45-PC™ emission control technologies (the "M-45 Technology") to Tinum Group, LLC ("Tinum Group"). License royalties are based on a percentage of the per-ton, pre-tax margin, inclusive of impacts related to depreciation expense and other allocable expenses, as defined in the M-45 License.

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. Payroll and benefits costs exclude direct labor included in Cost of revenue.

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, research and development expense and other general costs of conducting business. Research and development costs, net of reimbursements from cost-sharing arrangements, are charged to expense in the period incurred and are reported in the General and administrative line item in the Consolidated Statements of Operations.

Depreciation, amortization, depletion and accretion

Depreciation and amortization expense consists of depreciation expense related to property, plant and equipment and the amortization of long-lived intangible assets. Depletion and accretion expense consists of depletion expense related to the depletion of mine development costs and the accretion of a mine reclamation liability.

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 Tinum Group, a related party in which we own a 42.5% equity interest and a 50% voting interest, are positively impacted when Tinum Group obtains an investor in a RC facility and receives cash payments under either a lease arrangement or sales arrangement of the RC facility. If Tinum 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 Tinum Group. These benefits, if utilized, will increase our consolidated net income as a result of a reduction in income tax expense.

Tinum Services, LLC ("Tinum 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. Tinum Group or the lessee/owner of the RC facilities pays Tinum Services, subject to certain limitations, the costs of operating and maintaining the RC facilities plus certain fees. Tinum Services also arranges for the purchase and delivery of certain chemical additives under chemical agency agreements necessary for the production of RC. Tinum Services consolidates certain RC facilities leased or owned by tax equity investors that are deemed to be variable interest entities ("VIE's). All net income (loss) associated with these VIE's is allocated to the noncontrolling equity holders of Tinum Services and therefore does not impact our equity earnings (loss) from Tinum Services.

Other income (expense)

The remaining components of other income (expense) include interest income, interest expense and other miscellaneous items.

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 operating results for the year ended December 31, 2018 include the operations of Carbon Solutions from the Acquisition Date through December 31, 2018. 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, 2019 Compared to Year ended December 31, 2018

Total Revenue and Cost of Revenue

A summary of the components of revenues and cost of revenue for the years ended December 31, 2019 and 2018 is as follows:

<i>(Amounts in thousands except percentages)</i>	Years Ended December 31,		Change	
	2019	2018	(\$)	(%)
Revenues:				
Consumables	\$ 53,187	\$ 8,733	\$ 44,454	509 %
License royalties, related party	16,899	15,140	1,759	12 %
Other	—	72	(72)	(100)%
Total revenues	\$ 70,086	\$ 23,945	\$ 46,141	193 %
Consumables cost of revenue, exclusive of depreciation and amortization	\$ 49,443	\$ 6,606	\$ 42,837	648 %
Other cost of revenue, exclusive of depreciation and amortization	\$ —	\$ (353)	\$ 353	(100)%

Consumables revenue and consumables cost of revenue

For the years ended December 31, 2019 and 2018, consumables revenue increased year over year primarily due to the addition of Carbon Solutions' operations. These operations increased the total pounds of our consumables sold year over year.

Consumables cost of revenue was also increased year-over-year primarily due to the Carbon Solutions' operations. Additional increase to cost of revenue was due to a \$5.0 million adjustment related to the step-up in basis of inventory acquired related to the Carbon Solutions Acquisition.

During the year ended December 31, 2019, Consumables revenue and margins were negatively impacted by low coal-fired power dispatch driven by power generation from sources other than coal as well as mild weather conditions. According to the most recent U.S. Energy Information Administration ("EIA") data, coal-fired power generation was down year over year by approximately 15%, even though overall power generation was flat.

Based on current market estimates, we believe that consumables sales volumes and revenues will be negatively impacted in 2020 due to continued generation of power from sources other than coal. The most significant drivers related to this expected impact are natural gas prices and the expansion of energy generation sources related to natural gas and renewables.

License royalties, related party

License royalties increased in 2019 compared to 2018 primarily due to obtaining additional third party investors for two RC facilities during 2018 and four new RC facilities during 2019, all of which use our M-45 License. The addition of new invested RC facilities in 2018 and 2019 resulted in an increase in both cash payments to Tinum Group and the related tons subject to the M-45 License. For the years ended December 31, 2019 and 2018, there were 47.3 million and 37.3 million tons, respectively, of RC produced using the M-45 Technology. Offsetting the net increase in license royalties for 2019 from additional facilities and related tonnage was a lower royalty per ton rate. This lower rate was attributable to higher depreciation recognized of approximately \$1.0 million on all royalty bearing RC facilities during the second half of 2019 as a result of a reduction in their estimated useful lives as determined by Tinum Group. Further offsetting the net increase in license royalties was a decrease in net lease payments of approximately \$0.1 million as a result of Tinum Group restructuring RC facility contracted leases with its largest customer. As a result of higher depreciation and lower lease payments, we expect that the lower royalty rate per ton will continue in 2020 and 2021.

Additional information related to revenue concentrations and contributions by class and reportable segment is included in the segment discussion below and in Note 8 and Note 16 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, 2019 and 2018 is as follows:

<i>(in thousands, except percentages)</i>	Years Ended December 31,		Change	
	2019	2018	(\$)	(%)
Operating expenses:				
Payroll and benefits	\$ 10,094	\$ 10,639	\$ (545)	(5)%
Legal and professional fees	9,948	8,552	1,396	16 %
General and administrative	8,123	4,178	3,945	94 %
Depreciation, amortization, depletion and accretion	7,371	723	6,648	920 %
	<u>\$ 35,536</u>	<u>\$ 24,092</u>	<u>\$ 11,444</u>	48 %

Payroll and benefits

Payroll and benefits expenses decreased in 2019 compared to 2018 primarily due to restructuring expenses in connection with the departure of certain executive officers and management's alignment of the business with strategic objectives during 2018, as well as the elimination of certain duplicative positions in connection with the Carbon Solutions Acquisition. There was a decrease in restructuring charges of \$3.0 million year over year. Offsetting this decrease was an increase in payroll-related expenses due to a full year of increased headcount as a result of the Carbon Solutions Acquisition.

Legal and professional fees

Legal and professional fees expenses increased in 2019 compared to 2018 as a result of costs incurred related to professional fees, primarily outsourced IT cost specific to the integration of Carbon Solutions of \$2.9 million, consulting fees of \$1.8 million, legal fees related to ongoing business matters of \$1.0 million and shared service costs, including audit fees, of \$0.5 million. These costs were partially offset by a decrease in costs related to transaction fees incurred related to the Carbon Solutions Acquisition during the year ended December 31, 2018 of approximately \$4.5 million.

General and administrative

General and administrative expenses increased in 2019 compared to 2018 primarily due to an increase in general operating expenses, including an increase year over year of approximately \$1.3 million related to rent and occupancy expense from additional leased office and warehouse space resulting from the Carbon Solutions Acquisition. Remaining increases of approximately \$1.9 million period over period related to other general and administrative expenses, including travel, insurance and recruiting expenses.

Depreciation, amortization, depletion and accretion

Depreciation and amortization expense increased in 2019 compared to 2018 due to the addition of long-lived assets and intangible assets acquired as part of the Carbon Solutions Acquisition, which contributed approximately \$6.7 million of depreciation and amortization for 2019.

Other Income (Expense), net

A summary of the components of our other income (expense), net for the years ended December 31, 2019 and 2018 is as follows:

<i>(Amounts in thousands, except percentages)</i>	Years Ended December 31,		Change	
	2019	2018	(\$)	(%)
Other income (expense):				
Earnings from equity method investments	\$ 69,176	\$ 54,208	\$ 14,968	28%
Interest expense	(7,174)	(2,151)	(5,023)	234%
Other	427	220	207	94%
Total other income	\$ 62,429	\$ 52,277	\$ 10,152	19%

Earnings in equity method investments

The following table presents the equity method earnings by investee for the years ended December 31, 2019 and 2018:

<i>(in thousands)</i>	Years Ended December 31,		Change	
	2019	2018	(\$)	(%)
Earnings from Tinum Group	\$ 60,286	\$ 47,175	\$ 13,111	28%
Earnings from Tinum Services	8,896	7,033	1,863	26%
Loss from other	(6)	—	(6)	*
Earnings from equity method investments	\$ 69,176	\$ 54,208	\$ 14,968	28%

* Calculation not meaningful

Earnings from equity method investments, and changes related thereto, are impacted by our significant equity method investees: Tinum Group and Tinum Services.

For the year ended December 31, 2019, we recognized \$60.3 million in equity earnings from Tinum Group compared to our proportionate share of Tinum Group's net income of \$62.0 million for the year. The difference represents the cumulative earnings short-fall balance as of December 31, 2018. For the year ended December 31, 2018, we recognized \$47.2 million in equity earnings from Tinum Group compared to our proportionate share of Tinum Group's net income of \$57.7 million for the year. This difference was the result of cumulative distributions received from Tinum Group being in excess of the carrying value of the investment, and therefore we recognized such excess distributions as equity method earnings in the year the distributions occurred.

For the year ended December 31, 2019, equity earnings from Tinum Group were positively impacted by the addition during the year of four new invested RC facilities. Further, revenues from two of these facilities were recognized immediately in 2019 as a result of Tinum Group's adoption of ASC Topic 606 - *Revenue from Contracts with Customers* ("ASC 606"). However, equity earnings from Tinum Group were negatively impacted by approximately \$4.9 million from higher depreciation on all Tinum Group RC facilities as a result of a reduction in their estimated useful lives as determined by Tinum Group during the three months ended September 30, 2019. In addition and during the three months ended September 30, 2019, Tinum Group restructured RC facility leases with its largest customer, which decreased lease payments and equity earnings beginning in the three months ended September 30, 2019 and will also negatively impact equity earnings in the future. For the year ended December 31, 2018, cash distributions and related equity earnings from Tinum Group were negatively impacted as a result of \$17.6 million of capital expenditures incurred by Tinum Group related to the engineering and installation of RC facilities. See the discussion below regarding the accounting of earnings from Tinum Group.

We expect our earnings in Tinum to decrease in future periods due to higher depreciation and revised lease payments as discussed above. Future earnings will also be negatively impacted due to the expiration of Section 45 tax credits in 2021. However, although earnings recognized under accounting principles generally accepted in the U.S. ("GAAP") are expected to decrease in future years compared to 2019, cash distributions are expected to significantly exceed GAAP earnings, consistent with our current expectations of future RC cash distributions.

On January 1, 2019, Tinuum Group adopted ASC 606 and ASU 2016-02 (Topic 842), *Leases* (“ASU 2016-02”). As a result of Tinuum Group’s adoption, on January 1, 2019, we recorded a cumulative adjustment increase to Retained earnings of \$27.4 million related to our portion of Tinuum Group’s cumulative effect adjustment. As a result, we recognized equity earnings based on our pro-rata share of Tinuum Group’s net income as, on a go-forward basis, our cumulative pro-rata share of Tinuum Group’s net income was equal to or exceeded cumulative cash distributions received from Tinuum Group.

Tinuum Group’s audited consolidated financial statements as of December 31, 2019 and 2018 and for the years then ended are included in Item 15 - "Exhibits and Financial Statement Schedules" ("Item 15") of this Report.

Equity earnings from our interest in Tinuum Services increased by \$1.9 million in 2019 compared to 2018. As of December 31, 2019 and 2018, Tinuum Services provided operating and maintenance services to 19 and 18 RC facilities, respectively. Tinuum 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.

Additional information related to equity method investments is included in Note 5 to the Consolidated Financial Statements included in Item 8 of this Report.

Tax Credits and Obligations

Historically, we have earned tax credits that may be available for future benefit related to the production of RC from the operation of RC facilities under Section 45 tax credits (or "GBC's") in which we have held both direct ownership and indirect ownership through Tinuum's direct ownership. We refer to these RC facilities as "retained facilities." We currently hold a direct and indirect ownership through Tinuum Group in the GWN REF RC facility ("GWN REF") and during 2018 we earned substantially all of our Section 45 tax credits from GWN REF. However, under an agreement effective January 1, 2019 between Tinuum Group and its largest customer, who also has an ownership interest in Tinuum Group, substantially all of the tax credits earned from GWN REF were allocated prospectively to this customer. As a result, our earned Section 45 tax credits for the year ended December 31, 2019 were \$0.3 million compared to \$7.0 million for the year ended December 31, 2018. Future earned Section 45 tax credits for the years 2020-2021 are expected to be consistent with 2019. As of December 31, 2019, we had approximately \$98.5 million in GBC carryforwards.

In the hypothetical event of an ownership change, as defined by IRC Section 382, utilization of 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, 2019, as defined by IRC Section 382. Such analysis for the period from January 1, 2020 through the date of this Report has not been completed. Therefore, it is possible that we experienced an ownership change between January 1, 2020 and the date of this filing, thus subjecting our GBC carryforwards to limitation.

Interest expense

Interest expense increased \$5.0 million in 2019 compared to 2018 primarily due to interest expense of \$5.3 million related to the Senior Term Loan entered into on December 7, 2018 to fund the Carbon Solutions Acquisition. This increase was comprised of stated interest on the Senior Term Loan principal of \$3.7 million and interest expense related to debt discount and debt issuance costs associated with the Senior Term Loan of \$1.6 million. Offsetting this increase was a decrease in IRS section 453A ("Section 453A") interest expense of \$0.5 million in 2019 compared to 2018. This reduction was driven by a decrease in the tax liability associated with RC facilities in which Tinuum Group recognized as installment sales for tax purposes.

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

<i>(in thousands)</i>	As of December 31,	
	2019	2018
Tax liability deferred on installment sales (1)	\$ 20,783	\$ 35,703
Interest rate	5.00%	5.00%

(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 \$112 million as of December 31, 2019).

Based on the interest rate in effect as of the date of this filing, the 453A interest rate for the year ended December 31, 2020 is expected to be 5%.

Income tax expense

For the year ended December 31, 2019, our reported income tax expense of \$12.0 million differed from income tax expense computed by applying the U.S. statutory federal income tax rate (the "Federal Rate") of \$10.0 million primarily due to state income tax expense, net of federal benefit of \$1.6 million.

For the year ended December 31, 2018, our reported income tax expense of \$10.4 million differed from income tax expense computed using the Federal Rate of \$9.6 million primarily due to an increase in income tax expense from state income tax expense, net of federal benefit of \$3.6 million and an increase in the valuation allowance from on our deferred tax assets of \$4.5 million, offset by a decrease in income tax expense from tax credits realized of \$7.0 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.

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, 2019, we concluded it is more likely than not we will generate sufficient taxable income within the applicable net operating loss and tax credit carryforward periods to realize \$14.1 million of our net deferred tax assets, which resulted in a decrease in the valuation allowance from December 31, 2018 of \$0.3 million. In reaching this conclusion, we primarily considered: (1) the future reversal of existing temporary differences; and (2) forecasts of continued future taxable income. As of December 31, 2019 and 2018, we had a valuation allowance of \$79.6 million and \$79.9 million, respectively, against our deferred tax assets.

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 that 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 14 of the Consolidated Financial Statements included in Item 8 of this Report.

Non-GAAP Financial Measures

To supplement our financial information presented in accordance with GAAP, we are providing non-GAAP measures of certain financial performance. These non-GAAP measures include Consolidated EBITDA and Segment EBITDA. We have included non-GAAP measures because management believes that they help to facilitate comparison of operating results between periods. We believe the non-GAAP measures provide useful information to both management and users of the financial statements by excluding certain expenses, gains and losses that may not be indicative of core operating results and business outlook. These non-GAAP measures are not in accordance with, or an alternative to, measures prepared in accordance with GAAP and may be different from non-GAAP measures used by other companies. In addition, these non-GAAP measures are not based on any comprehensive set of accounting rules or principles. These measures should only be used to evaluate our results of operations in conjunction with the corresponding GAAP measures.

We define Consolidated EBITDA as net income, adjusted for the impact of the following items that are either non-cash or that we do not consider representative of our ongoing operating performance: depreciation, amortization, depletion and accretion, interest expense, net and income tax expense. Because Consolidated EBITDA omits certain non-cash items, we believe that the measure is less susceptible to variances that affect our operating performance.

Segment EBITDA is calculated as Segment operating income (loss) adjusted for the impact of the following items that are either non-cash or that we do not consider representative of our ongoing operating performance: depreciation, amortization, depletion and accretion and interest expense, net. When used in conjunction with GAAP financial measures, Segment EBITDA is a supplemental measure of operating performance that management believes is a useful measure for our PGI segment performance relative to the performance of our competitors as well as performance period over period. Additionally, we believe the measure is less susceptible to variances that affect our operating performance results.

We present Consolidated EBITDA and Segment EBITDA because we believe they are useful as supplemental measures in evaluating our operating performance and provide greater transparency into the results of operations. Management uses Consolidated EBITDA and Segment EBITDA as factors in evaluating the performance of our business.

The adjustments to Consolidated EBITDA and Segment EBITDA in future periods are generally expected to be similar. Consolidated EBITDA and Segment EBITDA have limitations as analytical tools, and these measures should not be considered in isolation or as a substitute for analyzing our results as reported under GAAP.

Consolidated EBITDA

	Year ended December 31,	
	2019	2018
Net income (1)	\$ 35,537	\$ 35,454
Depreciation, amortization, depletion and accretion	7,371	723
Interest expense, net	6,913	1,912
Income tax expense	11,999	10,423
Consolidated EBITDA	\$ 61,820	\$ 48,512

(1) Net income for the year ended December 31, 2019 was inclusive of a \$5.0 million adjustment, which increased cost of revenue due to a step-up in basis of inventory acquired related to the Carbon Solutions Acquisition.

Business Segments

As of December 31, 2019, we have two reportable segments: (1) Refined Coal ("RC"); and (2) Power Generation and Industrials ("PGI").

The business segment measurements provided to and evaluated by our chief operating decision maker 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 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 Tinnuum Group, Tinnuum Services and one insignificant investee. Segment revenues include equity method earnings (losses) from our equity method investments and royalty earnings from Tinnuum Group. These earnings are included in the Earnings from equity method investments and License 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 the produced and sold RC from both operating and retained RC facilities, 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.
2. PGI - Our PGI segment includes revenues and related expenses from the sale of consumable products that utilize PAC and chemical technologies. These options provide coal-powered utilities and industrial boilers with mercury control solutions working in conjunction with pollution control equipment systems, generally without the requirement for significant ongoing capital outlays. These amounts are included in the respective revenue and cost of revenue line items in the Consolidated Statements of Operations included in Item 8 of this Report.

The following table presents our operating segment results for the years ended December 31, 2019 and 2018:

<i>(in thousands)</i>	<u>Years Ended December 31,</u>		<u>Change</u>
	<u>2019</u>	<u>2018</u>	<u>(\$)</u>
Revenues:			
Refined Coal:			
Earnings in equity method investments	\$ 69,176	\$ 54,208	\$ 14,968
License royalties, related party	16,899	15,140	1,759
	<u>86,075</u>	<u>69,348</u>	<u>16,727</u>
Power Generation and Industrials:			
Consumables	50,458	8,628	41,830
Other	—	72	(72)
	<u>50,458</u>	<u>8,700</u>	<u>41,758</u>
Total segment reporting revenues	<u>136,533</u>	<u>78,048</u>	<u>58,485</u>
Adjustments to reconcile to reported revenues:			
Earnings in equity method investments	(69,176)	(54,208)	(14,968)
Corporate and other	2,729	105	2,624
Total reported revenues	<u>\$ 70,086</u>	<u>\$ 23,945</u>	<u>\$ 46,141</u>
Segment operating income (loss)			
Refined Coal (1)	\$ 83,471	\$ 64,854	\$ 18,617
Power Generation and Industrials (2)	(11,606)	(2,621)	(8,985)
Total segment operating income	<u>\$ 71,865</u>	<u>\$ 62,233</u>	<u>\$ 9,632</u>

(1) Included in the RC segment operating income for the years ended December 31, 2019 and 2018 is 453A interest expense of \$1.0 million and \$1.6 million, respectively. Also included in the RC segment operating income for the year ended December 31, 2018 was \$0.4 million of severance expense.

(2) Included in the PGI segment operating income for the year ended December 31, 2019 and 2018 was approximately \$4.7 million and \$1.0 million, respectively, of cost of revenue expense related to a step up in basis of the fair value of inventory. Also included in the PGI segment operating income for the year ended December 31, 2019 and 2018 was \$6.7 million and \$0.5 million, respectively, of depreciation, amortization and depletion expense on mine- and plant-related long-lived assets.

A reconciliation of segment operating income to consolidated net income is included in Note 15 of the Consolidated Financial Statements included in Item 8 of this Report.

Refined Coal

The following table details the segment revenues of our respective equity method investments for the years ended December 31, 2019 and 2018:

<i>(in thousands)</i>	<u>Year ended December 31,</u>	
	<u>2019</u>	<u>2018</u>
Earnings from Tinnium Group	\$ 60,286	\$ 47,175
Earnings from Tinnium Services	8,896	7,033
Loss from other	(6)	—
Earnings from equity method investments	<u>\$ 69,176</u>	<u>\$ 54,208</u>

RC earnings increased primarily due to increased equity earnings from Tinnium Group during the year ended December 31, 2019 compared to the year ended December 31, 2018, as presented above. For the year ended December 31, 2019, we

recognized \$60.3 million in equity earnings from Tinum Group compared to our proportionate share of Tinum Group's net income of \$62.0 million for the year. The difference represents the cumulative earnings short-fall balance as of December 31, 2018. For the year ended December 31, 2018, we recognized \$47.2 million in equity earnings from Tinum Group compared to our proportionate share of Tinum Group's net income of \$57.7 million for the year. This difference was the result of cumulative distributions received from Tinum Group being in excess of the carrying value of the investment, and therefore we recognized such excess distributions as equity method earnings in the year the distributions occurred.

For the year ended December 31, 2019, equity earnings from our interest in Tinum Group were positively impacted by the addition of four new RC facilities during the year ended December 31, 2019. Further, revenues from two of these facilities were recognized immediately in 2019 as a result of Tinum Group's adoption of ASC 606 and ASC 842 as of January 1, 2019. However, our earnings were negatively impacted from higher depreciation recognized for the year ended December 31, 2019 on all Tinum Group RC facilities as a result of a reduction in their estimated useful lives as determined by Tinum Group during the three months ended September 30, 2019, as described above. As a result of a reduction in coal consumption, as noted above, during the three months ended September 30, 2019, Tinum Group restructured RC facility contracted leases with its largest customer, which decreased lease payments beginning for the remainder of 2019 and will also negatively impact our pro-rata share of Tinum Group's earnings in the future.

Earnings from Tinum Services for 2019 increased compared to 2018 primarily due to an increase in the number of operating RC facilities from 18 to 19 in which Tinum Services provides operating and maintenance services.

RC earnings were positively impacted during the year ended December 31, 2019 by an increase in royalties related to Tinum Group's use of our M-45 License. The addition of new invested RC facilities in 2018 and 2019 resulted in an increase in both cash payments to Tinum Group and the related tons subject to the M-45 License. For the years ended December 31, 2019 and 2018, there were 47.3 million and 37.3 million tons, respectively, of RC produced using the M-45 Technology. Offsetting the net increase in license royalties for the year ended December 31, 2019 from additional facilities and related tonnage was a lower royalty per ton rate. This lower rate is attributable to higher depreciation recognized of approximately \$1.0 million on all royalty bearing RC facilities during the second half of 2019 as a result of a reduction in their estimated useful lives as determined by Tinum Group. Further offsetting the net increase in license royalties was a decrease in lease payments of approximately \$0.1 million as a result of Tinum Group restructuring RC facility contracted leases with its largest customer.

Outlook

Future earnings and growth in the RC segment will continue to be impacted by coal-fired dispatch and invested facilities with leases subject to periodic renewals being terminated, repriced, or otherwise subject to renegotiated terms. Further, we expect our earnings in Tinum to decrease in future periods due to higher depreciation and revised lease payments as discussed above. Future earnings will also be negatively impacted due to the expiration of Section 45 tax credits in 2021 earned from RC production. However, although GAAP earnings are expected to decrease in future years compared to 2019, cash distributions are expected to significantly exceed GAAP earnings, consistent with our current expectations of future RC distributions.

Power Generation and Industrials

PGI segment operating loss increased during the year ended December 31, 2019 compared to 2018 primarily due to the increase in the operating loss of Carbon Solutions. This increase included \$4.7 million of cost of revenue expense recognized in 2019 related to a step-up in basis of acquired finished goods inventory and \$6.7 million of depreciation, amortization and depletion expense related to Carbon Solutions Acquisition. During the year ended December 31, 2019, Consumables revenue and margins were negatively impacted by low coal-fired power dispatch driven by power generation from sources other than coal as well as mild weather. According to the most recent EIA data, coal-fired power generation was down year over year by approximately 15% even though overall power generation was flat.

Outlook

Based on current market estimates, we believe that the PGI segment will continued to be negatively impacted, as power generation from coal-fired power plants declines and the market focuses on other sources, including natural gas and renewable energy. Future demand will also be impacted by prices of competing energy sources, such as natural gas. Low prices of alternative energy sources and decreasing power generation from coal-fired utilities reduce demand for our products.

PGI Segment EBITDA

<i>(in thousands)</i>	Year ended December 31,	
	2019	2018
Segment operating loss (1)	\$ (11,606)	\$ (2,621)
Depreciation, amortization, depletion and accretion	6,682	520
Interest expense, net	351	45
Segment EBITDA loss	<u>\$ (4,573)</u>	<u>\$ (2,056)</u>

(1) Segment operating loss for the year ended December 31, 2019 and 2018 was inclusive of adjustments of \$4.7 million and \$1.0 million, respectively, which increased cost of revenue due to a step-up in basis of inventory acquired related to the Carbon Solutions Acquisition.

Liquidity and Capital Resources

Overview of Factors Affecting Our Liquidity

During 2019, our liquidity position was positively affected primarily due to distributions from Tinnuum Group and Tinnuum Services, royalty payments from Tinnuum Group and borrowing availability under our bank ("Lender") line of credit (the "Line of Credit").

Our principal sources of liquidity currently include:

- cash and cash equivalents on hand;
- distributions from Tinnuum Group and Tinnuum Services;
- royalty payments from Tinnuum Group;
- operations of the PGI segment; and
- the Line of Credit.

Our principal uses of liquidity during the year ended December 31, 2019 included:

- repurchases of shares of common stock;
- payment of dividends;
- payment of debt principal and interest; and
- our business operating expenses, including capital expenditures, federal and state tax payments and cash severance payments.

Our ability to continue to generate sufficient cash flow required to meet ongoing operational needs and obligations, and make potential future dividend payments and share repurchases depends upon several factors, including executing on our contracts and initiatives, receiving royalty payments from Tinnuum Group and distributions from Tinnuum Group and Tinnuum Services, and increasing our share of the market for PGI consumables, including expanding our overall AC business into additional adjacent markets. Increasing distributions from Tinnuum Group will likely be dependent on both preserving existing contractual relationships and securing additional tax equity investors for those Tinnuum Group facilities that are currently not operating.

Due to the Carbon Solutions Acquisition, we spent significantly more in capital expenditures in 2019, which included expenditures for a plant turnaround of our AC manufacturing facility that occurs on average about every 18 - 24 months. We believe that capital expenditures for 2020 may be slightly lower compared to 2019. Carbon Solutions has historically incurred costs for capital expenditures related to the PAC manufacturing facility under normal operations and planned outages and for mine development at the Five Forks Mine.

Tinnuum Group and Tinnuum Services Distributions

The following table summarizes the cash distributions from our equity method investments, which most significantly affected our consolidated cash flow results, for the years ended December 31, 2019 and 2018:

<i>(in thousands)</i>	Year ended December 31,	
	2019	2018
Tinnuum Group	\$ 65,238	\$ 47,175
Tinnuum Services	8,650	5,500
Distributions from equity method investees	<u>\$ 73,888</u>	<u>\$ 52,675</u>

Future cash flows from Tinnuum through 2021 are expected to range from \$150 to \$175 million, and key drivers in achieving these future cash flows are based on the following:

- 20 invested facilities as of December 31, 2019 and inclusive of all net Tinnuum cash flows (distributions and license royalties), offset by estimated federal and state income tax payments and 453A interest payments.

Expected future cash flows from Tinnuum Group are based on the following key assumptions:

- Tinnuum Group continues to not operate retained facilities;
- Tinnuum Group does not have material unexpected capital expenditures or unusual operating expenses;

- Tax equity lease renewals on invested facilities are not terminated or repriced; and
- Coal-fired power generation remains consistent with existing contractual expectations.

During the fourth quarter of 2019, two coal-fired utilities where Tinuum Group had invested RC facilities operating closed. The shuttering of these two facilities has negatively impacted our expectations related to future cash flows if Tinuum is unable to move these two RC facilities to new utilities. As previously noted under this Item, Tinuum Group and its largest customer agreed to certain reductions in overall net lease payments for the period from October 2019 to December 2021, and these reductions will negatively impact future cash flows. All of these factors, combined with the addition of new invested facilities during 2019, are included in the expected cash flows as of December 31, 2019.

Senior Term Loan

On December 7, 2018, we executed the Senior Term Loan with Apollo in the principal amount of \$70.0 million, less original issue discount of \$2.1 million. We also paid debt issuance costs of \$2.0 million related to the Senior Term Loan. The Senior Term Loan has a term of 36 months and bears interest at a rate equal to 3-month LIBOR (subject to a 1.5% floor) + 4.75% per annum, which is adjusted quarterly to the current 3-month LIBOR rate, and interest is payable quarterly in arrears. Quarterly principal payments of \$6.0 million were required beginning in March 2019, and we may prepay the Senior Term Loan at any time without penalty. The Senior Term Loan is secured by substantially all of our assets, including the cash flows from Tinuum Group and Tinuum Services, but excluding our equity interests in those Tinuum entities.

The Senior Term Loan includes, among others, the following covenants: (1) Beginning December 31, 2018 and as of the end of each fiscal quarter thereafter, we must maintain a minimum cash balance of \$5.0 million and shall not permit "expected future net cash flows from the refined coal business" (as defined in the Senior Term Loan) to be less than 1.75 times the outstanding principal amount of the Senior Term Loan; (2) Beginning in January 2019, annual collective dividends and buybacks of shares of our common stock in an aggregate amount, not to exceed \$30.0 million, are permitted so long as (a) no default or event of default exists under the Senior Term Loan and (b) expected future net cash flows from the refined coal business as of the end of the most recent fiscal quarter exceed \$100.0 million. See "Risk Factors-Risks relating to our common stock - There can be no assurance that we will continue to declare cash dividends at all or in any particular amounts."

Stock Repurchases and Dividends

In November 2018, our Board of Directors (the "Board") authorized us to purchase up to \$20.0 million of our outstanding common stock. As of November 2019, \$2.9 million remained outstanding under this program. In November 2019, the Board authorized an incremental \$7.1 million to this stock repurchase program and provided that the program will remain in effect until all amounts are utilized or the program is otherwise modified by the Board. For the year ended December 31, 2019, under these two stock repurchase programs, we purchased 533,345 shares of our common stock for cash of \$5.8 million, inclusive of commissions and fees.

Previously, in December 2017, the Board had authorized us to purchase up to \$20.0 million of our outstanding common stock under a separate repurchase program that was in effect until July 31, 2018. For the year ended December 31, 2018, under this program and the program implemented in November 2018, we purchased 2,350,422 shares of our common stock for cash of \$25.3 million, inclusive of commissions and fees.

During the year ended December 31, 2019, we paid quarterly cash dividends to stockholders of \$18.3 million, which were paid on March 7, 2019, June 7, 2019, September 6, 2019 and December 13, 2019.

Line of Credit

As of December 31, 2019, there were no outstanding borrowings under the Line of Credit.

On September 30, 2018, ADA, as borrower, ADES, as guarantor, and the Lender entered into an amendment (the "Twelfth Amendment") to the Line of Credit. The Twelfth Amendment decreased the Line of Credit to \$5.0 million due to decreased collateral requirements, extended the maturity date of the Line of Credit to September 30, 2020 and permitted the Line of Credit to be used as collateral (in place of restricted cash) for letters of credit ("LC's") up to \$5.0 million related to equipment projects and certain other agreements. Under the Twelfth Amendment, there was no minimum cash balance requirement based on us meeting certain conditions and maintaining minimum trailing twelve-month EBITDA (earnings before interest, taxes, depreciation and amortization), as previously defined in the "Eleventh Amendment" to the Line of Credit, of \$24.0 million.

On December 7, 2018, ADA, as borrower, ADES as guarantor, and the Lender entered into an amendment to the Line of Credit, which provided, among other things, for ADA to be able to enter into the Senior Term Loan as a guarantor so long as the principal amount of the Senior Term Loan does not exceed \$70 million. Additionally, the financial covenants in the Line of Credit were amended and restated to be consistent with the aforementioned Senior Term Loan covenants, including maintaining a minimum cash balance of \$5.0 million.

Sources and Uses of Cash

Cash, cash equivalents and restricted cash decreased from \$23.8 million as of December 31, 2018 to \$17.1 million as of December 31, 2019, a decrease of \$6.7 million. The following table summarizes our cash flows for the years ended December 31, 2019 and 2018, respectively:

(in thousands)	Years Ended December 31,		
	2019	2018	Change
Cash provided by (used in):			
Operating activities	\$ 62,262	\$ (9,889)	\$ 72,151
Investing activities	(13,238)	(16,543)	3,305
Financing activities	(55,716)	19,511	(75,227)
Net change in Cash and Cash Equivalents and Restricted Cash	\$ (6,692)	\$ (6,921)	\$ 229

Cash flows from operating activities

Cash flows provided by operating activities for the year ended December 31, 2019 increased by \$72.2 million compared to the year ended December 31, 2018 and were positively impacted primarily by the following: (1) an increase in Distributions from equity method investees, return on investment of \$68.4 million; (2) an increase in depreciation, amortization, depletion and accretion of \$6.6 million; (3) an increase of \$3.4 million in deferred income tax expense; and (4) a net decrease in working capital of \$6.9 million, primarily due to a decrease in accrued payroll and related liabilities. Offsetting these increases to operating cash flows was primarily an increase in earnings from equity method investments of \$15.0 million.

Cash flows from investing activities

Cash flows used in investing activities for the year ended December 31, 2019 decreased by \$3.3 million compared to the year ended December 31, 2018 primarily from the net cash consideration paid in 2018 of \$62.5 million for the Carbon Solutions Acquisition. Offsetting this net decrease in cash flows used in investing activities were increases in cash flows used in investing activities for acquisition of property, plant, equipment and intangibles of \$7.4 million and mine development costs of \$4.7 million. In addition, cash flows from investing activities were negatively impacted by a decrease in cash distributions from equity method investees, return in excess of cumulative earnings of \$47.2 million, as all distributions received from Tinum Group in 2019 represent a return on investment and are classified under operating activities.

Cash flows from financing activities

Cash flows used in financing activities for the year ended December 31, 2019 were \$55.7 million compared to cash flows provided by financing activities of \$19.5 million for the year ended December 31, 2018. This net increase in cash flows used in financing activities was primarily due to the net borrowings, net of debt issuance costs paid, of \$65.9 million on the Senior Term Loan incurred in 2018 and principal payments made in 2019 on the Senior Term Loan and finance lease obligations of \$30.0 million and \$1.4 million, respectively. Offsetting this net increase in cash flows used in financing activities were decreases in repurchases of common shares of \$19.6 million and dividends paid of \$1.9 million.

Contractual Obligations

Our contractual obligations as of December 31, 2019 are as follows:

<i>(in thousands)</i>	Payment Due by Period				
	Total	Less than 1 year	1-3 years	4-5 years	After 5 years
Senior Term Note (1)	\$ 40,000	\$ 24,000	\$ 16,000	\$ —	\$ —
Finance lease obligations	7,908	1,707	2,753	2,880	568
Operating lease obligations	5,759	2,710	2,690	359	—
Purchase obligations (2)	1,927	1,927	—	—	—
	<u>\$ 55,594</u>	<u>\$ 30,344</u>	<u>\$ 21,443</u>	<u>\$ 3,239</u>	<u>\$ 568</u>

(1) Includes outstanding principal amounts due through the maturity date.

(2) Represents non-cancellable obligations related to construction of and furnishings for our new corporate office and laboratory facilities that we expect to occupy during the first quarter of 2020.

The table above excludes obligations related to 453A interest payments due to uncertainty of amounts payable in future periods relating to matters impacting future obligations such as our portion of Tinum Group's 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, Tinum Group's deferred tax 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.

The table above also excludes our asset retirement obligation related to reclamation of the Five Forks Mine. As of December 31, 2019, our consolidated balance sheet reflects a liability of \$2.7 million for mine reclamation. Asset retirement obligations are recorded at fair value when incurred and accretion expense is recognized through the expected date of settlement. Determining the fair value of our asset retirement obligation involves a number of estimates, as discussed in the section entitled "Critical Accounting Policies" below, including the timing of payments to satisfy the obligation. The timing of payments to satisfy asset retirement obligations is based on numerous factors, including the Five Forks Mine closure date.

We had no outstanding letters of credit as of December 31, 2019.

Off-Balance Sheet Arrangements

During 2019 and 2018, we did not engage in any off-balance sheet financing.

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 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.

Business Combinations

We allocate the purchase price of acquired companies to the tangible and intangible assets acquired and liabilities assumed based on their estimated fair values at the Acquisition Date. The purchase price allocation process requires us to make significant estimates and assumptions with respect to property, plant and equipment, intangible assets and certain obligations. Although we believe the assumptions and estimates we have made are reasonable, they are based in part on historical experience, market conditions and information obtained from management of the acquired companies and are inherently uncertain. Examples of critical estimates in valuing certain of the intangible assets we have acquired or may acquire in the future include but are not limited to:

- future expected cash flows from revenues;

- historical and expected customer attrition rates and anticipated growth in revenues from acquired customers;
- the acquired company's developed technology as well as assumptions about the period of time the acquired developed technology will continue to be used in the combined company's product portfolio;
- the expected use and useful lives of the acquired assets; and
- valuation methods and discount rates used in estimating the values of the assets acquired and liabilities assumed.

Carrying value of long-lived assets and intangibles;

We review and evaluate our long-lived assets and intangibles for impairment at least annually, or more frequently when events or changes in circumstances indicate that the related carrying amounts may not be recoverable. An impairment loss is measured and recorded based on the estimated fair value of the long-lived assets or intangibles being tested for impairment and their carrying amounts. Fair value is typically determined through the use of an income approach utilizing estimates of discounted pre-tax future cash flows or a market approach utilizing recent transaction activity for comparable properties.

Asset Retirement Obligation

Reclamation costs are related to the Five Forks Mine and are allocated to expense over the life of the related mine assets, and are periodically adjusted to reflect changes in the estimated present value resulting from the passage of time and revisions to the estimates of either the timing or amount of the reclamation costs. Reclamation obligations are based on when the spending for an existing environmental disturbance will occur. We review, on at least an annual basis, the reclamation obligation for the Five Forks Mine.

Remediation costs for the Five Forks Mine are accrued based on management's best estimate at the end of each period of the costs expected to be incurred. Such cost estimates may include ongoing care, maintenance and monitoring costs.

Accounting for reclamation and remediation obligations requires management to make estimates unique to the mining operation of the future costs we will incur to complete the reclamation and remediation work required to comply with existing laws and regulations. Any such changes in future costs, the timing of reclamation activities, scope, or the exclusion of certain costs not considered reclamation and remediation costs, could materially impact the amounts charged to earnings for reclamation and remediation. Additionally, future changes to environmental laws and regulations could increase the extent of reclamation and remediation work required.

Income Taxes

We account for income taxes as required by 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.

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, 2019 and 2018, 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, we adjust the valuation allowance through the provision for income taxes in the period in which this determination is made. Refer to Note 14 of our Consolidated Financial Statements included in Item 8 of this Report for additional information regarding our net deferred tax assets and related deferred 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

The information under this Item is not required to be provided by smaller reporting companies.

Item 8. Financial Statements and Supplementary Data

Advanced Emissions Solutions, Inc.

Index to Financial Statements

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 sheets of Advanced Emissions Solutions, Inc. and subsidiaries (the “Company”) as of December 31, 2019 and 2018, the related consolidated statements of operations, stockholders’ equity and cash flows for the years 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, 2019 and 2018, and the consolidated results of its operations and its cash flows for the years 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, 2019, 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 16, 2020 expressed an unqualified opinion on the Company’s internal control over financial reporting.

Change in Accounting Principle

As discussed in Note 1 to the consolidated financial statements, in 2019 the Company changed its method of accounting for leases due to the adoption of Accounting Standards Codification (ASC) 842.

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 audits. 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 audits 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 audits 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 audits 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 audits provide a reasonable basis for our opinion.

/s/ Moss Adams LLP

Denver, Colorado
March 16, 2020

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

Advanced Emissions Solutions, Inc. and Subsidiaries
Consolidated Balance Sheets

<i>(in thousands, except share data)</i>	As of December 31,	
	2019	2018
ASSETS		
Current assets:		
Cash, cash equivalents and restricted cash	\$ 12,080	\$ 18,577
Receivables, net	7,430	9,554
Receivables, related party	4,246	4,284
Inventories, net	15,460	21,791
Prepaid expenses and other assets	7,832	5,570
Total current assets	47,048	59,776
Restricted cash, long-term	5,000	5,195
Property, plant and equipment, net of accumulated depreciation of \$7,444 and \$1,499, respectively	44,001	42,697
Intangible assets, net	4,169	4,830
Equity method investments	39,155	6,634
Deferred tax assets, net	14,095	32,539
Other long-term assets, net	20,331	7,993
Total Assets	\$ 173,799	\$ 159,664
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Accounts payable	\$ 8,046	\$ 6,235
Accrued payroll and related liabilities	3,024	8,279
Current portion of long-term debt	23,932	24,067
Other current liabilities	4,311	2,138
Total current liabilities	39,313	40,719
Long-term debt, net of current portion	20,434	50,058
Other long-term liabilities	5,760	940
Total Liabilities	65,507	91,717
Commitments and contingencies (Notes 6 and 9)		
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, 22,960,157 and 22,640,677 shares issued and 18,362,624 and 18,576,489 shares outstanding at December 31, 2019 and 2018, respectively	23	23
Treasury stock, at cost: 4,597,533 and 4,064,188 shares as of December 31, 2019 and 2018, respectively	(47,533)	(41,740)
Additional paid-in capital	98,466	96,750
Retained earnings	57,336	12,914
Total stockholders' equity	108,292	67,947
Total Liabilities and Stockholders' equity	\$ 173,799	\$ 159,664

See Notes to the Consolidated Financial Statements.

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

Years Ended December 31,

(in thousands, except per share data)

	2019	2018
Revenues:		
Consumables	\$ 53,187	\$ 8,733
License royalties, related party	16,899	15,140
Other	—	72
Total revenues	70,086	23,945
Operating expenses:		
Consumables cost of revenue, exclusive of depreciation and amortization	49,443	6,606
Other cost of revenue, exclusive of depreciation and amortization	—	(353)
Payroll and benefits	10,094	10,639
Legal and professional fees	9,948	8,552
General and administrative	8,123	4,178
Depreciation, amortization, depletion and accretion	7,371	723
Total operating expenses	84,979	30,345
Operating loss	(14,893)	(6,400)
Other income (expense):		
Earnings from equity method investments	69,176	54,208
Interest expense	(7,174)	(2,151)
Other	427	220
Total other income	62,429	52,277
Income before income tax expense	47,536	45,877
Income tax expense	11,999	10,423
Net income	\$ 35,537	\$ 35,454
Earnings per common share (Note 1):		
Basic	\$ 1.96	\$ 1.78
Diluted	\$ 1.93	\$ 1.76
Weighted-average number of common shares outstanding:		
Basic	18,154	19,901
Diluted	18,372	20,033

See Notes to the Consolidated Financial Statements.

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

<i>(in thousands, except share data)</i>	Common Stock		Treasury Stock		Additional Paid-in Capital	Retained Earnings/ (Accumulated Deficit)	Total Stockholders' Equity
	Shares	Amount	Shares	Amount			
Balances, January 1, 2018	22,465,821	\$ 22	(1,713,766)	\$ (16,397)	\$ 105,308	\$ (15,478)	\$ 73,455
Cumulative effect of change in accounting principle (Note 8)	—	—	—	—	—	2,950	2,950
Stock-based compensation	217,174	1	—	—	2,489	—	2,490
Issuance of stock upon exercise of options, net	18,667	—	—	—	—	—	—
Repurchase of common shares to satisfy tax withholdings	(60,985)	—	—	—	(769)	—	(769)
Cash dividends declared on common stock	—	—	—	—	(10,278)	(10,012)	(20,290)
Repurchase of common shares	—	—	(2,350,422)	(25,343)	—	—	(25,343)
Net income	—	—	—	—	—	35,454	35,454
Balances, December 31, 2018	22,640,677	\$ 23	(4,064,188)	\$ (41,740)	\$ 96,750	\$ 12,914	\$ 67,947
Cumulative effect of change in accounting principle (Note 5)	—	—	—	—	—	27,442	27,442
Stock-based compensation	298,573	—	—	—	2,011	—	2,011
Issuance of stock upon exercise of options, net	50,268	—	—	—	156	—	156
Repurchase of common shares to satisfy tax withholdings	(29,361)	—	—	—	(451)	—	(451)
Cash dividends declared on common stock	—	—	—	—	—	(18,557)	(18,557)
Repurchase of common shares	—	—	(533,345)	(5,793)	—	—	(5,793)
Net income	—	—	—	—	—	35,537	35,537
Balances, December 31, 2019	22,960,157	\$ 23	(4,597,533)	\$ (47,533)	\$ 98,466	\$ 57,336	\$ 108,292

See Notes to the Consolidated Financial Statements.

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

<i>(in thousands)</i>	Years Ended December 31,	
	2019	2018
Cash flows from operating activities		
Net income	\$ 35,537	\$ 35,454
Adjustments to reconcile net income to net cash used in operating activities:		
Deferred income tax expense	8,655	5,233
Depreciation, amortization, depletion and accretion	7,371	723
Amortization of debt discount and debt issuance costs	1,678	94
Operating lease expense	3,192	—
Stock-based compensation expense, net	2,011	2,490
Earnings from equity method investments	(69,176)	(54,208)
Other non-cash items, net	638	289
Changes in operating assets and liabilities, net of effects of acquired businesses:		
Receivables, net	2,124	(1,847)
Related party receivables	37	(1,037)
Prepaid expenses and other assets	(2,200)	(757)
Costs incurred on uncompleted contracts	—	15,945
Inventories, net	5,505	237
Other long-term assets, net	(262)	(753)
Accounts payable	2,218	(197)
Accrued payroll and related liabilities	(5,255)	(59)
Other current liabilities	(261)	(869)
Billings on uncompleted contracts	—	(15,945)
Operating lease liabilities	(3,180)	—
Other long-term liabilities	(258)	(182)
Distributions from equity method investees, return on investment	73,888	5,500
Net cash provided by (used in) operating activities	62,262	(9,889)

<i>(in thousands)</i>	Years Ended December 31,	
	2019	2018
Cash flows from investing activities		
Distributions from equity method investees in excess of cumulative earnings	\$ —	\$ 47,175
Acquisition of business, net of cash acquired	(661)	(62,501)
Acquisition of property, plant, equipment, and intangible assets, net	(7,851)	(467)
Mine development costs	(4,726)	—
Contributions to equity method investee	—	(750)
Net cash used in investing activities	<u>(13,238)</u>	<u>(16,543)</u>
Cash flows from financing activities		
Principal payments on term loan	(30,000)	—
Principal payments on finance lease obligations	(1,354)	—
Borrowings, net of debt discount - related party	—	67,900
Debt issuance costs paid	—	(2,036)
Dividends paid	(18,274)	(20,165)
Repurchase of common shares	(5,793)	(25,343)
Repurchase of shares to satisfy tax withholdings	(451)	(769)
Other	156	(76)
Net cash (used in) provided by financing activities	<u>(55,716)</u>	<u>19,511</u>
Decrease in Cash, Cash Equivalents and Restricted Cash	<u>(6,692)</u>	<u>(6,921)</u>
Cash, Cash Equivalents and Restricted Cash, beginning of year	23,772	30,693
Cash, Cash Equivalents and Restricted Cash, end of year	<u>\$ 17,080</u>	<u>\$ 23,772</u>
Supplemental disclosure of cash flow information:		
Cash paid for interest	\$ 5,650	\$ 1,400
Cash paid for income taxes, net of refunds received	\$ 4,308	\$ 7,460
Supplemental disclosure of non-cash investing and financing activities:		
Acquisition consideration payable	\$ —	\$ 661
Dividends payable	\$ 284	\$ 125

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 and operations located in Louisiana. The Company is principally engaged in consumable mercury control options including powdered activated carbon ("PAC") and chemical technologies. The Company's proprietary environmental technologies in the power generation and industrial ("PGI") market 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 emission control 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 earns royalties for 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 15 for additional information regarding the Company's operating segments.

On December 7, 2018 (the "Acquisition Date"), the Company acquired (the "Carbon Solutions Acquisition") 100% of the equity interests of ADA Carbon Solutions, LLC ("Carbon Solutions"). Carbon Solutions is a manufacturer and seller of activated carbon ("AC") and the North American leader in mercury capture using PAC for the coal-fired power plant, industrial and water treatment markets. Carbon Solutions also owns an associated lignite mine (the "Five Forks Mine") that supplies the raw material for the activated carbon plant. Carbon Solutions was formed in 2008 as a 50/50 joint venture by the Company and Energy Capital Partners LLC. The Company relinquished its ownership in 2011 as part of a legal settlement agreement as described in the Company's Annual Report on Form 10-K for the fiscal year ended December 31, 2017. The Company acquired Carbon Solutions primarily to expand the Company's product offerings in the mercury control industry and other complementary AC markets.

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 Sheet. As of December 31, 2019, the Company holds equity interests of 42.5% and 50.0% in Tinum Group and Tinum Services, LLC ("Tinum Services"), respectively. 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, cash equivalents and restricted cash

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

Restricted cash primarily consists of minimum cash balance requirements under the Term Loan and Security Agreement (the "Senior Term Loan") and is classified according to the period at which it will no longer be restricted.

Receivables, net

Receivables, net are recorded at net realizable value. This carrying value includes an appropriate allowance for estimated uncollectible amounts to reflect any loss anticipated on the receivables balances. Increases and decreases in the allowance for doubtful accounts are established based upon changes in the credit quality of receivables and are included as a component of the General and administrative line item in the Consolidated Statements of Operations. The allowance for doubtful accounts is based on historical experience, general economic conditions and the credit quality of specific accounts.

Inventories

Inventories are stated at the lower of average cost or net realizable value and consist principally of raw materials and finished goods related to the Company's PAC and chemical product offerings. The cost of inventory is determined using the average cost method.

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

Inventories are periodically reviewed for both potential obsolescence and potential declines in anticipated selling prices. In this review, the Company makes assumptions about the future demand for and market value of the inventory, and based on these assumptions estimates the amount of any obsolete, unmarketable, slow moving or overvalued inventory. The Company will write down the value of inventories by an amount equal to the difference between the cost of the inventory and its estimated net realizable value.

Additional details regarding Inventory balances are included in Note 3.

Intangible Assets

Intangible assets consist of patents, licensed technology, customer relationships, developed technologies and trade names.

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 remaining intangible assets were recorded at fair value in connection with the Carbon Solutions Acquisition.

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

<i>(in thousands, except years)</i>	Weighted average amortization (in years)	As of December 31,			
		2019		2018	
		Initial Cost	Net of Accumulated Amortization	Initial Cost	Net of Accumulated Amortization
Customer relationships	5	\$ 2,200	\$ 1,731	\$ 2,100	\$ 2,071
Patents	16	1,489	1,039	1,244	891
Developed technology	5	1,600	1,259	1,600	1,578
Trade name	2	300	140	300	290
Total		\$ 5,589	\$ 4,169	\$ 5,244	\$ 4,830

Included in the Consolidated Statements of Operations is amortization expense related to intangible assets of \$1.0 million and \$0.2 million for the years ended December 31, 2019 and 2018, respectively. The estimated future amortization expense for existing intangible assets as of December 31, 2019 is expected to be \$0.8 million for each of the five succeeding fiscal years.

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 in 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 Sheet.

When the Company receives distributions in excess of the carrying value of the investment and has not guaranteed any obligations of the investee and/or is not 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, 2019 and 2018, 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 and/or is not 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 on

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

the percentage ownership of the Company's equity interest and the net income or loss attributable to equity owners as shown on the 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" in 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" in Investing cash flows. See Note 5 for additional information regarding the Company's equity method investments.

Investments in partially-owned subsidiaries for which the Company has less-than-20% ownership are accounted for in accordance with accounting principles generally accepted in the United States ("U.S. GAAP") applicable to equity investments that do not qualify for the equity method of accounting. The Company evaluates these types of investments for changes in fair value and, if there is change, recognizes the change in the Consolidated Statement of Operations. If no such events or changes in circumstances have occurred related to these types of investments, the fair value is estimated only if practicable to do so.

Property, Plant and Equipment

Property, plant 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 1 to 31 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 property, plant and equipment to determine if facts and circumstances indicate that their carrying value may be impaired and if any adjustment is warranted. Amortization of finance leased assets is included in depreciation expense and is calculated using the straight-line method over the term of the lease.

Other Assets

Mine Development Costs

Mine development costs, which are related to the Five Forks Mine, are stated at cost less accumulated depletion and include acquisition costs, the cost of other development work and mitigation costs. Costs are amortized over the estimated life of the related mine reserves, which is 21 years. The Company performs an evaluation of the recoverability of the carrying value of mine development costs to determine if facts and circumstances indicate that their carrying value may be impaired and if any adjustment is warranted. Mine development costs are reported in the "Other long-term assets, net" line item on the Consolidated Balance Sheet.

Spare Parts

Spare parts include critical spares required to support plant operations. Parts and supply costs are determined using the lower of cost or estimated replacement cost. Parts are recorded as maintenance expenses in the period in which they are consumed. Spare parts are reported in the "Other long-term assets, net" line item on the Consolidated Balance Sheet.

Revenue Recognition

On January 1, 2018, the Company adopted ASC 606 - *Revenue from Contracts with Customers* ("ASC 606") using the modified retrospective method applied to those contracts that were not completed as of January 1, 2018. The Company recognized the cumulative effect of initially applying ASC 606 to the opening balance of the Accumulated deficit. See further discussion of the impact of the adoption of ASC 606 in Note 8.

Effective with the Acquisition Date, Carbon Solutions adopted ASC 606 using the modified retrospective method applied to those contracts that were not completed as of December 7, 2018. There was no impact to the consolidated financial statements of the Company upon Carbon Solutions' adoption of ASC 606, except for a reclassification from revenues to cost of revenue for Carbon Solutions for freight costs billed to its customers in conjunction with product sales, which historically were recorded as revenues. This reclassification of freight costs billed to customers to cost of revenue results in an offset to Carbon Solutions' actual freight costs recorded in cost of revenue and has no impact to Carbon Solutions' operating results. This presentation is consistent with ADES' policy of reporting freight costs, net of freight costs billed to customers, under cost of revenue. ADES adopted this policy effective with its adoption of ASC 606 on January 1, 2018.

The Company recognizes revenue from a contract with a customer when a performance obligation under the terms of a contract with a customer is satisfied, which is when the customer controls the promised goods or services that are transferred in satisfaction of the performance obligation. Revenue is measured as the amount of consideration that is expected to be received

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in exchange for transferring goods or providing services, and the transaction price is generally fixed and generally does not contain variable or noncash consideration. In addition, the Company's contracts with customers generally do not contain customer refund or return provisions or other similar obligations. Transfer of control and satisfaction of performance obligations are further discussed in each of the revenue components listed below.

The Company uses estimates and judgments in determining the nature and timing of satisfaction of performance obligations, the standalone selling price ("SSP") of performance obligations and the allocation of the transaction price to multiple performance obligations.

The Company's principal revenue components are Consumables sales and License royalties.

Consumables

Consumables are comprised of the sale of AC and chemicals for mercury capture for the coal-fired power plant, industrial and water treatment markets. Customer contracts for consumables are short duration and performance obligations generally do not extend beyond one year. Certain customer contracts for consumables are comprised of evaluation tests of the Company's consumables' effectiveness and efficiency in reducing emissions. These contracts entail the delivery of consumables to the customer and the Company's evaluation of results of emissions reduction over the term of the contract. Under these types of arrangements, which are generally for durations that are short term, the Company has determined that the customer is simultaneously receiving benefits of emissions reduction from the consumption of the consumables over the testing period and this represents a single performance obligation that is satisfied over time. This determination may require significant judgment. The Company recognizes revenue over time using an input model that is generally based on the cost of consumables used by the customer during the testing period. The use of an input model and the use of total costs as the measure of progress in the satisfaction of the performance obligations may require significant judgment. In addition, under these types of contracts, the Company has determined that the services performed and related costs incurred by the Company during the testing period represent costs to fulfill a contract.

License royalties, related party

The Company generates revenues from royalties ("M-45 Royalties") earned under a licensing arrangement ("M-45 License") of its M-45TM and M-45-PCTM emissions control technologies ("M-45 Technology") between the Company and Tinum Group. The Company recognizes M-45 Royalties at a point in time based on the use of the M-45 Technology at certain RC facilities or through Tinum Group's use of licensed technology for rates in excess of amounts allowed for RC application. The amount of M-45 Royalties recognized is generally based on a percentage of pre-tax margins (as defined in the M-45 License) of the RC facilities using the M-45 Technology.

Practical Expedients and Exemptions

The Company does not disclose the value of unsatisfied performance obligations for contracts with an original expected length of one year or less.

Sales and other taxes that are collected concurrently with revenue-producing activities are excluded from revenue.

The Company has elected to account for freight costs as activities to fulfill the promise to transfer the goods, and therefore these activities are also not assessed as a separate service to customers.

The Company accounts for all shipping and handling activities that occur after control of the related good transfers as fulfillment activities. These activities are included in Cost of Revenue line items of the Consolidated Statement of Operations.

The Company generally expenses sales commissions when incurred because the amortization period of the asset that the Company would have recognized is one year or less. These costs are recorded in sales and marketing expenses in the General and administrative line item of the Consolidated Statement of Operations.

Cost of Revenue

Cost of revenue includes all labor, fringe benefits, subcontract labor, additive 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.

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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.

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, rent, insurance and occupancy-related expenses, bad debt expense, impairments and other general costs of conducting business.

Research and development costs are charged to expense in the period incurred and are reported in the General and administrative line item in the Consolidated Statements of Operations.

Asset Retirement Obligations

Reclamation obligations, which are related to the Five Forks Mine, are recognized when incurred and recorded as liabilities at fair value. The liability is accreted over time through periodic charges to earnings. In addition, a corresponding asset retirement cost is capitalized as part of the asset's carrying value and amortized over the life of the related asset. Reclamation costs are periodically adjusted to reflect changes in the estimated present value resulting from the passage of time and revisions to the estimates of either the timing or amount of the reclamation costs. The estimated reclamation obligation is based on when spending for an existing disturbance is expected to occur. The Company reviews, on an annual basis, unless otherwise deemed necessary, the reclamation obligation for the Five Forks Mine.

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 Tinnium Group's equity method earnings for Refined Coal ("RC") facilities, in which the related lease income or sale are treated as installment sales for federal income 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. Stock-based compensation expense related to manufacturing employees and administrative employees is included in the Consumables, Cost of revenues and Payroll and benefits line items, respectively, in the Consolidated Statements of Operations. Stock-based compensation expense related to non-employee directors and consultants is included in the General and administrative line item in the Consolidated Statements of Operations.

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Dividends

When a sufficient amount of available earnings exists at the time of declaration, dividends are charged as a reduction to Retained earnings in the Consolidated Balance Sheet when declared. If sufficient Retained earnings is not available, dividends declared are charged as a reduction to Additional paid-in capital in the Consolidated Balance Sheet.

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 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.

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 11 for additional information related to PSU's.

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

<i>(in thousands, except per share amounts)</i>	Years Ended December 31,	
	2019	2018
Net income	\$ 35,537	\$ 35,454
Less: Dividends and undistributed income allocated to participating securities	44	112
Income attributable to common stockholders	\$ 35,493	\$ 35,342
Basic weighted-average number of common shares outstanding	18,154	19,901
Add: dilutive effect of equity instruments	218	132
Diluted weighted-average shares outstanding	18,372	20,033
Earnings per share - basic	\$ 1.96	\$ 1.78
Earnings per share - diluted	\$ 1.93	\$ 1.76

For the years ended December 31, 2019 and 2018, options to purchase 0.3 million and 0.3 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.

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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:

- business combinations;
- the carrying value of its long-lived assets;
- the carrying value of its intangible assets;
- asset retirement obligation; 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 Tinum Group. As of December 31, 2019, Tinum Group has 20 invested RC facilities of which 8 are leased to a single customer. A majority of these leases are periodically renewed and the loss of this customer by Tinum 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. Such reclassifications had no effect on the Company's results of operations or financial position in any of the periods presented.

New Accounting Guidance

Recently Adopted

In February 2016, the FASB issued ASU 2016-02, *Leases* (Topic 842) ("ASU 2016-02"), which created ASC Topic 842 - *Leases* ("ASC 842"), requiring 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. ASC 842 retains the distinction between finance leases (formerly defined as capital leases) and operating leases. On January 1, 2019, the Company adopted ASC 842 retrospectively beginning with the date of adoption. Under this adoption method, the application date is the beginning of the reporting period in which the Company first applies the provisions of ASC 842. Accordingly, the Company's reporting for the comparative periods presented in the financial statements and related disclosures continues in accordance with legacy U.S. GAAP under ASC Topic 840 - *Leases* ("ASC 840"). The adoption of ASC 842 had no impact to the opening balance of Retained earnings.

As of the adoption date, the Company recorded \$7.0 million and \$7.0 million of "right of use" ("ROU") assets and incremental lease liabilities, respectively. The cumulative effect of the change from the adoption of ASC 842 to the Consolidated Balance Sheet as of January 1, 2019 is shown in the table that follows:

<i>(in thousands)</i>	Balance as of December 31, 2018	Impact of Adoption	Balance as of January 1, 2019
Balance Sheet			
Other long-term assets	\$ 7,993	\$ 6,956	\$ 14,949
Other liabilities	\$ 50,058	\$ 3,085	\$ 53,143
Other long-term liabilities	\$ 940	\$ 3,871	\$ 4,811

See Note 7 for additional disclosures required under ASC 842 in the year of adoption.

As of January 1, 2019, Tinum Group adopted ASC 606 and ASC 842. As a result of Tinum Group's adoption of these pronouncements, the Company recorded a cumulative effect increase of \$27.4 million to Retained earnings as of January 1, 2019, based on the Company's ownership percentage of Tinum Group's cumulative effect adjustment, and increased its investment balance in Tinum Group in the amount of \$37.2 million and established a deferred tax liability of \$9.8 million. As

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a result of the increase in the investment balance in Tinuum Group, for the year ended December 31, 2019, the Company recognized equity earnings in Tinuum Group based on its pro-rata share of Tinuum Group's net income rather than based on cash distributions received as had been required in prior periods as a result of the cumulative cash distributions exceeding the cumulative pro-rata share of Tinuum Group's net income.

Not yet Adopted

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 "smaller reporting companies" (as defined by the Securities and Exchange Commission) for fiscal years beginning after December 15, 2022, 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 provisions of this guidance and assessing its impact on the Company's financial statements and disclosures and does not believe this standard will have a material impact on the Company's financial statements and disclosures.

In August 2018, the FASB issued ASU 2018-13, *Fair Value Measurement (Topic 820) Disclosure Framework - Changes to the Disclosure Requirements for Fair Value Measurement* ("ASU 2018-13"). The amendments in ASU 2018-13 improve the effectiveness of fair value measurement disclosures and modify the disclosure requirements on fair value measurements in Topic 820, Fair Value Measurement ("Topic 820"), based on the concepts in FASB Concepts Statement, Conceptual Framework for Financial Reporting - Chapter 8: Notes to Financial Statements, including the consideration of costs and benefits. ASU 2018-13 is effective for fiscal years, and interim periods within those fiscal years, beginning after December 15, 2019. The amendments on changes in unrealized gains and losses, the range and weighted average of significant unobservable inputs used to develop Level 3 fair value measurements, and the narrative description of measurement uncertainty should be applied prospectively for only the most recent interim or annual period presented in the initial fiscal year of adoption. All other amendments should be applied retrospectively to all periods presented upon their effective date. Early adoption is permitted upon issuance of this Update. An entity is permitted to early adopt any removed or modified disclosures upon issuance of this Update and delay adoption of the additional disclosures until their effective date. The Company has completed its evaluation of ASU 2018-13 and does not believe this standard will have a material impact on the Company's financial statement disclosures.

In December 2019, the FASB issued ASU 2019-12, *Income Taxes (Topic 740) Simplifying the Accounting for Income Taxes* ("ASU 2019-12"). The amendments in ASU 2019-12 simplify various aspects related to accounting for income taxes by removing certain exceptions contained in Topic 740 and also clarifies and amends existing guidance in Topic 740 to improve consistent application. ASU 2019-12 is effective for public business entities beginning after December 15, 2020, including interim periods within those years, and early adoption is permitted. The Company is currently evaluating the provisions of this guidance and assessing its impact on the Company's financial statements and disclosures and does not believe this standard will have a material impact on the Company's financial statements and disclosures.

Note 2 - Acquisition

As described in Note 1, on the Acquisition Date, the Company completed the Carbon Solutions Acquisition for a total purchase price of \$75.0 million (the "Purchase Price"). The results of Carbon Solutions have been included in the Company's consolidated financial statements since the Acquisition Date. The fair value of the purchase consideration totaled \$66.5 million and consisted of cash of \$65.8 million and an additional purchase adjustment amount payable to Carbon Solutions' secured lender of \$0.7 million, which was paid in March 2019. The Purchase Price was adjusted by assumed debt and contractual commitments of \$11.8 million, and less cash acquired of \$3.3 million. The Company also paid \$4.5 million in acquisition-related costs (or transaction costs) during the year ended December 31, 2018. The Company funded the cash consideration from cash on hand and the proceeds from the Senior Term Loan in the principal amount of \$70.0 million, as more fully described in Note 6.

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The following table summarizes the final Purchase Price allocation. Subsequent to December 31, 2018, the Company completed additional analysis and adjustments were made to the preliminary Purchase Price allocations as noted in the table below:

Fair value of assets acquired:	As Originally Reported	Adjustments	As Adjusted
Cash	\$ 3,284	\$ —	\$ 3,284
Receivables	6,409	—	6,409
Inventories	22,100	(356)	21,744
Prepaid expenses and other current assets	2,992	61	3,053
Spare parts	3,359	—	3,359
Property, plant and equipment	43,033	(377)	42,656
Mine leases and development	2,500	200	2,700
Mine reclamation asset	—	2,402	2,402
Intangible assets	4,000	100	4,100
Other assets	168	—	168
Amount attributable to assets acquired	87,845	2,030	89,875
Fair value of liabilities assumed:			
Accounts payable	4,771	—	4,771
Accrued liabilities	7,354	254	7,608
Equipment lease liabilities	8,211	—	8,211
Mine reclamation liability	626	1,776	2,402
Other liabilities	437	—	437
Amount attributable to liabilities assumed	21,399	2,030	23,429
Net assets acquired	\$ 66,446	\$ —	\$ 66,446

Adjustments to the preliminary Purchase Price allocation primarily relate to changes in fair values assigned to property, plant and equipment, intangible assets, mine reclamation liability and the related mine reclamation asset as a result of the final valuation report from the Company's third-party valuation firm issued in May 2019. During the year ended December 31, 2019 based on new information of facts and circumstances that existed as of the Acquisition Date, the Company revised its estimates used as of the Acquisition Date related to the net realizable value of certain finished goods inventory items as well as values assigned to certain prepaid and accrued expense items.

The adjustments were recorded as of June 30, 2019 and were included in the Consolidated Balance Sheet as of that date and the resultant impact to the Statement of Operations was reflected for the year ended December 31, 2019.

The following table represents the intangible assets identified as part of the Carbon Solutions Acquisition:

<i>(in thousands)</i>	Amount	Weighted Average Useful Life (years)
Customer relationships	\$ 2,200	5
Developed technology	1,600	5
Trade name	300	2
Total intangibles acquired	\$ 4,100	

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The amounts of revenues and income before income taxes for the period from the Acquisition Date to December 31, 2018 for Carbon Solutions are as follows:

<i>(in thousands)</i>	Year ended December 31, 2018
Revenues	\$ 5,580
Net loss	\$ (391)

Unaudited Pro Forma Financial Information

The following represents the pro forma effects of the Carbon Solutions Acquisition as if it had occurred on January 1, 2017. The pro forma pre-tax income for 2018 has been calculated after applying the Company's accounting policies in effect for that year. In addition, pro forma net income includes: (1) the impact on Carbon Solutions of the adoption of ASC 606 effective January 1, 2018, which resulted in a reclassification of \$5.9 million from Revenues to Cost of Revenue for freight costs billed to customers and had no impact to income from operations; (2) the reduction in depletion, depreciation and amortization resulting from the purchase price adjustments to Property, plant and equipment and Mine development costs; (3) the adjustment to interest expense from the combination of the Senior Term Loan that was used to fund the Carbon Solutions Acquisition and the elimination of certain debt of Carbon Solutions as a result of pay-offs by the Company as of the Acquisition Date; and (4) the removal of \$9.7 million in transaction costs incurred in 2018, together with the income tax effect on (1) through (4). The pro forma results do not include any anticipated synergies or other expected benefits of the Carbon Solutions Acquisition. The unaudited pro forma financial information below is not necessarily indicative of either future results of operations or results that might have been achieved had the Carbon Solutions Acquisition been consummated as of January 1, 2017.

<i>(in thousands)</i>	Year ended December 31, 2018
Revenues	\$ 78,591
Net income	\$ 31,562

Note 3 - Inventories, net

The following table summarizes the Company's inventories recorded at the lower of average cost or net realizable value as of December 31, 2019 and 2018:

<i>(in thousands)</i>	As of December 31,	
	2019	2018
Product inventory ⁽¹⁾	\$ 13,515	\$ 19,403
Raw material inventory	1,945	2,388
	<u>\$ 15,460</u>	<u>\$ 21,791</u>

(1) As of December 31, 2019 and 2018, Product inventory includes zero and \$5.0 million, respectively, attributed to the increase in fair value of inventory acquired from the Carbon Solutions Acquisition.

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Note 4 - Property, Plant and Equipment

The carrying basis and accumulated depreciation of property, plant and equipment at December 31, 2019 and 2018 are:

<i>(in thousands)</i>	Life in Years	As of December 31,	
		2019	2018
Land and land improvements	0-31	\$ 1,764	\$ 2,302
Plant and operating equipment	1-31	44,015	32,999
Furniture and fixtures	1-7	1,201	701
Machinery and equipment	1-7	1,235	1,277
Leasehold improvements	1-3	245	249
Construction in progress		2,985	6,668
		51,445	44,196
Less accumulated depreciation		(7,444)	(1,499)
Total property, plant and equipment, net		\$ 44,001	\$ 42,697

Included in plant and operating equipment as of December 31, 2019 and 2018 is mining equipment financed under various lease facilities, and obligations due under these facilities are included in finance lease obligations and capital lease obligations, respectively, in the Consolidated Balance Sheet. The total amount recorded for right of use ("ROU") assets as of December 31, 2019 related to finance lease obligations was \$5.9 million, net of accumulated depreciation of \$2.3 million. The total amount recorded for assets under capital lease obligations as of December 31, 2018 was \$8.1 million, net of accumulated depreciation of \$0.1 million.

Depreciation expense for the years ended December 31, 2019 and 2018 was \$6.0 million and \$0.5 million, respectively.

Note 5 - Equity Method Investments

Tinum Group, LLC

As of December 31, 2019 and 2018, 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 that do not have voting rights but 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. 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.

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

<i>(in thousands)</i>	As of December 31,	
	2019	2018
Current assets	\$ 128,473	\$ 54,958
Non-current assets	\$ 125,820	\$ 92,991
Current liabilities	\$ 59,392	\$ 50,908
Non-current liabilities	\$ 13,340	\$ 14,446
Members equity attributable to Class A members	\$ 117,006	\$ 49,102
Members equity attributable to Class B members	\$ 28,967	\$ 16,983
Noncontrolling interests	\$ 35,588	\$ 16,510

<i>(in thousands)</i>	Years Ended December 31,	
	2019	2018
Gross profit	\$ 104,976	\$ 107,135
Operating, selling, general and administrative expenses	37,641	23,662
Income from operations	67,335	83,473
Other expenses	(95)	(5,674)
Class B preferred return	—	(12)
Loss attributable to noncontrolling interest	78,544	58,013
Net income available to Class A and B members	\$ 145,784	\$ 135,800
ADES equity earnings from Tinum Group	\$ 60,286	\$ 47,175

As shown above, the Company reported earnings from its equity investment in Tinum Group of \$60.3 million and \$47.2 million for the years ended December 31, 2019 and 2018, respectively.

The carrying value of the Company's investment in Tinum Group shall be zero as long as the cumulative amount of distributions received from Tinum Group exceeds the Company's cumulative pro-rata share of Tinum Group's net income available to Class A members. For periods during which the ending balance of the Company's investment in Tinum Group is zero, the Company only recognizes equity earnings from Tinum Group to the extent that cash distributions are received from Tinum 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 Tinum Group exceeds cumulative cash distributions received), the Company recognizes its pro-rata share of Tinum 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 shown in the table below, the Company's carrying value in Tinum Group for the years ended December 31, 2019 and 2018 were \$32.3 million and zero, respectively.

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 Tinum Group's statement of operations. Additionally, for periods during which the carrying value of the Company's investment in Tinum Group is greater than zero, distributions from Tinum Group are reported on the Consolidated Statements of Cash Flows as "Distributions from equity method investees, return on investment" in Operating cash flows. For periods during which the carrying value of the Company's investment in Tinum 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" in Investing cash flows.

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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, 2018 and December 31, 2019 (*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	12/31/2017	\$ —	\$ —	\$ —	\$ (12,218)
ADES proportionate share of net income from Tinum Group (1)	2018 activity	57,721	57,721	—	—
Recovery of cash distributions in excess of investment balance (prior to cash distributions)	2018 activity	(12,218)	(12,218)	—	12,218
Cash distributions from Tinum Group	2018 activity	(47,175)	—	47,175	—
Adjustment for current year cash distributions in excess of investment balance	2018 activity	1,672	1,672	—	(1,672)
Total investment balance, equity earnings (loss) and cash distributions	12/31/2018	\$ —	\$ 47,175	\$ 47,175	\$ (1,672)
Impact of adoption of accounting standards (2)	2019 activity	\$ 37,232	\$ —	\$ —	\$ —
ADES proportionate share of net income from Tinum Group	2019 activity	61,958	61,958	—	—
Recovery of cash distributions in excess of investment balance (prior to cash distributions)	2019 activity	(1,672)	(1,672)	—	1,672
Cash distributions from Tinum Group	2019 activity	(65,238)	—	65,238	—
Total investment balance, equity earnings and cash distributions	12/31/2019	\$ 32,280	\$ 60,286	\$ 65,238	\$ —

(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.

(2) As discussed in Note 1, Tinum Group adopted ASC 606 and ASC 842 as of January 1, 2019. As a result of Tinum Group's adoption of these standards, the Company recorded a cumulative adjustment of \$27.4 million, net of the impact of income taxes, related to the Company's percentage of Tinum Group's cumulative effect adjustment that increased the Company's Retained earnings as of January 1, 2019.

Additional information related to Tinum Group pursuant to Regulation S-X Rule of the Securities and Exchange Act of 1934 is included in Item 15 - "Exhibits and Financial Statement Schedules" ("Item 15") of this Report.

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, 2019 and 2018, the Company's 50% investment in Tinum Services was \$6.8 million and \$6.6 million, respectively.

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

<i>(in thousands)</i>	As of December 31,	
	2019	2018
Current assets	\$ 308,249	\$ 300,288
Non-current assets	\$ 99,261	\$ 100,233
Current liabilities	\$ 155,367	\$ 219,959
Non-current liabilities	\$ 55,746	\$ 66,760
Equity	\$ 13,626	\$ 13,134
Noncontrolling interests	\$ 182,771	\$ 100,668
	Years Ended December 31,	
<i>(in thousands)</i>	2019	2018
Gross loss	\$ (102,172)	\$ (85,377)
Operating, selling, general and administrative expenses	199,691	173,500
Loss from operations	(301,863)	(258,877)
Other expenses	(1,422)	37
Loss attributable to noncontrolling interest	321,077	272,905
Net income	\$ 17,792	\$ 14,065
ADES equity earnings from Tinum Services	\$ 8,896	\$ 7,033

Included in the Consolidated Statement of Operations of Tinum Services for the years ended December 31, 2019 and 2018 were losses related to VIE entities that are consolidated within Tinum Services of \$321.1 million and \$272.9 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.

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

<i>(in thousands)</i>	As of December 31,	
	2019	2018
Equity method investment in Tinum Group	\$ 32,280	\$ —
Equity method investment in Tinum Services	6,813	6,567
Equity method investment in other	62	67
Total equity method investments	\$ 39,155	\$ 6,634

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, 2019 and 2018.

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

<i>(in thousands)</i>	Year ended December 31,	
	2019	2018
Earnings from Tinnuum Group	\$ 60,286	\$ 47,175
Earnings from Tinnuum Services	8,896	7,033
Loss from other	(6)	—
Earnings from equity method investments	\$ 69,176	\$ 54,208

The following table details the components of the cash distributions from the Company's respective equity method investments included in the Consolidated Statements of Cash Flows. Distributions from equity method investees are reported on the Consolidated Statements of Cash Flows as “return on investment” in 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” in Investing cash flows.

<i>(in thousands)</i>	Year ended December 31,	
	2019	2018
Distributions from equity method investees, return on investment		
Tinnuum Group	\$ 65,238	\$ —
Tinnuum Services	8,650	5,500
Included in Operating Cash Flows	\$ 73,888	\$ 5,500
Distributions from equity method investees in excess of cumulative earnings		
Tinnuum Group	\$ —	\$ 47,175
Included in Investing Cash Flows	\$ —	\$ 47,175

During the years ended December 31, 2019 and 2018, the Company, in the aggregate, made contributions to equity method investments of zero and \$0.8 million, respectively.

Note 6 - Debt Obligations

<i>(in thousands)</i>	Years ended December 31,	
	2019	2018
Senior Term Loan due December 2021, related party	\$ 40,000	\$ 70,000
Less: net unamortized debt issuance costs	(1,163)	(1,990)
Less: net unamortized debt discount	(1,200)	(2,052)
Senior Term Loan due December 2021, net	37,637	65,958
Finance lease obligations (1)	6,729	8,167
	44,366	74,125
Less: Current maturities	(23,932)	(24,067)
Total long-term borrowings	\$ 20,434	\$ 50,058

(1) As of December 31, 2018, obligations related to capital lease obligations as defined in ASC 840.

Senior Term Loan

In December 2018, the Company, and ADA-ES, Inc. ("ADA"), a wholly-owned subsidiary, and certain other subsidiaries of the Company as guarantors, The Bank of New York Mellon as administrative agent, and Apollo Credit Strategies Master Fund Ltd and Apollo A-N Credit Fund (Delaware) L.P. (collectively "Apollo"), affiliates of a beneficial owner of greater than five percent of the Company's common stock and a related party, entered into the Senior Term Loan in the amount of \$70.0 million, less original issue discount of \$2.1 million. Proceeds from the Senior Term Loan were used to fund the Carbon Solutions

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Acquisition as disclosed in Note 2. The Company also paid debt issuance costs of \$2.0 million related to the Senior Term Loan. The Senior Term Loan has a term of 36 months and bears interest at a rate equal to 3-month LIBOR (subject to a 1.5% floor) + 4.75% per annum, which is adjusted quarterly to the current 3-month LIBOR rate, and interest is payable quarterly in arrears. Quarterly principal payments of \$6 million were required beginning in March 2019, and the Company may prepay the Senior Term Loan at any time without penalty. The Senior Term Loan is secured by substantially all of the assets of the Company, including the cash flows from Tinum Group and Tinum Services (collectively, the "Tinum Entities"), but excluding the Company's equity interests in the Tinum entities.

The Senior Term Loan includes, among others, the following covenants: (1) Beginning December 31, 2018 and as of the end of each fiscal quarter thereafter, the Company must maintain a minimum cash balance of \$5.0 million and shall not permit "expected future net cash flows from the refined coal business" (as defined in the Senior Term Loan) to be less than 1.75 times the outstanding principal amount of the Senior Term Loan; (2) Beginning in January 2019, annual collective dividends and buybacks of Company shares in an aggregate amount, not to exceed \$30 million, is permitted so long as (a) no default or event of default exists under the Senior Term Loan and (b) expected future net cash flows from the refined coal business as of the end of the most recent fiscal quarter exceed \$100 million.

As of December 31, 2019, the following table presents the future aggregate annual maturities of the Company's Senior Term Loan excluding unamortized discounts and deferred financing costs:

Year ended December 31,

<i>(in thousands)</i>	Principal Amount
2020	\$ 24,000
2021	16,000
2022	—
2023	—
2024	—
Total	\$ 40,000

Line of Credit

In September 2013, ADA, as borrower, and the Company, as guarantor, entered into the Line of Credit with a bank (the "Lender") for an aggregate principal amount of \$10.0 million that was secured by certain amounts due to the Company from certain Tinum Group RC leases. The Line of Credit has been amended 13 times from the period from December 2, 2013 through December 31, 2018, including two amendments executed in 2018.

On September 30, 2018, ADA, as borrower, the Company, as guarantor, and the Lender entered into an amendment (the "Twelfth Amendment") to the Line of Credit. The Twelfth Amendment decreased the Line of Credit to \$5.0 million due to decreased collateral requirements, extended the maturity date of the Line of Credit to September 30, 2020 and permitted the Line of Credit to be used as collateral (in place of restricted cash) for letters of credit ("LC's") up to \$5.0 million related to equipment projects and certain other agreements. Under the Twelfth Amendment, there was no minimum cash balance requirement based on the Company meeting certain conditions and maintaining minimum trailing twelve-month EBITDA (earnings before interest, taxes, depreciation and amortization), as previously defined in the "Eleventh Amendment" to the Line of Credit, of \$24.0 million.

On December 7, 2018, ADA, as borrower, the Company, as guarantor, and the Lender entered into a further amendment to the Line of Credit, which provided, among other things, for ADA to be able to enter into the Senior Term Loan as a guarantor so long as the principal amount of the Senior Term Loan does not exceed \$70.0 million. Additionally, the financial covenants in the Line of Credit were amended and restated to be consistent with the aforementioned Senior Term Loan covenants, including maintaining a minimum cash balance of \$5.0 million.

As of December 31, 2019, there were no outstanding borrowings under the Line of Credit.

Note 7 - Leases

The financial statement impact from the adoption of ASC 842 as of January 1, 2019 is due to recording ROU assets and related lease liabilities for operating lease commitments that were outstanding as of December 31, 2018. The Company elected the

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transitional practical expedients allowed under ASC 842, which include among other things that the Company need not reassess: (1) whether any existing contracts are or contain leases, inclusive of land easements; (2) the lease classification or lease term for existing leases; and (3) initial direct costs for any existing leases. In addition, the Company elected for all classes of underlying assets the practical expedient to not separate nonlease components from lease components and to account for each separate lease component and the nonlease components associated with that lease component as a single lease component.

ASC 842 defines a lease as a contract, or part of a contract, that conveys the right to control the use of an identified asset for a period of time in exchange for consideration. Control over the use of an identified asset means that an entity has both the right to obtain substantially all of the economic benefits from the use of an identified asset and the right to direct the use of that identified asset. The determination of whether a contract contains a lease may require significant assumptions and judgments.

Historically, Carbon Solutions has used leasing to fund the majority of its capital needs for mining and manufacturing equipment. As of December 31, 2019, the Company has obligations under finance and operating leases in the amounts of \$6.7 million and \$5.2 million, respectively. ROU assets under finance leases are mining equipment used at the Company's lignite mine, which provides the key raw material for manufacturing the Company's products. ROU assets under operating leases are primarily plant equipment used at the Company's manufacturing facility, but also include other office equipment, vehicles and office facilities. As of December 31, 2019, the Company has ROU assets, net of accumulated amortization, under finance leases and operating leases of \$5.9 million and \$5.1 million, respectively.

Certain of the finance and operating leases have options permitting renewals for additional periods and buy-out options. Renewal and buy-out options for applicable leases have not been included in the measurement of the respective lease liabilities as the Company is not reasonably certain that it will exercise the respective option or the lessor does not have an exclusive right to exercise the option.

Variable lease payments represent payments made by a lessee for the right to use an underlying asset that vary because of changes in facts or circumstances occurring after the commencement date of a lease other than the passage of time. Variable lease payments that are based on an index or rate, calculated by using the index or rate that exists on the lease commencement date, are included in the measurement of a lease liability. Certain of the Company's operating leases for office facilities contain variable lease components that are not based on an index or rate, and the Company recognizes these payments as lease expense in the period in which the obligation for those payments is incurred.

The Company calculates lease liabilities based on the present value of lease payments discounted by the rate implicit in the lease or, if not readily determinable, the Company's incremental borrowing rate.

The Company records lease liabilities and related ROU assets for all leases that have a term of greater than one year. For short-term leases (leases with terms of less than one year), the Company expenses lease payments on a straight-line basis over the lease term.

Finance leases

Leases classified as capital leases under ASC 840 and the related assets and liabilities were recorded and classified as finance leases as of January 1, 2019 based on their carrying values of \$8.1 million and \$8.2 million, respectively, as of December 31, 2018. ROU assets under finance leases and finance lease liabilities are included in Property, plant and equipment and Current portion and Long-term portion of borrowings, respectively, in the Consolidated Balance Sheet as of December 31, 2019.

Finance lease liabilities are subsequently measured by increasing the carrying amount to reflect interest expense on the finance lease liability and reducing the carrying amount of the lease liability to reflect lease payments made during the period. Interest on finance lease liabilities is determined in each period during the lease term as the amount that produces a constant periodic discount rate on the remaining balance of the lease liability. ROU assets under finance leases are amortized over the remaining lease term on a straight-line basis. Interest expense related to finance lease liabilities and amortization of ROU assets under finance leases are included in Interest expense and Depreciation, amortization, depletion and accretion, respectively, in the Consolidated Statement of Operations for the year ended December 31, 2019.

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Operating leases

Operating lease liabilities as of January 1, 2019 were calculated at the present value, using a discount rate of the lease, of the remaining minimum rental payments (as defined under ASC 840). As the rate implicit in all of the operating leases was not readily determinable, the Company determined its discount rate as of January 1, 2019 based on an estimate of its incremental borrowing rate. This rate was based on the Company's effective borrowing rate on the Senior Term Loan, considering the collateral requirements contained therein, in effect as of January 1, 2019. ROU assets under operating leases as of January 1, 2019 were determined as the calculated value of the operating lease liabilities less accrued lease payments and accrued lease incentives. As of December 31, 2018, the total amount of accrued lease payments and accrued lease incentives was approximately \$0.1 million. ROU assets under operating leases and operating lease liabilities are included in Other long-term assets and Other liabilities and Other long-term liabilities, respectively, in the Consolidated Balance Sheet as of December 31, 2019.

Operating lease liabilities are subsequently measured at the present value of the lease payments not yet paid discounted using the discount rate for the lease established at the inception date of the lease (or January 1, 2019 for operating leases in effect as of December 31, 2018). ROU assets under operating leases are subsequently measured at the amounts of the related operating lease liability, adjusted for, as applicable, prepaid or accrued lease payments, the remaining balance of any lease incentives received, unamortized initial direct costs and impairment. Lease expense from operating leases is recognized as a single lease cost over the remaining lease term on a straight-line basis. Variable lease payments not included in operating lease liabilities are recognized as expense in the period in which the obligation for those payments is incurred. Under ASC 842, lease expense for operating leases for the year ended December 31, 2019 was \$4.4 million, of which \$3.9 million is included in Consumables - cost of revenue, exclusive of depreciation and amortization, and \$0.5 million is included in General and administrative in the Consolidated Statement of Operations for the year ended December 31, 2019.

In August 2019, the Company entered into a new lease agreement covering approximately 21,000 square feet of office space for a term of 3.5 years and recorded an ROU asset of \$1.2 million and a corresponding operating lease liability of \$1.2 million.

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Lease financial information as of and for the year ended December 31, 2019 is provided in the following table:

<i>(in thousands)</i>	Year ended December 31, 2019
Finance lease cost:	
Amortization of right-of-use assets	\$ 2,149
Interest on lease liabilities	365
Operating lease cost	3,673
Short-term lease cost	771
Variable lease cost (1)	371
Sublease income	—
Total lease cost	<u>\$ 7,329</u>
Other Information:	
Cash paid for amounts included in the measurement of lease liabilities:	
Operating cash flows from finance leases	\$ 365
Operating cash flows from operating leases	\$ 3,180
Financing cash flows from finance leases	\$ 1,354
Right-of-use assets obtained in exchange for new finance lease liabilities	\$ —
Right-of-use assets obtained in exchange for new operating lease liabilities	\$ 1,309
Weighted-average remaining lease term - finance leases	4.2 years
Weighted-average remaining lease term - operating leases	2.4 years
Weighted-average discount rate - finance leases	6.1%
Weighted-average discount rate - operating leases	8.5%

(1) Primarily includes common area maintenance, property taxes and insurance payable to lessors.

The following table summarizes the Company's future lease payments under finance and operating leases as of December 31, 2019:

<i>(in thousands)</i>	Operating Lease Commitments	Finance Lease Commitments	Total Lease Commitments
2020	\$ 2,710	\$ 1,707	\$ 4,417
2021	1,969	1,802	3,771
2022	721	951	1,672
2023	359	951	1,310
2024	—	1,929	1,929
Thereafter	—	568	568
Total lease payments	<u>5,759</u>	<u>7,908</u>	<u>13,667</u>
Less: Imputed interest	(567)	(1,179)	(1,746)
Present value of lease payments	<u>\$ 5,192</u>	<u>\$ 6,729</u>	<u>\$ 11,921</u>

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Disclosures under ASC 840

As previously disclosed in the Company's 2018 Annual Report on Form 10-K and under ASC 840, the following table summarizes the Company's future minimum non-cancellable lease payments due under capital and operating leases as of December 31, 2018:

<i>(in thousands)</i>	Operating Lease Commitments	Capital Lease Commitments
2019	\$ 3,619	\$ 1,749
2020	2,273	1,707
2021	1,632	1,802
2022	310	951
2023	221	951
Thereafter	—	2,482
Total minimum lease payments	<u>\$ 8,055</u>	<u>9,642</u>
Less: Imputed interest		(1,475)
Present value of minimum lease payments		<u>\$ 8,167</u>

Rent expense for the year ended December 31, 2018 was \$0.3 million and was included in General and administrative expense in the Consolidated Statements of Operations.

As of December 31, 2018, mining equipment financed under capital leases of \$8.1 million, net of accumulated amortization of \$0.1 million, was included in Property, plant and equipment in the Consolidated Balance Sheet.

Note 8 - Revenues

Contract Assets and Liabilities

Contract assets are comprised of unbilled receivables and are included in Receivables, net in the Consolidated Balance Sheet. Unbilled receivables represent a conditional right to consideration in exchange for goods or services transferred to a customer.

Trade receivables represent an unconditional right to consideration in exchange for goods or services transferred to a customer. The Company invoices its customers in accordance with the terms of the contract. Credit terms are generally net 30 from the date of invoice. The timing between the satisfaction of performance obligations and when payment is due from the customer is generally not significant. The Company records allowances for doubtful trade receivables when it is probable that the balances will not be collected.

Contract liabilities are comprised of deferred revenue, which represents an obligation to transfer goods or services to a customer for which the Company has received consideration from the customer and, if deliverable within one year or less, is included in Other current liabilities in the Consolidated Balance Sheet and, if deliverable outside of one year, is included in Other long-term liabilities in the Consolidated Balance Sheet.

Trade receivables, net

The following table shows the components of Trade receivables, net:

<i>(in thousands)</i>	As of December 31,	
	2019	2018
Trade receivables	\$ 8,057	\$ 10,121
Less: Allowance for doubtful accounts	(627)	(567)
Trade receivables, net	<u>\$ 7,430</u>	<u>\$ 9,554</u>

During the years ended December 31, 2019 and 2018, the Company recognized \$0.1 million and \$0.2 million, respectively, as bad debt expense related to specific accounts whose ultimate collection was in doubt.

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Disaggregation of Revenue and Earnings from Equity Method Investments

During the year ended December 31, 2019 and 2018, all performance obligations related to revenues recognized were satisfied at a point in time. The Company disaggregates its revenues by its major components as well as between its two operating segments, which are further discussed in Note 15 to the consolidated financial statements. The Company does not disaggregate revenue by geographic region as revenue is generated primarily from customers in the United States; however, in the PGI segment for the year ended December 31, 2019, approximately 15% of PGI revenue was generated in Canada. The following tables disaggregate revenues by major source for the year ended December 31, 2019 and 2018 (in thousands):

<i>(in thousands)</i>	Year ended December 31, 2019			
	Segment		Other	Total
	PGI	RC		
Revenue component				
Consumables	\$ 50,458	\$ —	\$ 2,729	\$ 53,187
License royalties, related party	—	16,899	—	16,899
Revenues from customers	50,458	16,899	2,729	70,086
Earnings from equity method investments	—	69,176	—	69,176
Total revenues and earnings from equity method investments	\$ 50,458	\$ 86,075	\$ 2,729	\$ 139,262

<i>(in thousands)</i>	Year ended December 31, 2018			
	Segment		Other	Total
	PGI	RC		
Revenue component				
Consumables	\$ 8,628	\$ —	\$ 105	\$ 8,733
License royalties, related party	—	15,140	—	15,140
Other	72	—	—	72
Revenues from customers	8,700	15,140	105	23,945
Earnings from equity method investments	—	54,208	—	54,208
Total revenues and earnings from equity method investments	\$ 8,700	\$ 69,348	\$ 105	\$ 78,153

Note 9 - 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 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 did not have any significant legal proceedings.

Other Commitments and Contingencies

The Company also has certain limited obligations contingent upon future events in connection with the activities of Tinum Group. The Company, NexGen and two entities affiliated with NexGen have provided GSFS with limited guaranties (the "Tinum Group Party Guaranties") related to certain losses it may suffer as a result of inaccuracies or breach of representations

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and covenants. The Company also is a party to a contribution agreement with NexGen under which any party called upon to 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.

Note 10 - Stockholders' Equity

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

Preferred Stock

The Company's Board of Directors (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, 2019 and 2018, 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 Programs

In November 2018, the Board authorized the Company to purchase up to \$20.0 million of its outstanding common stock. This stock repurchase program was to remain in effect until December 31, 2019 unless otherwise modified by the Board. As of November 2019, \$2.9 million remained outstanding related to this program. In November 2019, the Board authorized an incremental \$7.1 million to this stock repurchase program and provided that the program will remain in effect until all amounts are utilized or the program is otherwise modified by the Board. Previously, the Board had authorized the Company to purchase up to \$20.0 million of its outstanding common stock under a separate repurchase program that was in effect until July 31, 2018.

During the years ended December 31, 2019 and 2018, under the collective stock repurchase programs authorized by the Board, the Company purchased 533,345 and 2,350,422 shares of its common stock for cash of \$5.8 million and \$25.3 million, inclusive of commissions and fees, respectively. Of these amounts, zero and \$15.6 million, respectively, was purchased in single blocks through privately negotiated transactions. As of December 31, 2019, the Company had \$7.1 million remaining under its stock repurchase program.

Quarterly Cash Dividend

Dividends declared to holders of the Company's common shares during the years ended December 31, 2019 and December 31, 2018 were \$18.6 million and \$20.3 million, 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 Consolidated Balance Sheet as of December 31, 2019 and 2018.

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Dividends declared and paid quarterly per share on all outstanding shares of common stock during the years ended December 31, 2019 and 2018 were as follows:

	2019		2018	
	Per share	Date paid	Per share	Date paid
Dividends declared during quarter ended:				
March 31	\$ 0.25	March 7, 2019	\$ 0.25	March 8, 2018
June 30	0.25	June 7, 2019	0.25	June 8, 2018
September 30	0.25	September 6, 2019	0.25	September 6, 2018
December 31	0.25	December 13, 2019	0.25	December 6, 2018
	\$ 1.00		\$ 1.00	

Tax Asset Protection Plan

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.

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 (the "TAPP") designed to protect the Company's ability to utilize its net operating losses and tax credits. The TAPP 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.

On April 6, 2018, the Board approved the First Amendment to the Tax Asset Protection Plan (the "Amendment") that amends the TAPP. The Amendment amends the definition of "Final Expiration Date" under the TAPP to extend the duration of the TAPP and makes associated changes in connection therewith. At the Company's 2018 annual meeting, the Company's stockholders approved the Amendment, thus the Final Expiration Date will be the close of business on December 31, 2019, which was subsequently extended, as described below.

On April 5, 2019, the Board approved the Second Amendment to the TAPP (the "Second Amendment") that amends the TAPP, as previously amended. The Second Amendment amends the definition of the "Final Expiration Date" under the TAPP to extend the duration of the TAPP and makes associated changes in connection therewith. At the Company's 2019 annual meeting of stockholders, the Company's stockholders approved the Second Amendment, thus the Final Expiration Date became the close of business on December 31, 2020.

Note 11 - 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. As of December 31, 2019, the Company has 2,000,000 shares of its common stock authorized for issuance under the 2017 Plan.

Expense

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RSA's - Restricted Stock Awards ("RSA's") are typically granted with vesting terms of three years. The fair value of 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 vesting term 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. No stock options were granted during the years ended December 31, 2019 and 2018.

When options are granted, 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 when the outstanding options were granted.

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.

RSU's - Restricted Stock Units ("RSU's") are typically granted with vesting terms of one year. The fair value of RSU'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 is generally recognized over the service period of the award on a straight-line basis.

PSU's - Performance share units ("PSU's") generally vest over three years and are 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.

Compensation expense is recognized for PSU awards on a straight-line basis over the vesting period based on the estimated fair value at the date of grant using a Monte Carlo simulation model. No PSU's were granted during the years ended December 31, 2019 or 2018.

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.

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

<i>(in thousands)</i>	Years Ended December 31,	
	2019	2018
RSA expense	\$ 2,011	\$ 2,222
Stock option expense	—	58
RSU expense	—	210
Total stock-based compensation expense	\$ 2,011	\$ 2,490

Stock-based compensation expense related to manufacturing employees and administrative employees is included in the Cost of goods sold and Payroll and benefits line items, respectively, in the Consolidated Statements of Operations. Stock-based compensation expense related to non-employee directors and consultants is included in the General and administrative line item in the Consolidated Statements of Operations.

During the year ended December 31, 2019 and 2018, the Company modified the terms of awards granted to zero and 13

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employees in connection with its restructuring plans and termination of the impacted employees discussed in Note 19. These modifications resulted in the accelerated vesting and incremental expense related to certain performance-based awards and restricted stock awards. As a result, during 2019 and 2018, the Company recognized incremental stock-based compensation of zero and \$0.8 million, respectively, which was included in the Payroll and benefits line item in the Consolidated Statements of Operations.

The amount of unrecognized compensation cost as of December 31, 2019, and the expected weighted-average period over which the cost will be recognized is as follows:

<i>(in thousands)</i>	As of December 31, 2019	
	Unrecognized Compensation Cost	Expected Weighted-Average Period of Recognition (in years)
RSA expense	\$ 2,521	1.47
Total unrecognized stock-based compensation expense	\$ 2,521	1.47

Activity

Restricted Stock

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

<i>(in thousands, except for share and per share amounts)</i>	Restricted Stock		Weighted-Average Grant Date Fair Value	
	Awards	Units	RSA's	RSU's
For the year ended December 31, 2019				
Non-vested at January 1, 2019	280,852	20,000	\$ 9.92	\$ 10.52
Granted	287,288	—	\$ 11.03	\$ —
Vested	(108,081)	(20,000)	\$ 9.77	\$ 10.52
Forfeited	(8,715)	—	\$ 10.79	\$ —
Non-vested at December 31, 2019	451,344	—	\$ 10.65	\$ —

The weighted-average grant date fair value of RSA's granted or modified during the years ended December 31, 2019 and 2018 was \$11.03 and \$11.00, respectively. The weighted-average grant date fair value of RSU's granted or modified during the years ended December 31, 2019 and 2018 was zero and \$10.52, respectively. The total grant-date fair value of RSA's vested during the years ended December 31, 2019 and 2018 was \$1.1 million and \$2.0 million, respectively. The aggregate intrinsic value of non-vested RSA's and RSU's outstanding as of December 31, 2019 was \$4.7 million and zero, respectively.

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Stock Options

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

<i>(in thousands, except for share and per share amounts)</i>	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, 2019				
Options outstanding at January 1, 2019	529,780	\$ 12.23		
Options granted	—	\$ —		
Options exercised	(209,780)	\$ 9.14		
Options expired / forfeited	(20,000)	\$ 20.07		
Options outstanding at December 31, 2019	300,000	\$ 13.87	\$ —	0.43
Options vested and exercisable at December 31, 2019	300,000	\$ 13.87	\$ —	0.43

The weighted-average grant-date fair value of options vesting during the years ended December 31, 2019 and 2018 was zero and \$0.3 million, respectively. The weighted-average grant-date fair value of options exercised during the year ended December 31, 2019 and 2018 was \$0.6 million and \$0.3 million, respectively. The Company received proceeds of \$0.2 million from the exercise of stock options during the year ended December 31, 2019. The Company did not receive cash from the exercise of stock options during the year ended December 31, 2018.

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 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, 2019 and 2018.

PSU's

There were no PSU's granted during the years ended December 31, 2019 and 2018. PSU's outstanding remained unvested until the third anniversary date of their issuance, at which time the actual number of vested shares was 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 PSU's 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 year ended December 31, 2018	2015	12,311	4,061	112.50	112.50	—	—

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Note 12 - Supplemental Financial Information

Supplemental Balance Sheet Information

The following table summarizes the components of Prepaid expenses and other assets and Other long-term assets, net as presented in the Consolidated Balance Sheet:

<i>(in thousands)</i>	As of December 31,	
	2019	2018
Prepaid expenses and other current assets:		
Prepaid expenses	\$ 1,708	\$ 1,233
Prepaid income taxes	4,228	2,940
Other	1,896	1,397
	\$ 7,832	\$ 5,570
Other long-term assets:		
Right of use assets, operating leases, net	\$ 5,073	\$ —
Spare parts, net	3,453	3,278
Mine development costs, net	7,084	2,531
Mine reclamation asset, net	2,451	408
Highview investment	552	552
Other long-term assets	1,718	1,224
	\$ 20,331	\$ 7,993

Spare parts include critical spares required to support plant operations. Parts and supply costs are determined using the lower of cost or estimated replacement cost. Parts are recorded as maintenance expenses in the period in which they are consumed.

Mine development costs include acquisition costs, the cost of other development work and mitigation costs related to the Five Forks Mine are depleted over the estimated life of the related mine reserves, which is 21 years. The Company performs an evaluation of the recoverability of the carrying value of mine development costs to determine if facts and circumstances indicate that their carrying value may be impaired and if any adjustment is warranted. There were no indicators of impairment as of December 31, 2019. Mine reclamation asset represents an asset retirement obligation asset and is depreciated over the estimated life of the mine.

The Company holds a long-term investment (the "Highview Investment") in Highview Enterprises Limited ("Highview"), a London, England based developmental stage company specializing in power storage. In November 2014, the Company acquired an 8% ownership interest in the common stock of Highview for \$2.8 million in cash. The Company accounts for the Highview Investment as an investment recorded at cost, less impairment, plus or minus observable changes in price for identical or similar investments of the same issuer.

The Highview Investment is evaluated for indicators of impairment such as an event or change in circumstances that may have a significant adverse effect on the fair value of the investment. There were no changes to the carrying value of the Highview Investment for the years ended December 31, 2019 and 2018 as there were no indicators of impairment or observable price changes for equity issued by Highview.

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

<i>(in thousands)</i>	As of December 31,	
	2019	2018
Other current liabilities:		
Current portion of operating lease obligations	\$ 2,382	\$ —
Accrued interest	213	407
Income and other taxes payable	678	479
Other current liabilities	1,038	1,252
	\$ 4,311	\$ 2,138
Other long-term liabilities:		
Operating lease obligations, long-term	\$ 2,810	\$ —
Mine reclamation liability	2,721	624
Other	229	316
	\$ 5,760	\$ 940

Included in Other long-term liabilities is the Mine reclamation liability, which represents an asset retirement obligation. Changes in the asset retirement obligation were as follows:

<i>(in thousands)</i>	As of December 31,	
	2019	2018
Asset retirement obligation, beginning of year	\$ 624	\$ —
Asset retirement obligation assumed in Carbon Solutions Acquisition	1,776	626
Accretion	205	2
Liabilities settled	(78)	(4)
Changes due to scope and timing of reclamation	194	—
Asset retirement obligations, end of year	\$ 2,721	\$ 624

As part of the Carbon Solutions Acquisition, the Company assumed an asset retirement obligation related to the Five Forks Mine. The Company recorded the liability at its estimated fair value and periodically adjusts to reflect changes in the estimated present value resulting from the passage of time and revisions to the estimates of either the timing or amount of the reclamation costs. Refer to Note 2 for details regarding adjustments made to the fair values of the asset retirement obligation from the preliminary purchase price allocation.

The Company's mining activities are subject to various domestic laws and regulations governing the protection of the environment. The Company conducts its operations to protect public health and the environment and believes its operations are in compliance with applicable laws and regulations in all material respects. The Company has made, and expects to make in the future, expenditures to comply with such laws and regulations, but cannot predict the full amount of such future expenditures. Estimated future reclamation costs are based principally on current legal and regulatory requirements.

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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,	
	2019	2018
Interest on Senior Term Loan	\$ 4,112	\$ 366
Debt discount and debt issuance costs	1,678	94
453A interest	1,039	1,585
Other	345	106
	\$ 7,174	\$ 2,151

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

(in thousands)	Years Ended December 31,	
	2019	2018
Interest income	\$ 261	\$ 239
Other	166	(19)
	\$ 427	\$ 220

Note 13 - 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 December 31, 2019		As of December 31, 2018	
	Carrying Value	Fair Value	Carrying Value	Fair Value
Financial Instruments:				
Highview Investment	\$ 552	\$ 552	\$ 552	\$ 552
Highview Obligation	\$ 220	\$ 220	\$ 213	\$ 213

Concentration of credit risk

As of December 31, 2019, 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 three financial institutions as of December 31, 2019. If those institutions were unable to perform their obligations, the Company would be at risk regarding the amount of its cash balance in excess of the federal deposit insurance corporation limits (\$250 thousand).

Assets and Liabilities Measured at Fair Value on a Recurring Basis

As of December 31, 2019 and December 31, 2018, the Company had no material financial instruments carried and measured at fair value on a recurring basis.

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

The Company completed the Carbon Solutions Acquisition, in which the fair value of the purchase consideration totaled \$66.5 million. The Company's estimated fair values of the assets acquired and liabilities assumed are disclosed in Note 2. The fair value measurements represent Level 3 measurements as they were based on significant inputs not observable in the market.

The Company has applied the measurement alternative for investments without readily determinable fair values under ASC Topic 321 - *Investments in Equity Securities* ("ASC 321") for the Highview Investment. Fair value measurements, if any,

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resulting from the Company's application of the guidance in ASC 321 represent either Level 2 or Level 3 measurements. There were no changes to the carrying value of the Highview Investment for the years ended December 31, 2019 and 2018 as there were no indicators of impairment or observable price changes for equity issued by Highview.

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Note 14 - Income Taxes

The provision for income taxes consists of the following:

<i>(in thousands, except for rate)</i>	Years Ended December 31,	
	2019	2018
Current portion of income tax expense:		
Federal	\$ 2,133	\$ 882
State and other	1,211	4,308
	3,344	5,190
Deferred portion of income tax expense (benefit):		
Federal	10,491	4,766
State and other	(1,836)	467
	8,655	5,233
Total income tax expense	\$ 11,999	\$ 10,423
Effective tax rate	25%	23%

Income tax expense differs from the amount that would be computed by applying the U.S. statutory federal income tax rate of 21% for the years ended December 31, 2019 and 2018 to income before income taxes as a result of the following:

<i>(in thousands)</i>	Years Ended December 31,	
	2019	2018
Federal statutory rate	\$ 10,027	\$ 9,634
State income taxes, net of federal benefit	1,597	3,625
Permanent differences	286	130
Tax credits	(338)	(7,031)
Valuation allowances	(288)	4,462
Changes in tax rates	229	(464)
Stock-based compensation	112	(216)
UTP liability	236	—
Other	138	283
Expense for the provision for income taxes	\$ 11,999	\$ 10,423

Deferred income taxes are provided for the effects of temporary differences between the tax basis of an asset or liability and their reported amounts 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

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follows:

<i>(in thousands)</i>	As of December 31,	
	2019	2018
Deferred tax assets		
Tax credits	\$ 98,541	\$ 104,553
Operating lease obligations	1,307	—
Employee related liabilities	1,065	1,515
Intangible assets	1,574	1,623
Equity method investments	—	9,588
Net operating loss carryforwards	2,956	2,479
Other investments	555	583
Reserves	587	45
Other	244	335
Total deferred tax assets	106,829	120,721
Less valuation allowance	(79,610)	(79,898)
Deferred tax assets	27,219	40,823
Less: Deferred tax liabilities		
Property and equipment and other	(11,087)	(8,284)
Equity method investments	(736)	—
Right of use operating lease assets	(1,301)	—
Total deferred tax liabilities	(13,124)	(8,284)
Net deferred tax assets	\$ 14,095	\$ 32,539

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 a 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, 2019, the Company concluded it is more likely than not the Company will generate sufficient taxable income within the applicable net operating loss and tax credit carry-forward periods to realize \$14.1 million of its net deferred tax assets, which resulted in a decrease in the valuation allowance from December 31, 2018 of \$0.3 million. In reaching this conclusion, the Company primarily considered: (1) the future reversal of existing temporary differences; and (2) forecasts of continued future taxable income.

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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:

<i>(in thousands)</i>	As of December 31,		
	2019	Beginning expiration year	Ending expiration year
Federal tax credit carryforwards	\$ 98,541	2032	2039
State and other operating loss carryforwards	\$ 2,956	2021	2039

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, 2019 and 2018:

<i>(in thousands)</i>	Years Ended December 31,	
	2019	2018
Balance as of January 1	\$ 54	\$ 54
Increases for tax positions of prior years	892	—
Balance as of December 31	\$ 946	\$ 54

Included in the balance of unrecognized tax benefits as of December 31, 2019 are \$0.7 million of tax benefits that, if utilized, would result in adjustments to deferred taxes.

The Company did not record any adjustments or recognize interest expense for uncertain tax positions for the years ended December 31, 2019 and 2018. 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 the federal tax treatment of RC facilities at Tinum Group in the Interest expense line item in the Consolidated Statements of Operations. Additional information related to the components of Interest expense is included in Note 12.

The Company files income tax returns in the U.S. and various states. The Company is no longer subject to U.S. federal examinations by tax authorities for years before 2015. The Company is generally no longer subject to state examinations by tax authorities for years before 2013.

Note 15 - 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, 2019, 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, 2019, the Company has two reportable segments: (1) Refined Coal ("RC"); and (2) Power Generation and Industrials ("PGI"). The majority of Carbon Solutions operations has been included in the PGI segment; whereas a portion has been included in All Other and Corporate.

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.
- Segment operating income (loss) includes segment revenues and allocation of certain "Corporate general and administrative expenses," which includes Payroll and benefits, 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, 2019 and 2018, 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, 2019 and 2018:

<i>(in thousands)</i>	Years Ended December 31,	
	2019	2018
Revenues:		
Refined Coal:		
Earnings in equity method investments	\$ 69,176	\$ 54,208
License royalties, related party	16,899	15,140
	86,075	69,348
Power Generation and Industrials:		
Consumables	50,458	8,628
Other	—	72
	50,458	8,700
Total segment reporting revenues	136,533	78,048
Adjustments to reconcile to reported revenues:		
Earnings in equity method investments	(69,176)	(54,208)
Corporate and other	2,729	105
Total reported revenues	\$ 70,086	\$ 23,945
Segment operating income (loss)		
Refined Coal (1)	\$ 83,471	\$ 64,854
Power Generation and Industrials (2)	(11,606)	(2,621)
Total segment operating income	\$ 71,865	\$ 62,233

(1) Included in the RC segment operating income for the years ended December 31, 2019 and 2018 is 453A interest expense of \$1.0 million and \$1.6 million, respectively. Also included in the RC segment operating income for the year ended December 31, 2018 was \$0.4 million of severance expense.

(2) Included in the PGI segment operating income for the year ended December 31, 2019 and 2018 was approximately \$4.7 million and \$1.0 million, respectively, of amortization expense related to the fair value of inventory. Also included in the PGI segment operating income for the year ended December 31, 2019 and 2018 was \$6.7 million and \$0.5 million, respectively, of depreciation, amortization, and depletion on mine and plant related long-lived assets.

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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,	
	2019	2018
Total reported segment operating income	\$ 71,865	\$ 62,233
Other operating (loss) income	(1,994)	2
	<u>69,871</u>	<u>62,235</u>
Adjustments to reconcile to income before income tax expense attributable to the Company:		
Corporate payroll and benefits	(2,592)	(4,970)
Corporate legal and professional fees	(7,485)	(7,700)
Corporate general and administrative	(6,836)	(3,305)
Corporate depreciation and amortization	(82)	(134)
Corporate interest expense, net	(5,767)	(521)
Other income, net	427	272
Income before income tax expense	<u>\$ 47,536</u>	<u>\$ 45,877</u>

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,	
	2019	2018
Assets:		
Refined Coal ⁽¹⁾	\$ 43,953	\$ 11,468
Power Generation and Industrials	80,912	85,786
Total segment assets	124,865	97,254
All Other and Corporate ⁽²⁾	48,934	62,410
Consolidated	<u>\$ 173,799</u>	<u>\$ 159,664</u>

(1) Includes \$39.2 million and \$6.6 million of investments in equity method investees as of December 31, 2019 and 2018, respectively.

(2) Includes the Company's net deferred tax assets of \$14.1 million and \$32.5 million as of December 31, 2019 and 2018, respectively.

Note 16 - Major Customers

Revenues from external customers who represent 10% or more of the Company's revenues for the years ended December 31, 2019 and 2018 were as follows:

Customer	Revenue Type	Segment(s)	Years ended December 31,	
			2019	2018
A	License royalties, related party	RC	24%	63%
B	Consumables	PGI	10%	—%

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Note 17 - Related Party Transactions

Accounts Receivable

The following table shows the Company's receivable balance associated with related parties as of December 31, 2019 and 2018:

<i>(in thousands)</i>	As of December 31,	
	2019	2018
Receivable from related party - Tinum Group	\$ 4,246	\$ 4,284

Revenues

The following table shows the income recognized with related parties during the years ended December 31, 2019 and 2018:

<i>(in thousands)</i>	Years Ended December 31,	
	2019	2018
License royalties, related party - Tinum Group	\$ 16,899	\$ 15,140

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

Note 18 - Defined Contribution Savings Plans

The Company sponsors two qualified defined contribution savings plans (collectively the "401(k) Plans") that allow participation by eligible employees who may defer a portion of their gross pay. The Company makes contributions to the 401(k) Plans based on percentages of an employee's eligible compensation as specified in the 401(k) Plans, and such employer contributions are in the form of cash. As of January 1, 2020, the Company merged the 401(k) Plans.

The following table presents the amount of the Company's contributions made to the 401(k) Plan:

<i>(in thousands)</i>	Years Ended December 31,	
	2019	2018
401(k) Plans employer contributions	\$ 553	\$ 139

Due to the increase in employees resulting from the Carbon Solutions Acquisition, there was an increase in employer contributions made to the 401(k) Plan for the year ended December 31, 2019.

Note 19 - Restructuring

In December 2018, the Company recorded restructuring charges in connection with the departures of certain executives of Carbon Solutions in conjunction with the Carbon Solutions Acquisition. As part of the Carbon Solutions Acquisition, the Company also assumed a salary severance liability for an additional executive of Carbon Solutions in the amount of \$0.6 million. Additionally, the Company recorded restructuring charges in 2018 in connection with a reduction in force that commenced in May 2018 as part of the Company's further alignment of the business with strategic objectives, which included the departure of certain executive officers. These charges related to cash severance arrangements with departing employees and executives, as well as stock-based compensation charges related to the acceleration of vesting of certain stock awards.

During the year ended December 31, 2019, the Company did not record material restructuring charges.

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

<i>(in thousands, except employee data)</i>	Approximate Number of Employees	Pretax Charge			Total
		Refined Coal	PGI	All Other and Corporate	
Year ended December 31, 2018					
Restructuring charges	16	\$ 448	\$ 996	\$ 1,685	\$ 3,129
Changes in estimates		—	—	—	—
Total pretax charge, net of reversals		\$ 448	\$ 996	\$ 1,685	\$ 3,129

The following table summarizes the Company's utilization of restructuring accruals for the years ended December 31, 2019 and 2018:

<i>(in thousands)</i>	Employee Severance
Beginning accrual as of January 1, 2018	\$ —
Expense provision	3,129
Cash payments and other	(1,491)
Change in estimates	—
Severance liability acquired	570
Accrual as of December 31, 2018	2,208
Expense provision	172
Cash payments and other	(2,051)
Change in estimates	(75)
Accrual as of December 31, 2019	\$ 254

For the years ended December 31, 2019 and 2018, included in the Expense provision and Cash payments and other line items in the above table is stock-based compensation of zero and \$0.8 million, respectively, resulting from the accelerated vesting of modified equity-based compensation awards for certain terminated employees.

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

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Note 20 - Quarterly Financial Results (unaudited)

Summarized quarterly results for the two years ended December 31, 2019 and December 31, 2018 are as follows:

<i>(in thousands, except per share data)</i>	For the Quarter Ended			
	December 31, 2019	September 30, 2019	June 30, 2019	March 31, 2019
Revenues	\$ 16,047	\$ 19,133	\$ 15,577	\$ 19,329
Cost of revenues, exclusive of operating expenses shown below	11,104	11,939	12,292	14,108
Other operating expenses	9,630	9,585	7,545	8,776
Operating loss	(4,687)	(2,391)	(4,260)	(3,555)
Earnings from equity method investments	12,125	14,426	20,935	21,690
Other expenses, net	(1,269)	(1,517)	(1,927)	(2,034)
Income before income tax expense	6,169	10,518	14,748	16,101
Income tax (benefit) expense	(2,929) (1)	6,595	6,634	1,699
Net income	<u>\$ 9,098</u>	<u>\$ 3,923</u>	<u>\$ 8,114</u>	<u>\$ 14,402</u>
Earnings per common share – basic	\$ 0.50	\$ 0.22	\$ 0.45	\$ 0.79
Earnings per common share – diluted	\$ 0.50	\$ 0.21	\$ 0.44	\$ 0.78
Weighted-average number of common shares outstanding				
Basic	18,066	18,112	18,172	18,268
Diluted	18,275	18,339	18,377	18,433

<i>(in thousands, except per share data)</i>	For the Quarter Ended			
	December 31, 2018	September 30, 2018	June 30, 2018	March 31, 2018
Revenues	\$ 10,626 (2)	\$ 5,147	\$ 4,273	\$ 3,899
Cost of revenues, exclusive of operating expenses shown below	4,032 (2)	954	704	563
Other operating expenses	9,745 (2), (3)	4,161	5,138	5,048
Operating (loss) income	(3,151)	32	(1,569)	(1,712)
Earnings from equity method investments	16,351	9,715	15,889	12,253
Other expenses, net	(930)	(313)	(378)	(310)
Income before income tax expense	12,270 (2), (3)	9,434	13,942	10,231
Income tax expense (benefit)	5,272 (4)	3,931	(1,349)	2,569
Net income	<u>\$ 6,998</u>	<u>\$ 5,503</u>	<u>\$ 15,291</u>	<u>\$ 7,662</u>
Earnings per common share – basic	\$ 0.36	\$ 0.28	\$ 0.76	\$ 0.37
Earnings per common share – diluted	\$ 0.36	\$ 0.28	\$ 0.75	\$ 0.37
Weighted-average number of common shares outstanding				
Basic	19,339	19,726	20,062	20,502
Diluted	19,439	19,876	20,195	20,584

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

(1) During the fourth quarter of 2019, the Company recorded income tax benefit of \$2.9 million primarily due to a decrease in current income tax expense compared to current income tax recorded from the nine months ended September 30, 2019. This decrease was primarily due to a decrease in income before income tax expense for the year ended December 31, 2019 compared to the estimated annual income before income tax expense that was used in computing current income tax expense for the nine months ended September 30, 2019.

(2) During the fourth quarter of 2018, the Company completed the Carbon Solutions Acquisition and the operating results for the fourth quarter of 2018 include the operations of Carbon Solutions for the period from December 7 to December 31, 2018. For this period, Carbon Solutions contributed \$5.6 million to Revenues, \$3.4 million to Cost of Revenue, \$2.6 million to Other Operating Expenses and \$0.4 million to Loss before income tax expense.

(3) During the fourth quarter of 2018, the Company incurred \$3.4 million in transaction costs and \$1.1 million in severance charges for executives related to the Carbon Solutions Acquisition that were recorded in Other Operating Expenses.

(4) During the fourth quarter of 2018, the Company recorded income tax expense of \$5.3 million primarily due to an increase of \$4.5 million to the valuation allowance on its deferred tax assets.

Note 21 - Subsequent Events

Unless disclosed elsewhere in the notes to the Consolidated Financial Statements, the following are the significant matters that occurred subsequent to December 31, 2019.

Dividends

On February 7, 2020, the Board declared a quarterly dividend of \$0.25 per share of common stock, which was paid on March 10, 2020 to stockholders of record at the close of business on February 21, 2020.

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, 2019.

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, 2019.

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, 2019 and its report is included herein.

Changes in Internal Control Over Financial Reporting

During the fourth quarter of 2019, we completed the integration of Carbon Solutions into our internal control over financial reporting. Except for this change, 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 2019 that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

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, 2019, 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, 2019, 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 sheets of Advanced Emissions Solutions, Inc. as of December 31, 2019 and 2018, the related consolidated statements of operations, stockholders' equity and cash flows for the years then ended, and the related notes (collectively referred to as the "consolidated financial statements"), and our report dated March 16, 2020 expressed an unqualified opinion on those consolidated financial statements and included an explanatory paragraph relating to the adoption of ASC 842 - *Leases*.

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 16, 2020

Item 9B. Other Information

None.

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, 2019.

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, 2019.

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, 2019, 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 11 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, 2019:

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)	300,000	\$ 13.87	2,077,538
Equity compensation plans not approved by security holders	—	\$ —	—
Total	300,000		2,077,538

(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 300,000 shares of common stock issuable upon the exercise of outstanding options.

(3) The number of securities is reduced by 451,344 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, 2019.

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, 2019.

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;
 - (2) Financial Statement Schedules – All schedules are omitted because the required information is not applicable or is 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	Second Amended and Restated Certificate of Incorporation of Advanced Emissions Solutions, Inc.	10-Q	000-54992	3.1	August 9, 2013
3.2	Conformed Copy of the Bylaws of Advanced Emissions Solutions, Inc., as amended	10-K	001-37822	3.2	March 12, 2018
3.3	Certificate of Designation, Preferences, and Rights of Series B Junior Participating Preferred Stock of Advanced Emissions Solutions, Inc	8-K	001-37822	3.1	May 8, 2017
4.1	Form of Specimen Common Stock Certificate	10-Q	000-54992	4.1	August 9, 2013
4.2	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	8-K	001-37822	3.2	May 8, 2017
4.3	First Amendment to Tax Asset Protection Plan dated as of April 6, 2018, by and between the Company and Computershare Trust Company, N.A., as rights agent	8-K	001-37822	4.2	April 11, 2018
4.4	Second Amendment to Tax Asset Protection Plan dated as of April 5, 2019, by and between the Company and Computershare Trust Company, N.A., as rights agent	8-K	001-37822	4.3	April 11, 2019
10.1	Advanced Emissions Solutions, Inc. 2017 Omnibus Incentive Plan**	8-K	001-37822	10.1	June 22, 2017
10.2	Form of Employment Agreement dated August 27, 2014, among L. Heath Sampson, ADA-ES, Inc. and Advanced Emissions Solutions, Inc., as amended**	10-K	000-54992	10.19	February 29, 2016
10.3	Rider to Employment Agreement dated August 27, 2014 between Heath Sampson and ADA-ES, Inc. and Advanced Emissions Solutions, Inc.**	8-K	000-54992	10.66	September 2, 2014
10.4	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***	10-Q/A	000-50216	10.33	September 28, 2011
10.5	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	10-Q	000-50216	10.89	November 14, 2011
10.6	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	10-Q	000-50216	10.59	November 9, 2012
10.7	Contribution Agreement dated May 27, 2011 between ADA-ES, Inc. and NexGen Refined Coal, LLC	10-Q	000-50216	10.87	August 12, 2011

Exhibit No.	Description	Form	File No.	Incorporated by Reference Exhibit	Filing Date
10.8	<u>Amended and Restated Limited Liability Company 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
10.9	<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
10.10	<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
10.11	<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
10.12	<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
10.13	<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
10.14	<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
10.15	<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
10.16	<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
10.17	<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
10.18	<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
10.19	<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
10.20	<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
10.21	<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 as of September 19, 2013</u>	10-K	000-54992	10.69	February 29, 2016
10.22	<u>Form of Amendment No. 2 to Employment Agreement of Greg Marken and Theodore Sanders**</u>	10-Q	001-37822	10.1	August 6, 2018
10.23	<u>Purchase and Sale Agreement by and among Energy Capital Partners I, LP, Energy Capital Partners I-A, LP, Energy Capital Partners I-B IP, LP, Energy Capital Partners I (Crowfoot IP), LP, and Carbon Solutions Management, LLC, as Sellers, and Advanced Emissions Solutions, Inc., as Purchaser, dated as of November 15, 2018</u>	8-K	001-37822	2.1	November 15, 2018
10.24	<u>Term Loan and Security Agreement among Advanced Emissions Solutions, Inc., certain subsidiaries as Guarantors, the Bank of New York Mellon as administrative agent, and Apollo dated as of December 7, 2018</u>	8-K	001-37822	10.1	December 13, 2018

Exhibit No.	Description	Form	File No.	Incorporated by Reference Exhibit	Filing Date
10.25	Thirteenth Amendment of 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 7, 2018	8-K	001-37822	10.2	December 13, 2018
10.26	Lignite Mining Agreement between Demery Resources Company, L.L.C. and Five Forks Mining, LLC dated as of June 29, 2009***	10-K	001-37822	10.43	March 18, 2019
10.27	First Amendment to Lignite Mining Agreement between Demery Resources Company, L.L.C. and Five Forks Mining, LLC, dated as of March 22, 2017***	10-K	001-37822	10.44	March 18, 2019
10.28	Third Amendment to the Second Amended and Restated Operating Agreement of Tinum Group, LLC, dated September 4, 2019***	10-Q	001-37822	10.1	November 12, 2019
21.1	Subsidiaries of Advanced Emissions Solutions, Inc.*				
23.1	Consent of Moss Adams LLP*				
23.2	Consent of Moss Adams 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)*				
32.1	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*				
95	Mine Safety Disclosure Exhibit*				
101	The following financial statements, formatted in XBRL: (i) Consolidated Balance Sheets as of December 31, 2019 and 2018, (ii) Consolidated Statements of Operations for the Years ended December 31, 2019 and 2018, (iii) Consolidated Statements of Changes in Stockholders' Equity for the Years ended December 31, 2019 and 2018, (iv) Consolidated Statements of Cash Flows for the Years ended December 31, 2019 and 2018; 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.				

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:

- (1) Tinum Group, LLC and Subsidiaries;
 - a. Consolidated Financial Statements, December 31, 2019 and 2018 (With Independent Auditors' Reports Thereon);

Tinum Group, LLC and Subsidiaries
CONSOLIDATED FINANCIAL STATEMENTS
As of and for the Years Ended
December 31, 2019 and 2018

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Report of Independent Registered Public Accounting Firm

To the Board of Managers and Members of
Tinum Group, LLC

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of Tinum Group, LLC and subsidiaries (the Company) as of December 31, 2019 and 2018, the related consolidated statements of operations, members' equity and cash flows for the years 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, 2019 and 2018, and the consolidated results of its operations and its cash flows for the years then ended, in conformity with accounting principles generally accepted in the United States of America.

Change in Accounting Principle

As discussed in Note 1 to the consolidated financial statements, in 2019 the Company changed its method of accounting for revenue recognition due to the adoption of Accounting Standards Codification ("ASC") Topic No. 606, and its method of accounting for leases due to the adoption of ASC Topic No. 842.

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 audits. 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 audits 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 its internal control over financial reporting. As part of our audits 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 audits 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 audits 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 audits provide a reasonable basis for our opinion.

/s/ Moss Adams LLP

Denver, Colorado
March 13, 2020

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

TINUUM GROUP, LLC AND SUBSIDIARIES
CONSOLIDATED BALANCE SHEETS
As of December 31, 2019 and 2018
(in thousands)

ASSETS

	2019	2018
CURRENT ASSETS		
Cash and cash equivalents	\$ 44,441	\$ 26,211
Accounts receivable	6,030	7,218
Related party receivables	56	6,350
Contract receivables – current	42,916	—
Contract costs – current	21,503	—
Inventory	11,866	14,632
Other current assets	1,661	547
Total current assets	128,473	54,958
Fixed assets, net	50,323	75,206
Contract receivables – long term	51,587	—
Contract costs – long term	5,226	—
Other assets, net	18,684	17,785
TOTAL ASSETS	\$ 254,293	\$ 147,949

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

	2019	2018
ASSETS		
Cash and cash equivalents	\$ 31,481	\$ 10,939
Accounts receivable	22	1,574
Inventory	11,840	14,632
Other current assets	381	379
Non-current assets	14,838	11,981
TOTAL ASSETS	\$ 58,562	\$ 39,505

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, 2019 and 2018
(in thousands)

LIABILITIES AND MEMBERS' EQUITY

	2019	2018
CURRENT LIABILITIES		
Accounts payable	\$ 5,128	\$ 5,828
Accrued liabilities	7,076	3,169
Related party payables	10,278	10,705
Deferred revenue – current	9,810	31,206
Line of credit	5,500	—
Note payable to customer – current	21,600	—
Total current liabilities	59,392	50,908
Secured promissory notes	6,491	9,722
Deferred revenue – long term	—	3,420
Asset retirement obligations	1,449	1,304
Note payable to customer – long term	5,400	—
TOTAL LIABILITIES	72,732	65,354
MEMBERS' EQUITY		
Members' equity attributable to Class A Members	117,006	49,102
Member equity attributable to Class B Member	28,967	16,983
Noncontrolling interests	35,588	16,510
Total members' equity	181,561	82,595
TOTAL LIABILITIES AND MEMBERS' EQUITY	\$ 254,293	\$ 147,949

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.

Liabilities of Consolidated VIEs for Which Creditors Do Not Have Recourse Against the General Credit of Tinum Group, LLC

	2019	2018
LIABILITIES		
Accounts payable and accrued liabilities	\$ 6,745	\$ 6,266
Related party payables	5,462	3,135
Secured promissory notes	6,491	9,722
Non-current liabilities	1,091	795
TOTAL LIABILITIES	\$ 19,789	\$ 19,918

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, 2019 and 2018
(in thousands)

	2019	2018
REVENUES		
Reduced emissions and unrefined fuel	\$ 500,404	\$ 451,273
Lease revenues	—	162,684
REF Facility revenues – over time	142,028	—
REF Facility revenues – point-in-time	45,608	—
Other	733	1,103
TOTAL REVENUES	688,773	615,060
COST OF SALES (exclusive of depreciation shown separately below)		
Feedstock purchases	500,404	451,273
Cost of REF facilities	11,509	—
Chemicals	22,521	18,648
Site and production fees	27,523	20,849
Royalties and fees	21,840	17,155
TOTAL COST OF SALES	583,797	507,925
GROSS PROFIT	104,976	107,135
OPERATING EXPENSES	8,983	7,935
SELLING, GENERAL AND ADMINISTRATIVE EXPENSES	12,297	10,688
DEPRECIATION AND AMORTIZATION EXPENSE	16,361	5,039
INCOME FROM OPERATIONS	67,335	83,473
OTHER (INCOME) EXPENSE		
Interest income	(2,526)	(35)
Other expense	1,674	3,982
Interest expense	482	368
TOTAL OTHER (INCOME) EXPENSE	(370)	4,315
INCOME BEFORE INCOME TAXES	67,705	79,158
Income tax expense	465	1,359
NET INCOME	67,240	77,799
Class B holders preferred return	—	(12)
Loss attributable to noncontrolling interests	78,544	58,013
NET INCOME AVAILABLE TO MEMBERS	\$ 145,784	\$ 135,800

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, 2019 and 2018
(in thousands)

	Temporary Class B Member	Class A Members	Class B Member	Non- Controlling Interests	Total Members' Equity
BALANCES, JANUARY 1, 2018	\$ 821	\$ 40,452	\$ —	\$ 8,757	\$ 50,030
Class B holders preferred return	12	—	—	—	12
Member contributions	—	—	—	65,766	65,766
Member distributions	(513)	(107,100)	(3,387)	—	(111,000)
Reclassification of member equity	(320)	320	—	—	—
Net income available to members	—	115,430	20,370	—	135,800
Net loss attributable to noncontrolling interests	—	—	—	(58,013)	(58,013)
BALANCES, DECEMBER 31, 2018	<u>—</u>	<u>49,102</u>	<u>16,983</u>	<u>16,510</u>	<u>82,595</u>
Change in accounting principle	—	74,463	13,141	—	87,604
Member contributions	—	—	—	97,622	97,622
Member distributions	—	(130,475)	(23,025)	—	(153,500)
Net income available to members	—	123,916	21,868	—	145,784
Net loss attributable to noncontrolling interests	—	—	—	(78,544)	(78,544)
BALANCES, DECEMBER 31, 2019	<u>\$ —</u>	<u>\$ 117,006</u>	<u>\$ 28,967</u>	<u>\$ 35,588</u>	<u>\$ 181,561</u>

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, 2019 and 2018
(in thousands)

	2019	2018
CASH, BEGINNING OF YEAR	\$ 26,211	\$ 13,309
CASH FLOWS FROM OPERATING ACTIVITIES		
Net income	67,240	77,799
Adjustments to reconcile net income to net cash provided by operating activities:		
Depreciation and amortization	16,361	5,039
Noncash operating lease expense	159	—
Assets sold as part of REF Facility transaction	11,509	—
Loss on sale of assets	1,803	3,996
Gain on removal of asset retirement obligation	(129)	—
Accretion of asset retirement obligation	134	115
Deferred taxes	(904)	224
Amortization of contract costs	871	—
Effects of changes in operating assets and liabilities:		
Accounts receivable	1,188	(1,498)
Related party receivables	6,294	(5,381)
Contract receivables	(7,387)	—
Inventory	2,766	(3,562)
Payments on inventory purchase contract	—	(8,187)
Other assets	263	(10)
Accounts payable and accrued liabilities	2,033	3,221
Related party payables	1,524	1,230
Settlement of asset retirement obligation	(230)	(30)
Deferred revenue	(13,795)	(380)
Payments on operating leases	(176)	—
Net cash provided by operating activities	<u>89,524</u>	<u>72,576</u>
CASH FLOWS FROM INVESTING ACTIVITIES		
Capital expenditures for fixed assets	(17,891)	(16,914)
Proceeds from sale of fixed assets	206	36
Net cash used in investing activities	<u>(17,685)</u>	<u>(16,878)</u>
CASH FLOWS FROM FINANCING ACTIVITIES		
Borrowings (repayments) under secured promissory note	(3,231)	2,438
Borrowings under line of credit	5,500	4,000
Repayments under line of credit	—	(4,000)
Contributions from noncontrolling interest members	97,622	65,766
Distributions paid to members	(153,500)	(111,000)
Net cash used in financing activities	<u>(53,609)</u>	<u>(42,796)</u>
NET INCREASE IN CASH	<u>18,230</u>	<u>12,902</u>
CASH, END OF YEAR	<u>\$ 44,441</u>	<u>\$ 26,211</u>

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, 2019 and 2018
(in thousands)

	2019	2018
SUPPLEMENTAL DISCLOSURES		
Cash paid for interest	\$ 389	\$ 342
Cash paid for taxes	1,313	808
NON-CASH TRANSACTIONS		
Customer note for contract costs	\$ 27,000	\$ —
Capitalized contract costs	600	—
Capital expenditures included in related party payables	1,951	1,977
Asset retirement obligation layer	370	153

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

TINUUM GROUP, LLC AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS
DECEMBER 31, 2019 and 2018
(in thousands)

NOTE 1 - SIGNIFICANT ACCOUNTING POLICIES

Tinum Group, LLC (together with its subsidiaries, “Tinum” or “TG” 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 or “REF”) 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 2019 and 2018 PTC rates were \$7.173 and \$7.031 per ton of REF 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 REF to qualify for PTCs. The REF 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. The two REF Facilities that were placed in service prior to January 1, 2010 no longer qualify for PTCs as of December 31, 2019.

At December 31, 2019 and 2018, respectively, 20 and 19 REF Facilities had been sold to or were under lease with third-party investors (“TP Investors”) who utilize the REF Facilities to produce REF (each of these REF Facilities is owned or leased by a “Producer Entity”). Some of the Producer Entities are owned or leased exclusively by a TP Investor and some are owned or leased by a TP Investor with some ownership percentage retained by the Company. The REF Facilities are located at coal-fired generation stations throughout the United States.

Tinum may also produce REF from REF Facilities for the benefit of its Members. As of December 31, 2019 and 2018, none of the REF Facilities were retained to produce REF for the Members. In instances where Tinum retains certain member interests in a Producer Entity, PTCs generated are allocated to Tinum in proportion to its member interests and are therefore 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 proprietary chemical additives, an operating fee for the production of REF, 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 of America (“GAAP”) and 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 any of the following criteria outlined in Accounting Standard Codification 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, (ii) the entity has equity investors that, as a group, lack the characteristics of a controlling financial interest or (iii) the entity is structured with non-substantive voting rights.

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 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

TINUUM GROUP, LLC AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS
DECEMBER 31, 2019 and 2018
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statements and the reported amounts of revenue and expenses during the reporting period. Management bases its estimates on historical experience and on various other assumptions that are believed to be reasonable under the circumstances. Significant estimates include the estimated contingent revenues recognized related to revenues recognized at a point-in-time, the estimated useful lives associated with REF Facilities and assumptions associated with asset retirement obligations ("ARO"). Ultimate realization of assets and settlement of liabilities in the future could differ from those estimates.

During the third quarter of 2019, the Company reevaluated the estimated useful life of its REF Facilities. As a result, the Company determined that the estimated useful life of the REF Facilities should be reduced from 20 years as originally estimated to the remainder of the 10 year period from the date the REF Facility was originally placed in service. The Company accounted for the change in the useful life of the REF Facilities as a change in accounting estimate beginning August 1, 2019. The impact of the change in estimate resulted in a decrease in net income of \$11,644 for the year ended December 31, 2019.

Cash and Cash Equivalents

The Company considers all highly liquid investments with original maturities of three months or less to be cash equivalents. The carrying value approximates fair value due to the short-term nature of these instruments. The Company maintains its cash and cash equivalents in accounts with a local financial institution. These accounts at times may exceed federally insured limits. The Company has not experienced any losses in these accounts and believes it is not exposed to any significant credit risk related to cash and cash equivalents.

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, 2019 and 2018. 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, 2019 and 2018, no allowance for doubtful accounts was considered necessary.

Inventory

Inventory is comprised primarily of feedstock fuel and chemicals used in the production and sale of REF at REF Facilities. Inventory is valued at the lower of cost or net realizable value using the average cost method.

Fixed Assets

Fixed assets are stated at historical cost less accumulated depreciation and consist primarily of the REF Facilities and ancillary equipment, including major additions and improvements. 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 10 years.

The Company records an ARO liability 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 ("Site"). The ARO liability is estimated by the Company based on legal removal requirements, historical removal experience, and 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

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(in thousands)

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 consolidated statements of operations.

Intangible Assets

Tinum has two exclusive licenses from ADA for the patented and proprietary "CyClean™" and "M-45™" technologies related to the production of REF. 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, net on the consolidated balance sheets 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, 2019 and 2018.

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, 2019 and 2018, there were no such impairments.

Adoption of New Accounting Policies

Leases

Tinum elected to early adopt ASC 842, *Leases* ("ASC 842"), effective January 1, 2019, concurrent with the adoption of ASC 606, *Revenue from Contracts with Customers* ("ASC 606"). As a result, the Company, on January 1, 2019, recognized right-of-use ("ROU") assets and lease liabilities on a modified retrospective basis. The practical expedients known as the "package of practical expedients or Group of 3" permit companies to retain prior conclusions about lease identification, lease classification and initial direct costs. The Company did not elect the "package of practical expedients" and thus has reassessed its contracts (both as lessee and lessor) under the updated ASC 842 criteria. Tinum did elect the use-of hindsight practical expedient as it relates to the assessment of lease or contract terms.

Lessee contracts

In contracts where the Company is a lessee, each contract was reassessed using the new lease criteria and the Company identified operating and financing leases primarily related to its office space and office equipment. Tinum's accounting for finance leases, previously known as capital leases, remained substantially unchanged. Tinum recognized ROU assets of \$750 and an operating lease liability of \$816 for operating leases and derecognized \$66 of deferred rents on January 1, 2019.

The Company determines if a contractual arrangement is a lease at inception. Effective January 1, 2019, operating leases are included in the ROU assets within fixed assets, net; and lease liabilities are included within accrued liabilities, on the consolidated balance sheets.

Lessor contracts

Under ASC 842, the definition of a lease was modified to include the right to control the use of an identified asset. Utilizing the revised definition of a lease under ASC 842, the Company has reassessed its existing revenue generating contracts which include leases ("Leases"), membership interest purchase agreements ("MIPAs") and asset purchase agreements ("APAs"). These contracts have historically been accounted for as leases under ASC 840, *Leases* ("ASC 840"), or via analogy based upon other accounting guidance that was superseded by the issuance of the ASC 606 guidance. As a result of this reassessment, the Company determined that the contracts previously accounted for as leases under ASC 840 no longer meet the control criteria of a lease and the MIPAs and APAs, previously accounted for via analogy to ASC 840, were required to be analyzed and recorded utilizing the guidance in ASC 606.

TINUUM GROUP, LLC AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS
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(in thousands)

Revenues

On January 1, 2019 the Company adopted ASC 606, using the modified retrospective method. Comparative information has not been restated and continues to be accounted for under the historical revenue recognition accounting standards in effect for those periods. The Company recorded the cumulative effect of initially applying the new revenue standard as an adjustment to the opening balance of Members' equity.

As part of the adoption of ASC 606, the Company elected the following transition practical expedients: (i) to reflect the aggregate of all contract modifications that occurred prior to the date of initial application when identifying satisfied and unsatisfied performance obligations, determining the transaction price, and allocating the transaction price, and (ii) to apply the standard to all contracts at the date of initial application. Because contract modifications are minimal, there was not a significant impact as a result of electing these practical expedients.

The adoption of ASC 606 primarily impacted the revenues previously recorded as lease revenue associated with APAs that previously were accounted for under ASC 360-20, *Property, Plant and Equipment - Real Estate Sales* ("ASC 360-20"), which had required the Company to evaluate whether such arrangements had any forms of continuing involvement that may have affected the revenue or profit recognition of these transactions. When such forms of continuing involvement were present, revenues were recognized in a manner similar to an operating lease.

The adoption of ASC 606, which superseded the real estate sales guidance under ASC 360-20, generally requires revenue to be recognized for APAs earlier than what Tinuum's historical practice had been. Under ASC 606, revenue for APA transactions is recognized as of a "point-in-time" when control of the REF Facility transfers to the customer, rather than ratably over time.

At contract inception, under ASC 606, the Company identifies performance obligations by reviewing the combination of customer agreements for material distinct goods and services. Goods and services are distinct when the customer can benefit from them on their own and the promises to transfer these items are separately identifiable from other promises within the contract. When the Company is contracted to provide a single promise (an integrated system), it is treated as a single performance obligation as goods and services are provided with the same pattern of transfer. The Company has identified the provision of the technology sublicense combined with the use of the REF Facility to be a single performance obligation.

Commencing January 1, 2019, REF Facility revenues are recognized based upon the type of contract with the TP Investor. Generally, the Company has three types of contracts with customers (a) Leases, (b) MIPAs and (c) APAs. In all instances the contracts relate to the use of the REF Facility and the related sublicensed patented technology which is necessary for each Producer Entity to produce REF utilizing the REF Facilities.

Depending upon the agreement, the Company may receive fixed payments or a combination of fixed and variable payments over the contract term. Variable payments are determined based upon the expected amount of REF production during the defined period. Certain prepayments are received upon execution of TP Investor agreements.

For the Leases and MIPA contracts, revenue is recognized "over time" using the output method, utilizing actual REF production volumes. In these agreements where a prepayment is received, that amount is recorded as deferred revenue and is amortized into revenue in accordance with the amortization period of the respective TP Investor agreement. Contingent consideration associated with Leases or MIPAs is recorded based upon actual REF production volumes achieved, constrained by any contractual limitations or by production volumes that management estimates could occur.

Revenues recorded related to the APAs are recorded when the Company has completed delivery of the REF Facility and has transferred title and control of the REF Facility to the TP Investor. These revenues are recognized at a "point-in-time" based upon the net present value of the expected fixed purchase payments plus management's estimate of any variable payments associated with the sale. Additionally, since the payments are made quarterly over a time period exceeding one year, a financing component exists to these transactions. Interest recorded related to these contracts is recorded as interest income in the statement of operations and was \$2,346 for the year ended December 31, 2019. As a result of the recording of APA revenues as of a point-in-time, future cash flows will be received according to the contractual payment schedules, but no future revenues, other than changes in estimates,

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will be recognized for these contracts. Generally, the REF Facility is collateral for the outstanding contract receivable balances recorded by Tinuum.

The Company recognizes a contract receivable when the Company transfers control of a REF Facility to the customer in advance of receiving consideration. An accounts receivable balance represents the Company's right to consideration that is unconditional and only the passage of time is required before payment of that consideration is due. Deferred revenue is recognized when the Company receives consideration in advance of performance.

Prior to adoption of ASC 606, under certain REF Facility transactions, an initial deposit or prepayment was received. Any prepayments received were recorded as deferred revenue and were amortized into revenue under the straight-line method over the amortization period defined in the respective agreement. As of December 31, 2018, the Company recorded \$34,626 of deferred revenue related to prepayments.

The Company disaggregates revenue based upon the revenue recognition methodology (over time vs. point-in-time). The following table represents a disaggregation of revenue from contracts with customers for the year ended December 31, 2019 compared with the revenue that would have been recognized prior to the adoption of ASC 606.

Statement of Operations

	<u>As Reported</u>	<u>Adjustments</u>	<u>Balance without ASC 606 Adoption</u>
REF Facility revenues - point-in-time	\$ 45,608	\$ (45,608)	\$ —
REF Facility revenues - over time	142,028	47,954	189,982
Interest income	2,526	(2,346)	180

Balance Sheet

	<u>As Reported</u>	<u>Adjustments</u>	<u>Balance without ASC 606 Adoption</u>
Contract receivables	\$ 94,503	\$ (94,503)	\$ —
Contract costs	26,729	(26,729)	—
Interest receivable, within other current assets	541	(541)	—
Deferred revenues	9,810	36,367	46,177

Significant judgments and estimates are used in the Company's revenue policies. Throughout the revenue cycle, the Company evaluates contractual evidence, monitors performance and evaluates variable consideration changes.

Taxes assessed by a governmental agency that are imposed on and concurrent with a specific revenue producing transaction collected by the Company from a customer are excluded from revenues.

Shipping and handling costs are not associated with Tinuum's products and services and therefore are not included in revenues or costs of revenues.

No amounts have been recorded for returns, refunds, or other similar obligations.

Impact of ASC 606 and ASC 842 Adoption

The cumulative effect of the changes made to the consolidated balance sheet for the adoption of ASC 606 and ASC 842 on January 1, 2019 were as follows (in thousands):

TINUUM GROUP, LLC AND SUBSIDIARIES
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	<u>Balance at December 31, 2018</u>	<u>Adjustments Due to ASC 606</u>	<u>Adjustments Due to ASC 842</u>	<u>Balance at January 1, 2019</u>
Assets				
Contract receivables	\$ —	\$ 87,116	\$ —	\$ 87,116
Interest receivables, within other current assets	—	1,377	—	1,377
Fixed assets, net	75,206	(11,910)	—	63,296
ROU asset	—	—	750	750
Liabilities				
Deferred revenues	\$ 34,626	\$ (11,021)	\$ —	\$ 23,605
Accrued expenses -				
Operating lease liability	—	—	816	816
Deferred operating lease rents	66	—	(66)	—
Members' Equity	\$ 82,595	\$ 87,604	\$ —	\$ 170,199

Income Taxes

The Company, with the consent of its Members, has elected to be taxed under applicable sections of federal and state income tax laws 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.

In 2019, one of the Company's consolidated VIEs has elected to be a C corporation for federal and state income tax purposes. As a result, that VIE's income tax provision and related deferred tax assets and liabilities are included within the consolidated financial statements.

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.

The Company applies the requirement of ASC 740, *Income Taxes*, related to accounting for uncertain tax positions.

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 Members' equity.

Recent Accounting Pronouncements

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"). This ASU provides guidance for recognizing credit losses on financial instruments based on an estimate of current expected credit losses model. The FASB subsequently issued ASU 2019-04, *Codification Improvements to Topic 326, Financial Instruments - Credit Losses, Topic 815, Derivatives and Hedging, and Topic 825, Financial Instruments* and ASU 2019-11, *Codification Improvements to Topic 326, Financial Instruments - Credit Losses* to clarify and address certain items related to the amendments in ASU 2016-13. ASU 2019-10, *Financial Instruments - Credit Losses (Topic 326), Derivatives and Hedging (Topic 815) and Leases (Topic 842)* amends the mandatory effective date for ASU 2016-13. The

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amendments are effective for fiscal years beginning after December 15, 2022 for private companies. Although the impact upon adoption will depend on the financial instruments held by the Company at that time, the Company does not anticipate a significant impact on its consolidated financial statements.

In October 2018, the FASB issued ASU 2018-17, *Consolidation: Targeted Improvements to Related Party Guidance for Variable Interest Entities*, which modifies the guidance related to indirect interests held through related parties under common control for determining whether fees paid to decision makers and service providers are variable interests. The guidance is effective for annual reporting periods beginning after December 15, 2019 and early adoption is permitted. The Company does not expect this standard to have a material impact on the Company's consolidated financial statements.

NOTE 2 - FIXED ASSETS

Reduced Emissions Fuel Facilities

Each of the REF Facilities and related components that were placed in service by the Company in 2009 and 2011 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 10-year period, commencing with the original placed in service date in 2009 or 2011, as appropriate. The two REF Facilities originally placed in service in 2009 were fully depreciated as of December 31, 2019.

Under the site license agreements between the Producer Entities or Tinuum and the Generators, Tinuum may be required to return the site upon which the REF Facility is located at a 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 historical 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, 2019 and 2018, within operating expenses, the Company recorded \$134 and \$115 of accretion expense, respectively.

The following table describes changes to the Company's ARO liability for the years ended December 31, 2019 and 2018:

	<u>2019</u>	<u>2018</u>
Beginning balance	\$ 1,304	\$ 1,066
Liabilities incurred, net	370	153
Removal of liability	(129)	—
Accretion	134	115
Settlement of obligations	(230)	(30)
Ending balance	<u>\$ 1,449</u>	<u>\$ 1,304</u>

Furniture, Fixtures and Equipment

Furniture, fixtures, and equipment is comprised of office furniture, fixtures and office equipment, including those under finance leases. These assets are recorded at cost and depreciated using the straight-line method with estimated useful lives ranging from 3 to 8 years.

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The following table summarizes the components of gross and net carrying amounts for fixed assets as of December 31, 2019 and 2018:

	<u>2019</u>	<u>2018</u>
REF Facilities and related equipment	\$ 86,832	\$ 101,559
Assets associated with removal obligations	1,129	1,304
Furniture, fixtures and equipment	1,045	1,091
ROU assets	702	—
Other	369	348
Accumulated depreciation	(39,754)	(29,096)
Fixed assets, net	<u>\$ 50,323</u>	<u>\$ 75,206</u>

Depreciation expense was \$16,356 and \$5,034, for the years ended December 31, 2019 and 2018, respectively.

NOTE 3 - INVENTORY

Inventory is comprised primarily of feedstock fuel and chemicals used in the production and sale of REF at REF Facilities. Inventory is valued at the lower of cost or net realizable value using the average cost method. 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, 2019 and 2018.

	<u>2019</u>	<u>2018</u>
Feedstock fuel	\$ 11,187	\$ 14,150
Chemicals	679	482
Total inventory	<u>\$ 11,866</u>	<u>\$ 14,632</u>

NOTE 4 - REVENUES

REF Facility Revenues

As discussed in Note 1, revenue is recognized when a performance obligation is satisfied. The Company's contracts can contain both fixed and variable components of the transaction price. Each contract is evaluated for these components and may be determined to include fixed consideration, variable consideration and financing components as part of the overall transaction price. The Company receives payments from customers based upon specific payment schedules established under each contract. Payment schedules can include a combination of down payments, fixed payments and variable payments, based upon expected production volumes, and are generally made quarterly.

When a contract is determined to contain variable consideration, the transaction price is estimated using the expected value (i.e., the most likely amount method) to predict revenue for that contract. These variable amounts are estimated at contract inception based upon the projected REF production volumes associated with the specific Generator location. Estimated amounts are included in the transaction price to the extent it is probable that a significant reversal of cumulative revenue recognized will not occur when the uncertainty associated with the variable consideration is resolved. Estimates of variable consideration are estimated based upon contractual terms, historical experience and projected REF production volumes.

Changes in estimates for variable consideration can occur for a variety of reasons, including but not limited to (i) annual inflation adjustment factors being different from what was originally estimated and (ii) changes in actual versus expected production volumes of REF. Changes in estimates may have a material effect on our consolidated statements of operations.

Eight and eleven, respectively, of the REF Facility transactions with TP Investors are transactions with a related party as of December 31, 2019 and 2018. These transactions generally have terms that extend to the date ten years after the placed in service date for

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the particular REF Facility, subject to earlier termination by the TP Investor at periodic intervals or upon the occurrence of specified events. During 2019, two of these transactions were terminated as a result of the Generators closing their coal-fired generation station and one additional transaction expired as that particular REF Facility met its date that was ten years after its place in service date.

Under the various TP Investor agreements, Tinuum has committed to provide the REF Facility and the related sublicense for a term as identified in each contract. Most of the agreements expire in 2021 or by the first quarter of 2022. Generally, payments are made quarterly to Tinuum on a net 10 to 30 days basis, in advance of the respective quarter. Contracts with variable consideration are billed quarterly in arrears, once production volumes are known, under similar payment terms. No allowance for doubtful accounts related to accounts receivable balances or impairment of contract receivables has been recorded as of December 31, 2019 and 2018.

The opening and closing balances of the Company's contract receivables and deferred revenues are as follows:

	Contract Receivables	Deferred Revenue (current)	Deferred Revenue (long-term)
Opening (January 1, 2019)	\$ 87,116	\$ 22,566	\$ 1,039
Closing (December 31, 2019)	94,503	9,810	—
Increase/(decrease)	<u>\$ 7,387</u>	<u>\$ (12,756)</u>	<u>\$ (1,039)</u>

The amounts of revenue recognized in the period that were included in opening deferred revenues current and long-term balances were \$21,890 and \$1,039, respectively. The differences between the opening and closing balances of the Company's contract receivables and deferred revenues primarily result from the timing differences between the customers' payment and the Company's delivery of the performance obligation.

The following is an estimate of the cash flows expected to be received from TP Investors through December 31, 2021, assuming no variations in estimated production volumes, no modifications of payments, non-renewals or early terminations of contracts. It is possible that future payments from TP Investors may be modified or reduced. Future REF Facility payments, including any eliminated in consolidation, are based on the estimated levels of REF production. No estimated amounts related to point-in-time revenues have been included below:

2020	\$ 160,832
2021	146,674
Thereafter	9,074
	<u>\$ 316,580</u>

In December 2019, the Company agreed to provide a future price concession to a significant customer. A portion of the price concession is to be provided via a note payable ("Customer Note") under which the Company will make monthly principal and interest payments to the customer commencing in January 2020 and continuing through March 2021. The Customer Note is \$27,000 and the Company has recorded the amount as contract costs on the consolidated balance sheet and has allocated the payments to the customer as a reduction to the transaction price of the existing contracts with the customer. The reduction in the transaction price is being recorded monthly, commencing with the contract date of December 2019 through the end of the term of the payments of March 31, 2021. The reduction in the transaction price is recorded as production volumes are achieved (over time). During the year ended December 31, 2019, revenues were reduced by \$871 under this price concession contract.

In certain instances, the Company employs outside parties to facilitate the commencement of a Lease, MIPA or APA transaction. Under these agreements, the Company typically pays the outside party a fee ("Fee") relative to either the collection of revenues by the Company or the REF production volumes achieved. Under the Lease and MIPA transactions, any related contract costs are recorded as the production volumes or collection of revenues are achieved. These amounts are recorded as a component of cost of goods sold. Under the APA agreements, the Fees are capitalized as contract costs based on the estimated revenues recognized

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at the commencement of the contract and are amortized as a reduction of revenue over the period of benefit. As of December 31, 2019, Fees included in contract costs on the consolidated balance sheet were \$600.

Reduced Emissions and Unrefined Fuel Revenues

The Company's consolidated VIEs, which are Producer Entities, purchase and take title to feedstock fuel under purchase agreements with each respective Generator or other supplier of feedstock fuel. Each Producer Entity purchases chemicals from third-party vendors and applies them to the feedstock fuel to produce REF utilizing REF Facilities. The REF is sold by the Producer Entities, under REF sale agreements, to a Generator or to another third party at the discretion of the Manager of each Producer Entity, as permitted under the applicable Generator agreements. The Company performs REF recertification or redetermination testing periodically as required by Section 45 with respect to production and sale of REF at each of its REF Facilities. During the years ended December 31, 2019 and 2018, each of the Producer Entities sold all of its REF and unrefined fuel (coal untreated but part of the REF process) to third parties that used the fuel to generate electricity and recorded such amounts as REF and unrefined fuel revenues.

Each VIE utilizes the combination of the REF Facility and the technology license to combine raw materials (feedstock coal and chemicals) to produce REF which is then sold as a separate manufactured product to its customer, the Generator. As a result, the Company recognizes both REF Facility revenues and reduced emissions and unrefined fuel on a gross basis.

NOTE 5 - VARIABLE INTEREST ENTITIES

The Company consolidates seven entities (the "TG VIEs") that were created as REF production companies. The operations include the purchase of feedstock fuel from a Generator, application of chemicals utilizing that Producer Entity's REF Facility, and the subsequent sale of REF to the Generator. In six of the TG VIEs, CCS-AE, LLC ("CCS-AE"), a subsidiary of the Company, or another Tinum entity is the Managing Member and holds a 0.2% or 1.0% member interest, depending on the transaction. In the remaining TG VIE, TG has retained a 49.9% member interest and Tinum is the manager. As the Managing Member of the TG VIEs, CCS-AE or Tinum directs the activities that are considered most significant to the entities. 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, 2019 and 2018. 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 seven 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 Managing Member, the Managing Member 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 Managing Member, or (iii) suspend operations of the REF Facility. In certain instances, the TP Investor has the ability to put, and Tinum has the ability to call, the other member interests at a purchase price equal to fair market value.

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

Under certain of the TG VIE agreements, capital call limitations exist, limiting the amount of capital calls if certain operational costs are exceeded.

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NOTE 6 - NOTES PAYABLE

Line of Credit

In September 2019, the 2013 Revolver (“Revolver”) with BOK Financial (“BOK”), was amended and replaced with the Fifth Amendment to the Revolver (“Fifth Amendment”). Under the Fifth Amendment, the available borrowing limit was reduced to:

	Available Borrowing Limit
For the period ending December 30, 2019 through September 29, 2020	\$ 7,000
For the period commencing September 30, 2020 through December 30, 2020	\$ 3,400
For the period after December 31, 2020	\$ —

The Fifth Amendment also requires any outstanding borrowings to be fully repaid for a period of fifteen consecutive days during two non-consecutive calendar quarters.

Amounts outstanding under the Fifth 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 Fifth 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 Fifth Amendment is also collateralized by the Company’s deposit accounts held at BOK. These accounts are not restricted by the Fifth Amendment.

Tinum is required to be in compliance with certain covenants under the Fifth Amendment, including tangible net worth as defined in the agreement. As of December 31, 2019, and 2018, the Company was in compliance with the loan covenants. As of December 31, 2019 and 2018, respectively, the outstanding balance on the Revolver was \$5,500 and \$0.

Customer Note

As mentioned in Note 4, in December 2019, the Company agreed to provide a future price concession to a significant customer via a Customer Note. The Company will make monthly principal and interest payments to the customer commencing January 2020 through March 2021. The Customer Note amount is \$27,000 and the Company has recorded the amount due to the customer as short-term and long-term notes payable in the consolidated balance sheets. The Customer Note bears interest at 8% per annum.

Under the Customer Note, Tinum has agreed to maintain a Cash Reserve Account of \$3,000, to limit additional indebtedness to \$7,000 (plus amounts to finance Company insurance premiums plus a maximum of \$500 for finance leases) and to maintain compliance with certain loan covenants. At December 31, 2019, the Company was in compliance with the loan covenants.

Secured promissory note

In February 2014, a VIE consolidated into the consolidated financial statements of the Company, entered into an \$11,000 secured promissory note (the “Note”) with a Generator from which it purchases feedstock fuel, and to which it sells reduced emissions and unrefined fuel on a monthly basis. The purpose of the Note is to finance the purchases of feedstock fuel from the Generator. The amount of principal and interest owed is dependent upon the amount of feedstock fuel purchased and reduced emissions and unrefined fuel sold between the two parties and is net settled on a monthly basis. The Note is collateralized by the feedstock fuel 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, 2019 and 2018 was 2.72% and 1.68% 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 the TG VIE and the Generator.

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As of December 31, 2019, and 2018, respectively, the outstanding balance on the Note was \$4,505 and \$7,736 with interest payable of \$32 and \$40.

In June 2018, a second VIE consolidated into the consolidated financial statements of the Company, entered into an \$1,986 secured promissory note (“2018 Note”) with a Generator to fund the initial purchase of feedstock fuel. The 2018 Note bears interest at a per annum rate equal to the mid-term applicable federal rate announced by the IRS in December of each year. The rate was 3.03% and 2.82% for the years ended December 31, 2019 and 2018, respectively. Interest is payable quarterly in arrears. The 2018 Note is collateralized by the feedstock fuel inventory.

All outstanding amounts owed under the 2018 Note are due and payable on the earlier of December 31, 2025, or the termination or expiration of the Feedstock Coal Purchase Agreement between the Company and the Generator.

At each of December 31, 2019 and 2018, the outstanding balance on the Note was \$1,986. Interest payable of \$5 was recorded as of both December 31, 2019 and 2018.

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 were considered conditionally redeemable as specified in the Second Amended and Restated Operating Agreement and the Class B Agreement. GSFS’ Class B units included a guaranteed 15% annual return calculated monthly based upon the outstanding balance as of that date. The outstanding balance over time was 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 in the Class B units was reduced to zero.

In September 2019, the Second Amended and Restated Operating Agreement was amended to eliminate the preferential redemption provisions for the Class B shares and simultaneously reallocated certain tax attributes between the Class A and B Members.

As a result of the repayment of the guaranteed return and the unrecovered investment balance in February 2018, as of December 31, 2018, the Class B units were no longer considered conditionally redeemable and are now considered to be a non-voting class of Members’ equity. GSFS continues to own Class B units which 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, 2019 and 2018.

Class A Units (voting)	85 %
Class B Units (non-voting)	15 %

NOTE 8 - INCOME TAXES

During the years ended December 31, 2019 and 2018, the Company has concluded that there are no significant uncertain tax positions that would require recognition or disclosure in the financial statements. As of December 31, 2019, and 2018, the Company made no provision for interest or penalties related to uncertain positions.

Deferred income taxes reflect the net tax effects of temporary differences between the carrying amounts of assets and liabilities for financial reporting purposes and the amounts for income tax purposes related to one of the Company's consolidated VIEs. Under a tax sharing agreement with the specific TP Investor of this VIE, the deferred tax assets are allocated specifically to the TP Investor and are not for the benefit of Tinuum or its members. Net deferred tax assets are included within other long-term assets on the consolidated balance sheet:

	2019
Net operating losses	\$ 287
Production tax credits	617
Total deferred tax assets	<u>\$ 904</u>

Net operating loss carryforwards can be carried forward indefinitely and the PTCs can be carried forward for 20 years.

For the years ended December 31, 2019 and 2018, income tax expense (benefit) consisted of the following:

	2019	2018
Current	\$ 1,369	\$ 1,135
Deferred	(904)	224
Total income tax expense	<u>\$ 465</u>	<u>\$ 1,359</u>

NOTE 9 - RELATED PARTY TRANSACTIONS

During 2019 and 2018, 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
	<i>(a)</i>	<i>(b)</i>	<i>(c)</i>	<i>(d)</i>
As of December 31, 2019				
Accounts receivable	\$ —	\$ —	\$ 56	\$ —
Accounts payable	4,104	6,134	20	20
As of December 31, 2018				
Accounts receivable	\$ —	\$ 6,350	\$ —	\$ —
Accounts payable	4,284	6,397	—	24
Revenues Recognized During the Year Ended				
December 31, 2019	\$ —	\$ 45,608	\$ 121,794	\$ —
December 31, 2018	—	23,968	121,229	—
Expenses Incurred During the Year Ended				
December 31, 2019	\$ 16,945	\$ 14,807	\$ —	\$ 519
December 31, 2018	15,144	11,222	—	551

- (a) ADA expenses include expenditures for royalties.
- (b) TS expenses include operating expenses associated with the operations of retained REF Facilities. TS revenues include Asset Purchase Agreement payments from TP Investors included within the TS consolidated financial statements.
- (c) GSFS affiliates revenues relate to REF Facility lease revenues recognized.
- (d) NexGen and affiliates expenses include management fees and labor costs.

The Company acquires substantial amounts of fixed assets from TS. For the years ended December 31, 2019 and 2018, the Company acquired \$17,951 and \$18,651, respectively, of capital assets from its related party, TS.

NOTE 10 - COMMITMENTS

Purchase Commitments

In November 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 REF production at REF Facilities that utilize the M-45™ technology. During the years ended December 31, 2019 and 2018, respectively, the Company recognized royalty expense under cost of sales in the amounts of \$16,900 and \$15,141, respectively.

In December 2015 the Company was assigned, by TS, a Master Supply Agreement with a chemical vendor. Under the agreement the Company had a commitment commencing January 1, 2015, for minimum purchase quantities of the specified chemical that if not achieved would 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 were achieved. In 2018 an agreement was reached to further amend the Master Supply Agreement and the Company made an additional prepayment of \$8,187 resulting in a total prepaid amount of \$17,755 on deposit with the vendor as of both December 31, 2019 and 2018. This amount is included within long-term other assets in the Company’s consolidated balance sheets. The Company anticipates utilizing the prepaid deposit balance through ongoing chemical usage by the end of 2021.

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% of employees’ eligible pay to the Plan as safe harbor contributions. Commencing January 1, 2018, the Company began providing an additional matching contribution equivalent to 50% of the first 6% of employee contributions. Company contributions charged to benefits expense was \$186 and \$221 for the years ended December 31, 2019 and 2018, respectively.

Office Lease

Tinum’s ROU asset and lease liability are comprised of its lease for its corporate office space. The lease has an eight-year term that commenced in March 2014. The lease does not include renewal options that the Company expects to utilize. The Company has utilized its implicit borrowing rate of 5.75% to calculate the ROU asset and lease liabilities. Operating lease expense for each of the years ended December 31, 2019 and 2018 was \$201. Real estate taxes and common area maintenance charges are expensed as incurred as operating expenses and are not included in the lease payments.

As of December 31, 2019, future annual lease payments under lease agreements through December 31, 2022 are as follows:

2020	\$	226
2021		233
2022		240
Total lease payments		699
Less: interest expense		(59)
Present value of lease liabilities	\$	640

Prior to the adoption of ASC 842, as of December 31, 2018, future minimum lease payments under lease agreements through December 31, 2022 were as follows:

2019	\$	207
2020		214
2021		221
2022		229
Total	\$	<u>871</u>

NOTE 11 - CONCENTRATIONS

The Company’s operations are currently dependent upon TP Investors leasing or purchasing 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 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. During the year ended December 31, 2019, three TP Investor agreements were terminated, one due to the expiration of the PTC period of a specific REF Facility and the other two as a result of the Generator closing its coal-fired generating station.

Additionally, the production and sale of REF is dependent upon the plant operations of specific generating stations where the REF Facilities are located. Production at these locations could be impacted by the demand for electricity, the amount of fuel burned as compared to other electricity generation fuel sources utilized by the utility to produce electricity, disruptions due to foreseen or unforeseen plant outages, or changes in government regulations related to electricity generation or coal burning activities.

Certain of the chemicals utilized by the Company to produce REF 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 13, 2020, the date 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
L. Heath Sampson
Chief Executive Officer (Principal Executive Officer)

Date: March 16, 2020

By /s/ Greg P. Marken
Greg P. Marken
Chief Financial Officer (Principal Financial and Accounting Officer)

Date: March 16, 2020

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/ Carol Eicher
Carol Eicher, Director

Date: March 16, 2020

By /s/ Brian Leen
Brian Leen, Director

Date: March 16, 2020

By /s/ Gilbert Li
Gilbert Li, Director

Date: March 16, 2020

By /s/ R. Carter Pate
R. Carter Pate, Director

Date: March 16, 2020

By /s/ L. Heath Sampson
L. Heath Sampson, Director and Chief Executive Officer

Date: March 16, 2020

By /s/ J. Taylor Simonton
J. Taylor Simonton, Director

Date: March 16, 2020

By /s/ L. Spencer Wells
L. Spencer Wells, Director

Date: March 16, 2020